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Case No: HT-2016-000101

**IN THE HIGH COURT OF JUSTICE**  
**QUEEN'S BENCH DIVISION**  
**TECHNOLOGY AND CONSTRUCTION COURT**

Royal Courts of Justice  
Strand, London, WC2A 2LL

Date: 13/03/2019

Before :

**SIR ANTONY EDWARDS-STUART**

Between :

**HAMAD M. ALDREES & PARTNERS**

- and -

**ROTEX EUROPE LIMITED**  
**(COMPANY NUMBER 0437924)**

**Claimant**

**Defendant**

Mr Graham Chapman QC & Mr Tim Chelmick (instructed by Pinsent Masons LLP) for  
the Claimant

Mr Simon Hargreaves QC, Mr Piers Stansfield QC and Miss Jennie Wild, (instructed by  
DTM Legal LLP) for the Defendant

Hearing dates: 27<sup>th</sup>, 28<sup>th</sup> February, 1<sup>st</sup>, 5<sup>th</sup> – 8<sup>th</sup>, 12<sup>th</sup> – 14<sup>th</sup> March, 22<sup>nd</sup> June 2018 (and further  
submissions on 26<sup>th</sup>, 28<sup>th</sup> June 2018)

**Approved Judgment**

I direct that pursuant to CPR PD 39A para 6.1 no official shorthand note shall be taken of this  
Judgment and that copies of this version as handed down may be treated as authentic.

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SIR ANTONY EDWARDS-STUART

## **Sir Antony Edwards-Stuart :**

### Introduction

1. This is a case about machines for the screening and sorting of silica sand. The Claimant, Hamad M Aldrees & Partners (“Aldrees”), is a company registered in the Kingdom of Saudi Arabia which specialises, amongst other things, in the business of extracting, sorting and trading in silica sand. It sells the sorted sand to manufacturers, particularly those who manufacture float glass.
2. The dispute is about the performance of five<sup>1</sup> machines which Aldrees purchased from the Defendant (“Rotex”), which manufactures and supplies mineral separating machines for sorting raw materials, such as sand. Aldrees complains that right from the outset the machines were not capable of achieving the throughput stated in Rotex’s quotation, or anything like it. Apart from one minor point, Rotex disputes the claim in its entirety: put very simplistically, Rotex’s case is that the sand used by Aldrees as the feed material was very different from that which it had sent to Rotex for testing and that, in addition, Aldrees required the machines to produce a product to a specification which was tighter than that which it had given to Rotex.
3. However, Rotex accepts that the machines which it supplied did not accord with the description given in its quotation in that the meshes for the bottom screens were made of a thicker wire than that specified, with the result that the total aperture space of the mesh was much lower than it should have been. Unfortunately, this error was not discovered until about four years after Aldrees initially attempted to put the machines into production. However, even though the error was not discovered as soon as it should have been, Rotex says that it had no effect because, for different reasons, the relevant meshes were changed during commissioning and prior to commercial production.
4. Although the claim made by Aldrees is for nearly £40 million, it has been unable to access or produce its production records for the first year or so, with the result that conclusions about the actual performance of the machines during that period have to be based largely on inferences drawn from the contents of contemporaneous documents.
5. Although Aldrees has throughout presented this as a straightforward case, in my view it is nothing of the sort. Rotex’s opening submissions ran to about 200 pages and its closing submissions were even longer. The closing submissions by Aldrees ran to 115 pages, with a further 35 pages of Reply Closing Submissions. These were followed by further submissions of varying length from both sides. In order to deliver this judgment without undue delay and to keep it to a manageable length, I do not propose to deal with every point that has been raised but only those that I regard as necessary in order to decide the case. For the same reason, I have also not addressed every issue set out in the list of agreed issues.

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<sup>1</sup> In fact, one machine was purchased for the purpose of processing limestone, not silica sand, but was subsequently converted during 2013/2014 for use with sand. It was therefore in a different category from the others.

6. At the trial Aldrees was represented by Mr Graham Chapman QC and Mr Tim Chelmick, instructed by Pinsent Masons LLP, and Rotex was represented by Mr Simon Hargreaves QC and Miss Jennie Wild, instructed by DTM Legal LLP. But unfortunately, after the submission of written Closing Submissions, Mr Hargreaves was unable to represent Rotex any longer owing to illness. Fortunately, Mr Piers Stansfield QC was able to take his place and made the oral closing submissions on behalf of Rotex. This inevitably resulted in some delay with the result that the oral closing submissions did not take place until 22 June 2018, over three months after the conclusion of the evidence. The court is very grateful to all counsel and solicitors for their assistance, but particularly to Mr Stansfield for mastering an exceptionally complicated brief in a very short time.

### **An outline of the case**

7. Before I go into the details, it may be convenient to start with a brief outline of the dispute.
8. In early 2010 Aldrees was making enquiries about the purchase of new machines for sorting sand which it extracted from its open cast mine in the desert. The machines were required to produce silica sand with a particle size of between 100 µm and 500 µm, containing no more than 2% of product outside that specification. In addition, Aldrees wanted these machines to handle a throughput of 50 tph (tonnes per hour), or alternatively 66 tph: there is a dispute about the promised feed rate.
9. Aldrees was put in touch with Rotex to whom in due course it sent a sample of the sand which formed its feedstock for Rotex to analyse. The person who carried out the analysis at Rotex was Mr Neil Smith. Mr Smith prepared an initial quotation for three machines, which was sent to Aldrees on 22 April 2010.
10. Further discussions followed, during which the number of machines increased to five, although one was intended to process limestone, and finally agreement was reached. There is an important issue about when the contract was concluded and, therefore, whether or not it incorporated Rotex's general Terms and Conditions.
11. The machines were delivered the following year, but Aldrees was not in a position to install them until about September 2012. Mr Smith visited Aldrees in June 2013 with a view to commissioning the machines, but there is some uncertainty about what was achieved during this visit. At any rate, thereafter Aldrees attempted to put the machines into production, but without success.
12. Mr Smith paid another visit to Aldrees in December 2013 and, by the end of February 2014, Aldrees had put two of the machines into commercial production following various modifications that had been recommended by Rotex during the previous few weeks or so, including changing the bottom meshes.
13. There is a crucial issue about the output of these machines during the course of the next nine months. This is because Aldrees has been unable to produce any production records for that period (to which it says it does not have access), and so the only contemporaneous written evidence about the performance of the machines consists of notes in the minutes of the weekly meetings of Aldrees' directors, together with two e-mails in which its production manager, Mr Mustafa Turk, recorded that the

machines were capable of producing 30-40 tph. An output of 40 tph equates to a feed rate of about 50 tph, which is the throughput which, according to Rotex, it told Aldrees that each machine could achieve. A letter to Rotex written by locally instructed lawyers in December 2014 complained about the supply and quality of meshes, but said nothing about any underperformance of the machines.

14. It is Aldrees' case that during this period the machines did not achieve a throughput of 50 tph, or anything like it, and that they never achieved a throughput of more than about 20-25 tph at any time subsequently. It therefore claims damages for misrepresentation and breach of contract. The claim is for loss of profit over the ten year life of the machines in a sum approaching £40 million.
15. In July and August 2017 experts from each party visited the Aldrees site. Aldrees' expert, Professor Lieberwirth, carried out tests on the machines. Before his visit arrangements had been made for screen meshes to be sent to Aldrees corresponding to the configuration set out in Rotex's quotation, so that one machine could be tested in a state that was as near as possible to that in which it had been delivered.
16. However, as Professor Lieberwirth discovered following his visit, both the bottom screen meshes with which the machines had been originally fitted and those meshes sent to Aldrees for his tests, were not the meshes described in the quotation. The bottom meshes actually supplied were made of much thicker wire, which significantly reduced the overall area of the apertures. An unfortunate consequence of this was that Professor Lieberwirth's tests were devised and conducted in the erroneous belief that he was testing the relevant machine with the mesh configuration described in Rotex's quotation.
17. Rotex's expert, Mr Olmen, did not carry out any tests on the machines on site, although he analysed the feed and the product that they were producing, but instead arranged for further tests to be carried out in Rotex's laboratory using "replicated" sand; that is to say, sand taken from stock and sized to correspond with the feedstock used by Aldrees.
18. It was not until a few months before the trial that Rotex accepted that the wrong bottom meshes had been supplied in the first place, but it asserts that this made little difference because different bottom meshes were fitted in January/February 2014, prior to the start of commercial production with the first two machines.

### **The principal witnesses**

#### *Mr Fahad Aldrees*

19. Mr Fahad Aldrees is the Chief Executive Officer of the family business set up by his father. He was appointed CEO in April 2009. Mr Aldrees is obviously an intelligent man; he gave his evidence in English, in which he is fluent - although once or twice, quite understandably, he struggled to find the words which precisely conveyed what he wished to say.
20. Mr Aldrees was asked about a number of contemporaneous documents about which he was, in general, fairly unforthcoming. He would sometimes reply that he did not concern himself with the detail of e-mails which were copied to him and that he was

not really in a position to comment on them. In addition, he was reluctant to be drawn into any technical matters about the operation of the plant: see, for example, his responses to questions about the main conveyor on Day 1/176.

21. Mr Aldrees was asked about two of the weekly Meetings of Directors which were held on 8 and 15 May 2014. Each of the minutes referred to four of the machines (Nos 2-5) as “*functioning great*”, and, with reference to the minutes of the former meeting, Mr Aldrees was asked what was meant by this. His immediate response was to ask whether he had attended the meeting, which in fact he had not, and then to ask whether or not there were available the original minutes, which had been taken in Arabic, so that he could see the word that had been translated into English as “great”. He said that it could have been one of three words or expressions: “*jayid*”, meaning good, “*jayid jiddaan*”, meaning very good or “*mumtaz*”, meaning excellent. He then said that he believed that the original minutes must have used the word “*jayid*”, which had been translated into English as “great”.
22. In fact, when Mr Aldrees was shown the original versions of the two sets of minutes in Arabic he said that the word was “*mumtaz*”, which had been translated as “great”. When I suggested to Mr Aldrees that the minutes appeared to show that the machines were functioning well, he demurred. He said that there were two sides of the problem: one was the problem of vibration of the structures and the other was the level of production. He then said, at Day 2/60-61:

“I would only assume we are talking about the vibration and the structure because if we are talking about production, well, it shows from what we produced and also it will show that if it is great, why are we here?”

23. I do not accept this evidence: quite apart from anything else, the only machine which had a recorded vibration problem was machine No 1 (which was originally designated as the machine to process limestone) and this machine was not mentioned in the minutes as one of the machines that was functioning well: in fact, it was not brought into operation until several months later, a matter which I discuss later in this judgment. Further, it is a matter of record that, between February 2014 and April 2015 Aldrees made no complaints to Rotex about poor production levels at a time when, as is alleged in the present claim, it was losing nearly £1 million by way of profits every quarter. By contrast, there was fairly acrimonious correspondence in which Aldrees regularly complained about delays in the delivery of meshes by Rotex. This eventually resulted in a letter to Rotex from local lawyers complaining about the failures by Rotex to fulfil orders for spare parts promptly. It contained this passage:

“...my client contacted your agent but [s]he faced many technical and legal troubles such as: delay in provision and supplement of spare parts for 42 days which caused dropout in my client production line which resulted in financial losses amounted to million \$2,560,000; your agent has sent to my client 30 nets and after operating [s]he found them of poor type in violation of specifications stated in the contract as they don’t last more than 10 days while they (sic) life span exceed one month, noting that they didn’t send a technician as previously made.”

24. This letter is stating very clearly that the cause of the loss of production referred to in the letter were matters such as the delay in the provision of spare parts, and not any failure of the machines to achieve a promised level of throughput. I regard it as most unlikely that Mr Aldrees did not have significant input into the contents of this letter.
25. I consider that, perhaps understandably, the evidence given by Mr Aldrees was to a substantial extent tainted by the exigencies of the litigation and his belief that his company's investment in the Rotex machines has been a bad one. I therefore feel obliged to treat it with a degree of caution.

*Mr Mustafa Turk*

26. Mr Turk is the Production Manager for Aldrees, a post which he has held since 2014, having joined Aldrees in October 2012 as Project Engineer. He was not involved in the purchase of the machines but was involved in their commissioning in 2013.
27. I thought that in general Mr Turk was a careful, candid and entirely straightforward witness. He made no attempt to exaggerate the problems that Aldrees had had with the machines or to downplay matters such as the variability of the feedstock or its consequences.
28. In the course of cross examination he was asked some questions about facilities for inspecting the machines. For example, he was shown a photograph of Mr Neil Smith, I think, standing on what seemed to be an empty drum as a temporary platform in order to gain access to the pulleys. There was a further photograph of Mr Smith standing on the steel deck at high level by the top of one of the machines. Mr Turk was being asked, in somewhat critical terms, what facilities there were for access to the plant.
29. Mr Turk explained, quite logically, that any form of fixed access to the pulleys could be a hazard when the machines were in operation and that access to the deck at high-level could either be by means of a ladder or by climbing up the steel frame. A subsequent photograph showed a fixed steel ladder which looked as if it might give access to the structure at high level and so I asked Mr Turk whether Mr Smith could have used that ladder to gain access to the deck. Mr Turk explained that it would not have been a suitable means of access. I mention this because, in circumstances where Aldrees was effectively being criticised for the lack of suitable means of access to its plant, a less candid witness might have said, in the expectation that he would not be challenged, that the fixed ladder shown in the photograph would have been a suitable means of access to the deck, but Mr Turk made no attempt to do this.
30. In spite of the unfortunate difficulties with the video conferencing system during the course of his evidence, I was very impressed by the manner in which Mr Turk gave his evidence and for the most part, particularly where I specifically mention otherwise, I accept it. However, there is one aspect of his evidence that is not consistent with the contents of the contemporaneous documents, namely his description of the functioning of the Rotex machines during (and after) 2014, and on that aspect I consider that his evidence must be treated with caution.

*Mr Bassem Michel*

31. Mr Michel was the Finance Manager for Aldrees until December 2015, when he moved to the United States. However, since July 2017 he has been working for Aldrees remotely from the US on a consultancy basis.
32. Although aspects of Mr Michel's evidence were probed in some detail during cross examination, there was no challenge to his integrity or honesty.

*Mr Robert Dieckman*

33. Mr Dieckman is the President of Rotex Global LLC ("Rotex Global"), Rotex's US parent. He began his career as an accountant with Arthur Andersen and joined Rotex Global in December 2007 as chief financial officer. He became President in 2014.
34. Mr Dieckman gave general evidence about the sales history of the MM 3180-3 mineral separators, about which he said the company had never received any complaints. A substantial part of his evidence was devoted to the importance that Rotex Global placed on its terms and conditions, which I regard in part as inadmissible because it was evidence of Rotex's internal commercial attitudes and intentions (in particular paragraphs 26 and 27). I thought that Mr Dieckman was an honest and straightforward witness.

*Mr Robert Scheper*

35. Mr Scheper is the Vice President, Global Machine Sales and Marketing at Rotex Global. He is an engineer by background and has been with Rotex Global since 1998. Initially he was an application engineer, but in 2004 he became a regional sales manager since when he has remained in the sales and product development side of the business.
36. Mr Scheper gave detailed evidence about the working of the Rotex machines and their particular features. In particular, he gave a very detailed description (in paragraph 30 of his witness statement) of how testing of samples was carried out in the Rotex laboratory.
37. I consider that a large part of Mr Scheper's written evidence - paragraphs 41 to 73 - was inadmissible: it dealt with complaints from customers and his analysis of Rotex's proposal to the Claimant. The former was inadmissible because it is irrelevant and the latter was in my view evidence of opinion (for which permission had not been given): see his conclusion at paragraph 72, where he said that he was satisfied that the proposal put forward by Rotex was suitable for Aldrees' requirements.
38. Mr Scheper also gave a detailed analysis of the various sand samples that were taken in this case, which for the most part I think can properly be regarded as evidence of fact, although there was a point at which it drifted into expert evidence. At paragraph 93 of his witness statement he gave evidence about the theory of mass balance, which included what to my mind was a completely unintelligible example of a mass balance calculation performed on a sample run in the Rotex laboratory. The sample had nothing whatever to do with the facts of this case and, leaving aside the paucity of explanation for the details illustrated, I regard this as expert evidence and I propose to

disregard it. However, other evidence that he gave about mass balance calculations I regard as admissible.

39. But, matters of admissibility apart, Mr Scheper was obviously a very knowledgeable witness who knew exactly what he was talking about and I shall have to discuss his evidence in more detail later in this judgment.

*Mr Richard Paulsen*

40. Mr Paulsen was the Vice President of Rotex Global until 1 March 2013, having joined Rotex Global in 1991 as an application engineer. He spent most of his career in Sales Management. He was involved with the initial discussions with Aldrees in 2010.
41. Although Mr Paulsen was a fairly robust witness he was prepared to make concessions during the course of his evidence. In his witness statement he said that it was following his return from the Powtech exhibition that he told Mr Smith that Mr Aldrees had decided to purchase four machines, rather than three. However, during cross examination he was prepared to accept that any discussion about moving from three machines to four must have happened after the Powtech exhibition (Day 6/151-152).
42. What emerged from Mr Paulsen's evidence, and I do not think that he suggested anything to the contrary in his witness statement, was that he had very little recollection of the discussion with Mr Aldrees at the Powtech exhibition and that his evidence about that conversation was based largely on what he thinks he would have done.

*Mr Donald Anschutz*

43. Mr Anschutz is the President and Chief Executive Officer of PropTester Inc, an independent laboratory which provides customers with information about the physical and/or performance characteristics of various materials, including sand. As Mr Anschutz described it, PropTester's services are utilised across the entire supply chain from testing sand deposits for new mine development to verifying product quality to the end user.
44. It will be apparent from this brief description that Mr Anschutz is an expert in the field of testing and analysing sand. However, he was not called as an expert but as a witness of fact. He assisted Mr Olmen, Rotex's expert, in the collection of samples from the Aldrees site between 17 and 19 July 2017. In my view, there were parts of Mr Anschutz's witness statement which were in truth expert evidence and, unsurprisingly, some of the evidence he gave in cross examination was, properly considered, also expert evidence. However, I do not consider that Mr Chelmick, who cross-examined Mr Anschutz, had a great deal of choice about entering this territory.
45. Although Mr Chelmick asked Mr Anschutz about paragraphs 21 and 22 of his witness statement, which contained observations on his site visit and were expressed to be matters of opinion, I did not interrupt the cross examination, although I consider now - as I suspected at the time - that both his original evidence in those paragraphs and the answers he gave in cross examination were, properly considered, matters of expert evidence.



46. I thought that Mr Anschutz gave his evidence in a straightforward manner. The aspect of his evidence that was most contentious was his choice of sampling point for the feed. Mr Anschutz took his samples from the feed conveyor which fed the sand into the hopper, which in turn directed the sand into one of five feeders for the Rotex machines. I shall discuss this in more detail later in this judgment. The other significant fact to emerge from Mr Anschutz's cross examination was that he did not know at the time of his visit that the meshes were different on machine 2 (or 4 using Professor Lieberwirth's notation) from those on the other Rotex machines.

*Mr Neil Smith*

47. Mr Smith is a Senior Application Engineer with Rotex, which he joined in 2005. He spent much of his early years with the company working and training in the laboratory, during which time he learned how to conduct the testing required to size machines to a customer's requirements.
48. Mr Smith played a central role in the sale of the machines to Aldrees and some aspects of his evidence were strongly challenged. He was the person at Rotex who had the most extensive day to day dealings with Mr Turk, with whom he obviously developed a good working relationship. It was clear that Mr Smith's recollection of certain events was poor, if not non-existent, and I think that the exigencies of this litigation have unwittingly coloured some of his evidence.
49. However, I did not think that Mr Smith was in any way a dishonest witness: on the contrary, the fact that he did not disguise the fact that he blamed himself for the failure to discover that the wrong mesh had been supplied for the lower decks of the machines was, I thought, to his credit.
50. It is and was Rotex's case that during the summer of 2013 Aldrees started up the machines for commercial production without any reference to Rotex or request for assistance (which Rotex would normally expect to have provided). However, it was a notable feature of Mr Smith's evidence that in his long and detailed first witness statement he made no mention of having visited the Aldrees site between 4 and 6 June 2013, which he clearly did.
51. This emerged because shortly before the trial Mr Turk discovered a photograph of himself and Mr Smith standing in the office at the Aldrees site, with Mr Turk holding a sample bag of sand. He uploaded this photograph to his Facebook site on 6 June 2013, with a caption, in Arabic, which translates as "*The first production of our plant*". This led to further disclosure from Rotex which showed that Mr Smith had been in Riyadh from 2 to 6 June 2013. It seems that he had a prearranged visit to Oman scheduled for 7 to 10 June 2013 and that this trip was extended so as to permit Mr Smith to visit the Aldrees site just before going on to Oman. In his witness statement Mr Turk said that "*Wet commissioning took place between 3 and 7 June 2013*" (paragraph 15), and he said that this was done by Mr Smith and XOL (who acted as Rotex's agents in the Middle East).
52. In an e-mail dated 23 May 2013 from Mr Smith to Mr Hage, of XOL, Mr Smith wrote:

“The work scope will be to spend 3 days maximum on the plant to start up, make sure they get the required product quality, achieve the rate, define the spare mesh specs and get them to sign off on the remaining 10% they owe.”

53. In a spreadsheet kept by Rotex which was known as the “Issues open and warranties provision” document, sometimes referred to as the “war room document”, there was an updated entry for 27 June 2013 recording that the first machine at Aldrees had been “*started up running satisfactorily product well within spec*”. It was Mr Anderton’s evidence that this information would have been reported to him by Mr Smith and that he would have passed it on to the authors of the document (Day 7/176-177).
54. It is a matter of record that by mid-August 2013 Aldrees was running four of the machines, but in an e-mail to Mr Smith of 14 August Mr Turk said “*and also what about full commissioning we are ready for the tests as we have sands in the silos now*”. However, as Mr Turk pointed out in that e-mail, at this stage the product contained about 3.5% of fines, which was well over the acceptable limit. Having accepted, as he had to, that he had visited the Aldrees between 2 and 6 June 2013, Mr Smith said in evidence that, judging by the questions that he asked in subsequent e-mails, he could not have carried out a full wet commissioning during that period because otherwise he would have known the answers to those questions (see Day 7/49).
55. From these documents and the evidence, taken as a whole, I find that some sort of testing and part commissioning must have taken place during Mr Smith’s visit to the site in June 2013 - I suspect very much as described in Mr Smith’s e-mail of 23 May 2013, but there appears to have been a problem in respect of the supply of sand for the silos, which may have been what prevented the completion of a proper full commissioning. That may explain why Rotex did not press immediately for payment of the 10% of the price that was due on acceptance and testing of the machines.
56. My conclusion in relation to Mr Smith, therefore, is that he was an honest witness, if sometimes unreliable. However, as is so often the case in these disputes, on occasions he was being expected to give detailed accounts of events that occurred between five and eight years ago. Over that period of time anyone’s recollection is likely to be less than wholly reliable. Accordingly, in relation to any particular event Mr Smith’s evidence needs to be considered in the light of the contemporaneous documents and the inherent likelihood (or otherwise) of the events occurring as he described.

*Mr Steve Paxton*

57. Mr Paxton is a process consultant to the Sales Department of Rotex Global. He joined the company in 1974 and held various positions in its sales and marketing departments until he retired as Global Market Manager in 2001. Soon afterwards he became a consultant.
58. As his career indicates, he is a man of great experience in the industry and he was involved in discussing the inquiry by Aldrees. His evidence was largely uncontentious.

*Mr Scott Haley*

59. Mr Hayley is the Director of Global Market Development at Rotex Global, which he joined in August 1996 as an Application Engineer in the Sales and Marketing Department. He then became Regional Sales Manager and, subsequently, Market Development Manager.
60. Mr Haley was briefly involved in the response to the original inquiry by Aldrees, when he had a brief e-mail exchange with Mr Steve Paxton and Mr Neil Smith. He was an assured and straightforward witness and, unsurprisingly, very little of his evidence was contentious.

*Mr Martin Anderton*

61. Mr Anderson joined Rotex in 2011 as a sales director with responsibility for western Europe, Middle East and North Africa. Since he joined the company he has been Mr Smith's line manager.
62. I thought that Mr Anderson was an honest, straightforward and careful witness. When a problem arose in 2014 about the provision of spare parts to Aldrees, it was Mr Anderton who was primarily responsible for dealing with it. It seemed to me that his approach to such problems was one of constructive cooperation rather than the use of commercial pressure. He said that his approach was directed by a belief that often more goodwill could be achieved by a constructive approach to and solution of a problem encountered by a customer than by selling that customer a satisfactory product in the first place.
63. He said that he was not aware of any complaint by Aldrees about poor production during the 12 months after February 2014, although there were many issues about the supply of spare parts. Mr Anderton said that the first complaint about the productivity of the machines was made by Mr Fahad Aldrees at a meeting on 22 April 2015. I accept this evidence, which is entirely consistent with the contemporaneous documents.
64. However, Mr Anderton's evidence also suffered from the failure to make any reference to Mr Smith's visit to Aldrees in June 2013. But he was not asked about this in cross examination and so I do not feel able to draw any inferences from his failure to mention it in his witness statement.

*Mr Frank Renn*

65. Mr Renn is a Laboratory Supervisor at Rotex Global, where he has been a sales laboratory technician since 2007. He has vast experience of testing samples of sand. He was involved in testing a sample of sand that was sent by Aldrees to Rotex Global in April 2015.
66. Mr Renn carried out a test at 50 tph with what he described as "surprisingly good results". The only adverse finding that he noted was some blinding on the middle deck, which he (wrongly) assumed to have been the deck on which blinding had been experienced by Aldrees. In relation to that, he said in cross examination (at Day 8/20):

“The other thing on the loading seems high on the middle deck and the blinding on the middle deck, the middle deck isn’t doing anything but unloading. It is very academic at this point. If the loading was high on the top deck, I would be much more concerned. If the loading was high on the bottom deck, I would be much more concerned.”

67. Mr Renn’s conclusion was that “*the 0% > 35 mesh spec is killing their yield*”. What he meant by this was that a requirement that the product should contain no particles greater than 500 µm severely limited the throughput of the machines.
68. Mr Renn was obviously a highly knowledgeable technician and, unsurprisingly, his evidence was not seriously challenged, although Aldrees does challenge Rotex’s view of the conclusions that should be drawn from Mr Renn’s tests.

*Professor Holger Lieberwirth*

69. Professor Lieberwirth is the Managing Director (an academic position) of the Institute of Mineral Processing Machines (“IAM”), an organisation associated with the Technische Universität of Freiberg. The IAM is a research institute concerned with the development of machines and processes for the raw materials industry.
70. In his 30 year professional career Professor Lieberwirth has toured mines and manufacturing plants throughout the world, many of which have dealt with sand processing. He started his professional career as a design and project engineer with a mining machine manufacturer and remained in the industry until he joined IAM in 2013. Professor Lieberwirth’s duties involve both teaching and providing research for the industry. He produced his report in English which he spoke fluently. He was plainly an extremely knowledgeable witness and I thought that he gave his evidence with authority and candour.
71. The cross-examination of Professor Lieberwirth began on a very unsatisfactory note. He was questioned at some length about the association of both IAM and himself with a company called Haver. In short, it was suggested to Professor Lieberwirth that Haver had a particularly close association with IAM - and indeed that Haver had moved premises in order to be closer to the institute - and that IAM and Haver collaborated in the development of intellectual property which they may or may not be able to patent, that Professor Lieberwirth had on several recent occasions appeared on a platform or delegation with employees of Haver, that Haver had recommended Professor Lieberwirth as an expert in this case, that the CEO of Haver was the current president of an organisation called Friends of the Institute of Minerals Processing Machines, which been founded in 2006, and, finally, that Haver had entered into an arrangement with Aldrees under the terms of which a large contract would be placed with Haver if Aldrees recovered substantial damages in this litigation.
72. Professor Lieberwirth dealt with these questions with precision and dignity. He explained that the move of Haver to Freiberg had nothing to do with any collaboration with IAM, but because its office in Meissen and was an old family owned building and that all its employees lived in Freiburg. He said that IAM had not patented anything with Haver and that in fact IAM had collaborated much more closely with several other companies, of which he named three. Professor Lieberwirth said that he

frequently appeared on platforms with employees of companies in the industry and that IAM was affiliated to about 60 or 70% of the manufacturers in the field of mineral processing. He agreed that the CEO of Haver was the current head of the Friends of the Institute, which was an organisation the membership of which included about 20 companies and was concerned to raise money for the education and support of students.

73. Professor Lieberwirth gave the name of the person who had recommended him to Aldrees as an expert, a Mr Paritzke from a company called BHS. He said that he was not aware of the contract between Haver and Aldrees and that he had no detailed knowledge of the business affairs of Haver.
74. Whilst any party is perfectly entitled to question the independence and impartiality of another party's expert, it seemed to me that this line of cross examination was based on little more than innuendo. For instance, there was no evidence whatever to contradict Professor Lieberwirth's denial of any knowledge of any potential contract between Aldrees and Haver, and I consider that it was wrong for Professor Lieberwirth to be pressed about whether or not he was sure that he had not been recommended to Aldrees by Haver when he had already given the name and company of the person who had recommended him. There was no evidence of any relationship between Haver and IAM that was any different to the relationship that IAM had with several other companies in the industry.
75. If questions of this sort are to be asked of an expert, they should be raised in correspondence prior to the expert giving evidence so that he and those instructing him have a proper opportunity to deal with them and, if appropriate, obtain appropriate evidence. Such questions should not be bounced on the expert in cross examination and his answers then dismissed, in effect, by a submission along the lines of "*well, he would say that wouldn't he?*" I wish to make it absolutely clear that I can see no foundation whatever in the suggestion that there might have been some form of improper connection between Professor Lieberwirth, Haver and Aldrees, let alone one that had led him to be appointed as an expert in this case. I sincerely hope the no expert who gives evidence in this court will be treated in a similar manner in future.
76. As an expert, I thought that Professor Lieberwirth gave his evidence in a clear and straightforward manner and on the whole I accept his evidence save where I make a finding to the contrary.

*Mr Douglas Olmen*

77. Mr Olmen was Rotex's engineering expert. He has worked in the industry for 50 years, during which he has designed and built industrial sand processing plants of various types. Since 1996 he has been the President of his own company and he is a member of a number of industrial and professional organisations associating with the processing of sand and gravel.
78. Mr Olmen was clearly a man of enormous experience in the field and I thought that he was a straightforward witness who gave his evidence fairly and impartially. Where he and Professor Lieberwirth disagreed on a particular issue I shall have to decide whose evidence I prefer on an issue by issue basis: this is not a case where I find that the evidence of one expert is generally to be preferred to that of the other.

79. Mr Olmen carried out no tests on the Rotex machines themselves (as opposed to analysing the feed and the product that they were producing); his tests were carried out on a laboratory machine with what is known as “replicated sand” – which is a sand sample made from material in stock to represent sand of a particular PSD. In these circumstances I shall have to consider what weight is to be attached to his tests.

*Mr James Gilbey, FCA*

80. Mr Gilbey is a partner in Mazars. He qualified as a Chartered Accountant in 2003, and his specialist area is forensic accounting. I thought that he was a straightforward and honest witness. For reasons which will become clear in this judgment, little turns on the views of the expert accountants.

*Mr David Houghton, ACA*

81. Mr Houghton is the senior partner of DSW Bridge Houghton. He qualified as a Chartered Accountant in 1991, and his specialist area is in litigation support and valuation. He, too, appeared to be a reasonable witness, but for the reason that I have just given in relation to Mr Gilbey I need say little more about his evidence.

### **The machines**

82. Each machine consists of six sets of three vibrating screens. The top screen (or deck) is the coarsest. Its purpose is to allow particles that are within the specified maximum size to pass through it onto the middle screen, leaving those which do not do so to be discharged as “oversize”. The middle screen is known as a relieving screen, and its purpose is to limit the quantity of the product that arrives on the bottom screen. The purpose of the bottom screen is to allow particles below the specified minimum size (“fines”) to pass through it and be ejected.
83. Each screen consists of a rectangular metal frame with a broad mesh grille underneath it. The screen is divided into (in this case) 28 boxes. Each box typically had two triangular bars or “rumble strips” running across the bottom of the screen (ie. at right angle to the direction of travel of the particles). Across the top of the screen is laid the mesh which is clipped into place. The mesh may be made either of steel wire or some form of polypropylene: the disadvantage of the latter is that it wears out more quickly. There is sophisticated mechanism for vibrating the screens in various different modes.
84. In each box are placed one or more balls – in this case up to five, usually made of polyurethane, whose function is to bounce around striking the screen so as to dislodge any particles of sand that have become stuck in an aperture of the screen. This bouncing effect is accentuated by the presence of the rumble strips. When particles of sand stick to the mesh and block the apertures it is known as “blinding” and is, of course, a serious problem when it occurs because it prevents the particles from falling through the mesh as designed. If the bottom mesh becomes heavily blinded, nearly all the particles will be discharged as product, including the fines. By contrast, if the top mesh becomes heavily blinded, nearly all the particles will be discharged as oversize and few will go into the product. The former proved to be a serious problem when these machines were first put into service, and the latter occurred from time to time (in particular, in early 2015).

85. The screens are installed in a large container, rather like the shelves in a refrigerator. Each screen is at an angle so that the material that arrives at the feed end will move along it under gravity. Thus, if small enough, particles will fall through the mesh, either almost immediately at the feed end or during the course of their passage along the screen. The screen is agitated during the process, encouraging the particles to move along the screen until they fall through it (if small enough) and causing the balls underneath the screen to bounce around in the way that I have described - thus dislodging particles that become stuck on the apertures. However, as I shall explain later the bouncing of the balls can have the effect of preventing particles which come into contact with them from falling through the mesh – I suspect that that this may be why some of the boxes at the discharge end of the screen have only one rumble strip.
86. Three streams of material are discharged from the machines: the “oversize”, which does not pass through the top screen, the “fines” which fall through the bottom screen and the rest, which is the product. The ratio of the product discharged to the product content of the feedstock represents the efficiency of the machine. In this case, Rotex claimed that the machines were about 94% efficient. Taking the Lab Report 2269A as an example, in a typical 200 tonnes of feedstock, there were 172.6 tonnes of available product (according to Rotex’s analysis) of which 163 tonnes were recovered in the test - if the test machine had been 100% efficient, then all 172.6 tonnes of available product would have been recovered: in fact, 94.4% of it was recovered, representing the efficiency of the machine.
87. The efficiency of the machine can be adversely affected if the feedstock contains a high proportion of particles which are close to the upper limit (or “cut”) of the required particle size. This is known as a “nearsized” problem. Where this occurs some particles simply bounce over other particles and do not have the opportunity to pass through an aperture in the mesh, and other particles become stuck in the apertures, thereby blocking access by other particles. This happens because the particles are not spherical, but come in various irregular shapes which can cause them to become stuck in an aperture if unfavourably orientated: one of the purposes of the balls in the boxes below is to dislodge such particles so that they fall through. Conversely, some particles which have a dimension larger than the cut point can fall through the top mesh if they are, say, cylindrical in shape and happen to fall a particular way. A specification may well limit the proportion of oversize particles that are permitted in the product. Another problem, that I have already mentioned, is that of the balls effectively “bouncing” particles within the product range off the screen so that they are discharged with the oversize fraction.
88. Similarly, the ability of the machines to operate as intended is also affected when there are a high proportion of particles which are close in size to the aperture of the bottom mesh. This results in particles blocking the apertures in the mesh, in other words blinding, which prevents the fines from falling through the mesh and instead becoming included within the product stream. Even in a machine that is operating well, a typical analysis of the product recovered will include a small proportion of fines. The customer’s specification will usually prescribe a limit to the proportion of fines in the product, such as, say, 1% or 2%. Alternatively, as in this case, Aldrees required the total amount of oversize and fines in the product to be less than 2%.

## The events leading up to the final order

89. Whilst neither party contends that there was no concluded contract, there is a dispute as to when the contract came into existence and, in consequence, whether or not Rotex's Terms and Conditions were incorporated.
90. On 20 March 2010 Mr Aldrees e-mailed the Saudi Arabian Development Co Ltd ("SADCO"), which was Rotex's representative in Saudi Arabia, to enquire about a new production line for the grading of silica sand "*with production of 200 t/h*"<sup>2</sup>. Included with the inquiry was a particle size distribution of the sand to be processed, noting that its moisture content was 1%. The product was to have a minimum particle size of 106 µm and a maximum particle size of 850 µm (A), 600 µm (B) or 500 µm (C).
91. The inquiry was forwarded to Mr Smith of Rotex, who replied on 29 March 2010 saying that 1% moisture content was high for fine sand separations and that the end user should be asked if the moisture content could be reduced to 0.3% maximum, in which case Rotex could offer a solution.
92. Mr Aldrees replied to say that the moisture content of the sand taken from its mine was less than 0.3%. Over the next day or two there were further communications between Mr Smith and Mr Aldrees in which further technical information was exchanged, during which Mr Smith noted that the "*allowable oversize & fines is 2%*": by this he meant that 98% of the finished product had to be within the specified particle size range. Mr Smith also said this:

"Please confirm that I should base the preliminary sizing on product C, 106 to 500 micron duty. If you are only producing this fraction, say, 10% of the time it may be worth basing the sizing on your most frequently required product and accepting a slightly lower rate for 10% of the time."

I consider that this would have put Mr Aldrees on notice (if he did not know it already) of the fact that changing the particle size specification for the product might affect the rate of throughput.

93. In an e-mail sent to Mr Aldrees on 30 March 2010, Mr Smith said:

"I have also noticed that you are currently using inclined vibratory technology. For your information we would expect to offer a greater product yield for the equivalent area with a sharper separation as we would be able to fit meshes closer to your required cut point. For my information, could you please provide an overview of your current set up and yields. I would like to test your sand in our factory to demonstrate the efficiencies we could provide while at the same time confirm machine sizing and model selection. We would need about 50kg of your feedstock to do this.

Following receipt of this information I will work on a provisional offer."

This made it clear to Mr Aldrees that the selection of the machines would be based on tests carried out by Rotex on the sample provided by Aldrees. Indeed, it is accepted

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<sup>2</sup> Tonnes per hour – more commonly, tph or TPH, but sometimes mtph.



that Mr Aldrees himself knew that the sizing of the machines was based on the sample supplied by Aldrees and that the moisture content of the feedstock was important.

94. Based on the particle size distribution (“PSD”) given to him by Mr Aldrees, Mr Smith carried out some initial calculations. However, these calculations were, perhaps somewhat surprisingly, in part based on data for sugar, rather than for sand, with a PSD similar to the figures provided by Aldrees. Initially, Mr Smith estimated a feed rate of 3.27 tph, but he subsequently increased it to 4 tph. A note in his calculation said:

“As a test will be conducted and to size aggressively a rate of 4 TPH/m<sup>2</sup> will be used”

He agreed in evidence that he was sizing “*aggressively*”, by which he meant trying to propose the smallest number of machines at the lowest cost (Day 5/144).

95. The result of his calculations was that Mr Smith concluded that a lower deck screen area of 49.95 m<sup>2</sup> would be required for specification (A) and 44.2 m<sup>2</sup> for specification (C). The solution that he proposed was to have two Rotex 4240-2<sup>3</sup> machines, each of which had a screen area of 22.3 m<sup>2</sup>. This produced a total screen area of 44.6 m<sup>2</sup>, rather less than the 49.95 m<sup>2</sup> that Mr Smith’s calculations indicated were required for specification (A). By an e-mail to Mr Steve Paxton dated 31 March 2010 Mr Smith sent him his calculations and asked whether he thought that his conclusion was too aggressive, taking into account the deck loading and mesh life. He then said:

“I have discussed this with Mike [Birt] and he thinks 3 x 4240-2 would be a better option from a mesh life point of view but we concluded that our combined experience with the minerals separator and deck loading benefits was not sufficient to make a final decision at this time.”

96. Mr Paxton then discussed the question with Mr Haley, who thought that a feed rate of 200 tph could be handled with four MM 3180-3 machines<sup>4</sup> at 50 tph each but, having regard to the costs of installation and operation, three MM 5300-2 machines would be the most economical solution for the client.

#### *Lab report 2269*

97. On 20 April 2010 Mr Smith tested a sand sample that had been sent by Aldrees. He first determined its PSD, which he found to differ from the PSD figures previously provided by Aldrees with its initial inquiry. The differences between the two samples are as set out in the table below (taken from Aldrees’ Closing Submissions):

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<sup>3</sup> The suffix "2" indicates that the machine would have two decks.

<sup>4</sup> These were the machines ultimately supplied.

	Aldrees example PSD	April 2010 test <sup>5</sup>	Difference in percentage retained	Percentage change from original
Aperture	% retained			
850	2.1	1.8	0.3	-14%
600	5.1	3.5	1.6	-31%
<b>500</b>	<b>4.5</b>	<b>3.7</b>	<b>0.8</b>	<b>-18%</b>
<b>355</b>	<b>28.8</b>	<b>13.7</b>	<b>15.1</b>	<b>-52%</b>
250	31.6	26	5.6	-18%
180	16.1	25.5	-9.4	58%
125	8.9	17.5	-8.6	97%
106	2.2	3.1	-0.9	41%
<b>90</b>	<b>0.5</b>	<b>2.1</b>	<b>-1.6</b>	<b>320%</b>
<b>pan</b>	<b>0.3</b>	<b>3.1</b>	<b>-2.8</b>	<b>933%</b>

98. Of particular interest are the figures for the nearsize to the cut point, namely the proportion in the example PSD of 28.8% on the 355 mm mesh, which was double that of the April sample, and the fines - being 0.75%, rounded to 0.8%, compared with 5.2% in the April sample. The significance of these two values is, first, that a high proportion of particles close to the cut point might cause particles within the product size to be discharged as oversize; and, second, in relation to the fines, if the proportion of fines in the feed is below the permitted limit, blinding of the bottom deck may not matter very much, because the product will still be in specification (so far as fines are concerned) even if all the fines present are discharged with the product. The much higher proportion of fines in the April sample, if representative of the feedstock likely to be used, meant that any blinding problem on the bottom deck could have serious repercussions for production.
99. Although he had some difficulty in dealing with the point in cross examination, Mr Smith's evidence was to the effect that the differences between the two PSDs were minor and did not justify reverting to the client (Day 6/14-18). I consider that this was an underestimate: for the reasons I have just given, the consequences could be quite serious and, at the very least, it could not be assumed that the PSD first given by Aldrees was likely to be more representative of the typical feedstock than the sample provided in April 2010.
100. Mr Smith then went on to carry out tests in order to establish the number of machines required to achieve an output of 200 tph using the sample provided by Aldrees. The test procedure followed by Mr Smith simulated a two deck machine (although the subsequent proposal was for a three deck machine). He carried out six tests - three on the top deck (with an aperture of 500  $\mu\text{m}$ ) and three on the bottom deck (with an aperture of 118  $\mu\text{m}$ ). The screen area was 16.7 m<sup>2</sup> per separation, so three machines

<sup>5</sup> More sieves were used in the Rotex test and so certain levels have been combined by Aldrees for the purposes of the comparison.

would have a total area of 50.1 m<sup>2</sup>. During the course of Mr Chapman's cross examination of Mr Smith (at Day 6/37-54) it became clear that, of the six tests carried out by Mr Smith, only two were regarded as satisfactory (the third and the sixth), although the cross examination revealed a number of minor errors or inconsistencies in Mr Smith's work. The third and the sixth tests appeared to show that the screen area required was 58.62 m<sup>2</sup> and 51.3 m<sup>2</sup>, respectively - each being more than the total area for three machines of 50.1 m<sup>2</sup>. In fact, Mr Smith had made an arithmetical error in the second of these two tests, with the result that the true result was in fact lower than the result that he obtained. However, no one at Rotex realised this at the time.

101. In addition to carrying out a particle size analysis of both the fines and the product, there were spaces on Mr Smith's test form to record the extent of the blinding ("None", "Slight" and "Heavy") and material flow ("Even", "One Side" and "Both"). For test 5 Mr Smith recorded (by inserting an "x") that the blinding was "Heavy" and the material flow "Even". At the foot of the form, under the heading "Comments", Mr Smith wrote:

"Mesh blinded due to heavy burden and insufficient ball action.  
Would increase ball action on the production unit. Product out of  
spec. Retest at slightly faster rate, i.e approx 50m<sup>2</sup> requirement."

102. On the test form in relation to test 6 Mr Smith inserted an "x" against blinding and material flow in exactly the same places as on the previous form, thus apparently recording the blinding as "Heavy". Mr Smith said that this was a cut and paste error, an answer which was, unsurprisingly, challenged by Mr Chapman (Day/48-52). At the foot of the same form Mr Smith noted, under the heading "Comments":

"Increased to 2 balls per pocket. Just in Spec. Will combine this  
fraction with overs and run additional tests."

In test 5 Mr Smith had used one ball per pocket and noted that the blinding was "Heavy", which explains his decision in test 6 to add a further ball per pocket. One would expect this to reduce the blinding and, significantly, if it had not done so, for this fact to be noted by Mr Smith in his comments. Further, the product analysis for test 5 showed that 1.36% was retained on the 90 mesh and 1.67% was in the pan: thus the total exceeded the 2% permitted, which is why Mr Smith recorded the product as being out of specification. By contrast, in test 6, the respective percentages were 0.95% and 0.69%, bringing the product within specification.

103. I am quite satisfied that if there had been heavy blinding on test 6, as there had been on test 5, Mr Smith would have noted that fact under his comments, not least because it would have suggested that something was going seriously wrong. Further, the reduction in the percentage of fines in the product shows that the extent of blinding was lower in test 6 than in test 5. I therefore accept Mr Smith's explanation that the reference to "Heavy" blinding on test 6 was a copying error as he said.
104. In spite of the various errors in Mr Smith's work, I doubt if the final result would have been significantly different had they not been made: the tests would probably still have shown that, on the face of the results, three machines would not be sufficient to

meet the required duty. But since the decision was taken in the light of Mr Smith's results as presented, it probably does not matter.<sup>6</sup>

105. I find that the decision to put forward a proposal based on three machines was taken by, or at least strongly influenced by the views of, Mr Paulsen, who was Mr Smith's superior and had considerable experience in the field of processing sand. He said, at Day 6/127:

“When I saw this and the particle size distribution I saw it [as] a scalping and fines removal operation and I thought we would be able to get a higher rate on this machine.”

Mr Paulsen's reference to a “*scalping and fines removal operation*” was, I think, in distinction to a process which involves obtaining a particular particle size distribution within the product, which is a more complicated exercise.

106. Mr Paulsen said (in evidence, not in his witness statement) that there was “*a 20% safety factor in these numbers*”, based (he said) on 60 or 70 years' of Rotex's experience – which had shown that the laboratory test results were typically conservative by that factor (Day 6/136, 140).
107. At paragraph 30 of his witness statement Mr Scheper explained how the testing by Rotex was carried out in the laboratory. The test machine is equipped to make one separation at a time, so where the application involves more than one deck, the sample is first passed over a simulated top deck and the material that falls through that mesh is collected and then fed through a second mesh (representing the second deck) in the same way. Thus each particle has the opportunity to pass over the entire length of the mesh on each deck. I suggested to Mr Scheper that in the case of three deck machines in the field particles could fall onto the bottom deck from any point along the length of the middle deck, although one would expect them to fall through preferentially sooner rather than later during the course of their passage along that deck. The point, which Mr Scheper accepted, is that in a working machine the area of the bottom deck available for a particle to fall through is effectively reduced because not all particles will fall onto it at the feed end.
108. It was in this context that Mr Scheper said (at Day 5/70-71):

“...what we have done over time is we go and, after machines in the field are run, we check back to the lab tests and make sure the machines in the fields are operating at that. And we typically are either running at a 5% or a 10% safety factor.”

It was then suggested to Mr Scheper by the Court that the testing system that he had described in paragraph 30 of his witness statement was always going to underestimate the screen area required for the bottom deck, to which his response was, theoretically, yes, but (at Day 5/70-71):

“Maybe not with the safety factor when you are looking at that.”

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<sup>6</sup> In its Closing Submissions Rotex appended an elaborate set of calculations reworking Mr Smith's original calculations, but this exercise was not the subject of any scrutiny during the trial and, in any event, I consider that it is largely irrelevant because the exercise was not done at the time.

109. Mr Renn said that there was a direct correlation between “*what we see the field and what we see in the lab*” (Day 8/8), which is perhaps not quite the same thing (although there could be said to be a correlation where there is a consistent ratio between test performance and performance in the field, I suspect that this is not what Mr Renn meant).
110. Mr Smith told the court that the calculations used by him assumed that the area of the test screen was 0.6 m<sup>2</sup>, when it was in fact 0.5 m<sup>2</sup>, thus giving a factor of safety of 20%. I do not accept this: it seems to me to be far more likely that this adjustment was to take account of the point that I put to Mr Scheper to which I have referred above. I do not consider that the material appended to Rotex’s closing submissions provides a satisfactory answer. If the true area of the test screen was used, any laboratory testing using a single screen to predict the performance in the field of a machine in which the particles were to be fed sequentially through three screens would always overestimate the screening performance of the real machine. Accordingly, I cannot place much weight on Rotex’s reworking of Mr Smith’s calculations using the actual size of the test screen (at Closing Appendix 6).
111. Taken as a whole, the evidence from the Rotex witnesses about a factor of safety is not consistent: all that I can conclude with any confidence is that experience showed that the laboratory tests, if properly carried out, would be expected to provide a reasonable indication of performance in the field, if the machines were properly designed and built, and so long as the feedstock used in the field did not vary significantly from that used in the test. I shall revert later in this judgment to the question of what is meant by “significantly” in the circumstances of this case.
112. Rotex says that it made a judgement in the light of Mr Smith’s tests and Mr Paulsen’s experience that three machines could process 200 tph of sand if it corresponded with the sample supplied by Aldrees. However, I find that Rotex appreciated that this was, at best, over optimistic and left no margin to accommodate even small changes in composition, moisture level or PSD of the feedstock.

*Proposal MQ27278*

113. On 22 April 2010 Mr Smith sent Mr Aldrees his proposal MQ27278, which was for three 3180-3 machines. The covering letter began as follows:

“We refer to your recent inquiry in relation to your requirements for screening Silica Sand. For this application we are offering three (3) x Model MM3180-3 minerals machines.

The MM3180-3 is a three (3) deck unit offering a screen area of 16.7M<sup>2</sup> per separation. We can confirm following test that the total screen area required to do the 200 TPH duty is 50.1M<sup>2</sup> (per separation level) therefore 3 units are required. Please find proposal, outline drawing and laboratory report attached to my e-mail.

We feel three decks offer you greater flexibility. For example, if you run with the 600, 500 and 106 micron decks fitted you could make two products, the 500/106 and, if you reblend the 500/600 fraction back in, you can make the 600/106 product. In addition, and due to the machine being a parallel bank of screens where the feed is evenly distributed to two sides, you could even make the 500/106 product on one side of the machine and the 850/106 product on the other for instance. Alternatively you could fit the machine with an 850, 600 or 500 top deck and a 106 bottom deck with a

load relieving mesh fitted to the middle deck increase mesh life on longer production runs.”

114. Pausing at this point, Mr Smith accepted that - at that particular stage - it was not correct that the tests that he had carried out showed or confirmed that for these particular machines the area provided would be adequate (Day 6/91).

115. The letter went on to say this:

“Other screen manufacturers will be able to offer either good product quality or high screening efficiency but not both like Rotex gyratory equipment. As you have a high specification, other manufacturers will concentrate on producing this but please pay attention to the product recovery efficiency. Even for a relatively small 2% efficiency improvement the payback is worth noting.

For Example.

Through test we have established that we can offer equipment to provide the 98% on size requirement with a high product recovery efficiency of 94.4% (please refer to lab report). Being conservative, let’s say the inclined vibratory models such as the ones installed at your plant currently can offer the same product grade but they are 2% less efficient at removing saleable product from the feed. The tables below outline exactly what that means to your plant...

As you can see from the above, the difference will be made up within a year of production dependent on how many production hours your plant works per year and that does not include the installation cost difference or the fact that we are offering an extra deck and greater flexibility. This is for 2% greater efficiency only, please check your other lab reports and calculate for yourself.”

116. It is apparent from this passage that Rotex were making the machines’ efficiency rate of 94.4% a very strong selling point, even though it was not mentioned in the proposal.

117. The proposal itself contained the following information:

*“Thank you for your inquiry. We are pleased to quote for acceptance within 30 days.”*

**APPLICATION DATA:**

<u>Material:</u>	Silica Sand	<u>Separations:</u>	500 & 600 Micron
<u>Bulk</u>	1600 KG/M <sup>3</sup>	<u>Specification:</u>	98% 500 to 106 Micron
<u>Density:</u>			
<u>Feed Rate:</u>	200 T/HR	<u>Temperature:</u>	Ambient °C

**PROPOSAL SUMMARY:**

**(3) Rotex Minerals Separator Model MM 3180-3 High Capacity Screener** Eighteen (18) deck unit with nominal screen area of 16.7M<sup>2</sup> per deck. Motor: 15 HP, 1200 RPM, 3 Phase, 60 Hz, 450 Volt , TEFC motor.  
Dimensions: As shown in Rotex preliminary outline drawing #183754  
Installation: Machine installed by hanger support shaft suspension.

...

### Screen Clothing

- 0.5mm Aperture, 0.16mm diameter, 304/SS wire screen cloth, 48" x 90", made up with edging and grommets and applied to the top deck screen frames on the above machine (6 Req'd.)
  - 0.25mm Aperture, 0.09mm diameter, 304/SS wire screen cloth, 48" x 90", made up with edging and grommets and applied to the middle deck screen frames on the above machine (6 Req'd). *(For example only, other mesh could be selected to make other separations and provide flexibility, D50 of sample was 244 Micron so 250 micron mesh selected for quotation purposes only. In the event of an order this could be discussed and finalized).*
  - 0.118mm Aperture, 0.056mm diameter, 304/SS wire screen cloth, 48" x 90", made up with edging and grommets and applied to the bottom deck screen frames on the above machine (6 Req'd)."
118. Mr Smith accepted in cross examination that, in relation to the middle deck, this implied - incorrectly - that the rationale for having the third middle deck was greater flexibility and not to relieve the load on the bottom screen (Day 8/97). However, he said that this was a matter that was always going to be the subject of discussions with Aldrees.
119. As to terms of payment, the quotation provided that 30% of the price was to be paid with the order, 20% on "Purchase of major Items" and 50% on submission of shipping documents.
120. In short, by this proposal Rotex offered to supply three machines to process silica sand at a rate of 200 tph so that 98% of the product would be within the range 106 to 500 µm. Implicit in the proposal is a representation that the three machines described could achieve the required throughput provided, of course, that the sand to be processed had a PSD that was more or less in accordance with the sample provided by Aldrees.
121. I consider that the proviso is to be inferred, not only because Aldrees had given a PSD of its feedstock with its initial inquiry and had subsequently sent a sample of its sand, but also because the reference to "*D50 of sample*" in relation to the middle deck suggests that the proposal was formulated on the basis of the sample provided by Aldrees.
122. If the tests carried out by Mr Smith had stood on their own, I would have found that this representation was not true and that there was no reasonable justification for making it.
123. But, even in the light of the evidence of Mr Paulsen and Mr Scheper, I do not feel able to find that Rotex's representation that the three machines could (in the right conditions) achieve the required output was reached with a reasonable belief in its truth. It involved an unreasonably optimistic interpretation of the test results and insufficient allowance for even minor variations in the PSD of the feed material: as Rotex accepted at the time, the ability of three 3180-3 machines to achieve the required throughput was, on any view, "tight".

124. In these circumstances, I consider that a statement that a throughput of 200 tph could be achieved with three machines was misleading because, first, it was not confirmed by the test results (as Mr Smith's letter implied) and, second, it contained no qualification about its very sensitive dependence on the correspondence of the feedstock with the sample: in other words, that it was tight. However, it is Rotex's case that this statement was corrected by subsequent events and so had no effect on the decision by Aldrees to enter into the contract. I will consider this point below.
125. In this context, I should mention that it was Mr Smith's evidence, which I found somewhat surprising, that it had been his intention to undertake further testing following this proposal in order to carry out a three deck test prior to submission of a final proposal. Whilst this is consistent with his reference to working "*on a provisional offer*" in his e-mail of 30 March 2010, I regard it as a little surprising because one would expect a company such as Rotex to carry out all the tests necessary to support the performance of the machines that it was proposing to provide before submitting a proposal. But, apart from this comment in the e-mail, there is no evidence that this was ever communicated to Aldrees.

*Lab Report 2269A*

126. This followed further tests by Mr Smith, this time carried out on the basis that there would be an unloading deck to relieve the load on the bottom deck. The reason for this is that by screening out particles of an intermediate size and sending those particles directly into the product stream, less material will go through to the bottom deck. There is an issue about whether this was prompted by a suggestion from Mr Aldrees or whether it was because although three deck machines had been proposed by Rotex, the testing it had carried out had been based on a two deck system only. I do not consider that it is necessary to resolve this issue, although I see the force of the point made by Rotex that Mr Aldrees must have been aware of the concept of a load-relieving deck because it seems that he had received a proposal from Haver earlier that year for some screening machines that were described as having two "relieving decks" (according to a subsequent invoice). In addition, I can see no reason why Mr Smith should have said to Mr Paxton (as he did in his e-mail dated 1 April 2010) that the "*customer mentioned load relieving*", unless this had happened. However, I am not prepared to make a finding to this effect.
127. On 27 April Mr Smith carried out three tests: a top deck with a 500  $\mu\text{m}$  mesh, a middle deck with a 315  $\mu\text{m}$  mesh and a bottom deck with a 118  $\mu\text{m}$  mesh (in error shown as 315  $\mu\text{m}$ ). There was some slight blinding on the top and middle decks, but none was observed on the bottom deck. The required screen areas, as indicated by each test were, respectively, 49.92 m<sup>2</sup>, 54.32 m<sup>2</sup> and 53.77 m<sup>2</sup>. In fact, Mr Smith made an arithmetical error in relation to the third test which slightly underestimated the capacity required. These tests were challenged by Mr Chapman on the ground that Mr Smith did not carry out any analysis of the particle size distribution, but used the PSD obtained for the previous tests - a point which Mr Smith accepted as a matter of proper procedure - and because a substantial quantity of the fines were larger than the aperture of the 118  $\mu\text{m}$  mesh.<sup>7</sup> Mr Smith's only explanation for the latter point

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<sup>7</sup> At paragraph 85 of its Closing Submissions Aldrees incorrectly refers to screening having taken place "*at 106 microns*", rather than the 118  $\mu\text{m}$  that Mr Smith used. However, the point remains valid.



was that there were gaps between the mesh and its frame on the test machine through which larger particles could fall. However, I do not see that either of these points made any material difference to the outcome because the tests showed - ignoring any margin of safety - that three machines would be insufficient and that four machines would be required in order to achieve a throughput of 200 tph (as Mr Olmen acknowledged at paragraph 4.3.6 of his report).

128. For reasons which were never satisfactorily explained, Mr Smith did not send any report of these tests to Mr Aldrees at the time.

*The Powtech Exhibition*

129. Between 27 and 29 April 2010 there was a trade fair in Germany known as "Powtech". Mr Paulsen was due to attend this exhibition because he was in charge of Rotex's sales in Europe and Rotex had a stand there. Mr Smith was not able to attend but he had told Mr Aldrees that Mr Paulsen would be attending.
130. Mr Aldrees was also planning to go to the exhibition, together with his brother, Majed. They wanted to go in order to gain a better understanding of what was available in the market by way of screening machines. They were impressed by Rotex - Mr Aldrees described the meeting with Mr Paulsen as "*extremely positive in terms of the capability of the Rotex machines*" (paragraph 41 of his witness statement). It seems that at that point Aldrees took the decision in principle to purchase its new machines from Rotex.
131. Mr Paulsen did not have a clear recollection of his conversation with Mr Aldrees at Powtech - quite understandably, since it took place more than seven years before he made his witness statement. What he said at paragraph 21 of his witness statement was that, on the basis of the sample supplied by Aldrees, he considered that three machines could achieve a throughput of 200 tph but with little margin of error. He said that he would have discussed this with Mr Aldrees and told him that four machines would be preferable. This, he said, was his usual practice in this type of situation.
132. In cross examination Mr Paulsen agreed that he had not seen the results of the tests that Mr Smith had carried out on 27 April 2010 by the time that he spoke to Mr Aldrees at Powtech and that he did not go to that exhibition "*with the idea of moving to four machines*" (Day 6/151). He then conceded that if there had been any discussion about moving to four machines from three, it must have taken place after Powtech.
133. In his first witness statement Mr Smith said that after the Powtech exhibition Mr Paulsen advised him that the proposal for Aldrees should be increased from three to four machines, which he understood to be because Mr Paulsen thought that the proposal for three machines was too tight (paragraphs 97-100).
134. I think that it is likely that Mr Paulsen's concession was correct and that there was no discussion with Mr Aldrees at the Powtech exhibition about moving from three machines to four machines. I find that the discussion would have been in much more general terms as implied by Mr Aldrees. However, I accept Mr Smith's evidence to the extent that he did discuss the proposal with Mr Paulsen after his return from the

Powtech exhibition and that Mr Paulsen told him to suggest to Mr Aldrees that he should buy four machines, and not three.

*The meeting of 10 June 2010*

135. Neither Mr Aldrees nor Mr Smith can be expected to have had a very clear or reliable recollection of a meeting that took place some six years before the action was started, before which neither of them would probably have had any reason to direct their minds to what happened at that meeting. I find that to have been the case, and so any conclusions about what happened at the meeting must be based largely on inference.
136. I find it strange that, the parties having been in contact by e-mail, Mr Smith did not send a copy of lab report 2269A to Mr Aldrees before the meeting on 10 June 2010: after all, it had been prepared about six weeks earlier. It may well be that Mr Smith mentioned the report at the meeting and, perhaps, showed it to Mr Aldrees on his laptop. Its existence must have been mentioned at some time, because otherwise Mr Aldrees could not have asked for it in his e-mail to Mr Smith dated 30 October 2010. However, it is of course possible that Mr Aldrees had been given a copy of the report at the meeting on 10 June 2010 but had subsequently mislaid it.
137. It is Rotex's case that Mr Aldrees was given a copy of the lab report at the meeting. This is strongly denied by Mr Aldrees. Mr Chapman suggested to Mr Smith in cross examination that it was Mr Aldrees who raised the prospect of buying a fourth machine and that "*it must have come as the greatest of blessings when he did*". Mr Smith denied this (Day 6/117).
138. On the state of the evidence I am not able to reach any positive conclusion as to whether or not a copy of the report was handed over at the meeting on 10 June 2010, but I do think that it was probably mentioned. Either way, for the reasons that follow, I am not sure that it matters.
139. As I have already mentioned, Mr Paulsen accepted in cross examination that any discussion about moving from three machines to four machines must have taken place after the Powtech conference on 27-29 April 2010 (contrary to the position taken in Rotex's written opening submissions, paragraph 122).
140. I consider that the most likely sequence of events is that, in the light of Mr Smith's second round of testing, by the end of April 2010 Rotex had become concerned that its initial statement that three machines could achieve a throughput of 200 tph was too tight to be supportable, so decided to advise Aldrees accordingly. However, as I have already found, this was not raised with Mr Aldrees at the Powtech exhibition.
141. It may well be that Mr Aldrees did raise the possibility of buying a fourth machine to process sand (in addition to a further machine for limestone) when he met Mr Smith on 10 June 2010 and that this gave Mr Smith the opportunity to encourage this course by explaining to Mr Aldrees that Rotex was now concerned that three machines would be too tight and that Aldrees really needed four machines, which "*would comfortably process 200 tph*" (Rotex's words - see paragraph 11 of its closing submissions). If Mr Aldrees was already considering increasing his capacity by the purchase of another machine, this change of position by Rotex would have provided the perfect opportunity for him to make the most of it - and no doubt of Rotex's

embarrassment at having overstated the capacity of the machines - and to drive a hard bargain. This would go some way to explaining why Mr Aldrees asked for such a high discount - roughly equivalent to the list price of the fourth machine<sup>8</sup> - and why Rotex was prepared to give it.

142. Unfortunately, the subsequent exchange of correspondence throws little light on precisely what happened on 10 June 2010; however, I regard it as significant that the revised proposal from Rotex, MQ27278 Rev 1, which included four machines for silica sand (and one for limestone), still quoted a feed rate of 200 tph. If Mr Aldrees was expecting a corresponding increase in the specified feed rate to reflect the addition of a further machine, then it is surprising that he did not ask why the figure of 200 tph had not been increased to 250 tph. Whilst I accept that Mr Aldrees did not concern himself with printed terms and conditions, I formed the view that he is a man who likes to know exactly what he is getting for his money and who would therefore have studied any proposal of this sort with great care.
143. I find that, in effect, Mr Aldrees saw, and took, an opportunity to gain additional production capacity by the purchase of an additional machine for next to nothing (apart from the relatively modest installation costs). In these circumstances, I do not accept the suggestion (made by Aldrees in its Reply Closing Submissions) that for Mr Aldrees to accept the change to four machines without demur made no sense: on the contrary, the deal which Mr Aldrees struck with Rotex made very good sense.
144. In the light of this finding any previous misrepresentation to the effect that each machine had a throughput of 66 tph was effectively corrected and, in any event, was no longer relied on by Mr Aldrees.<sup>9</sup> For the reasons set out later in this judgment, I find it unlikely that any of the machines ever achieved a throughput much in excess of 50 tph and yet there was no complaint by Aldrees during 2014 that the machines were underperforming. Had Mr Aldrees believed that each machine should be able to process 66 tph, I am quite certain that he would have complained to Rotex at their failure to achieve more than 50 tph when they were first brought into commercial production in February/March 2014. He never did so.

## **The terms of the contract**

### *The principal documents*

145. On 23 April 2010 Mr Smith sent an e-mail to Mr Aldrees, to which was attached various documents: these were a drawing, a test report, a brochure, a surveyor's list, a covering letter, Rotex's Terms and Conditions of Sale and Rotex's proposal MQ 27278. In the e-mail Mr Smith explained that he had only offered delivery FOB because he would not have the full CFR delivery cost from his forwarding agent until the following Monday. Save that the e-mail concluded with the words "*I trust the above and attached meet your immediate requirements*", neither the covering letter

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<sup>8</sup> The total list price of five machines, as quoted by Mr Paulsen in his e-mail dated 11 June 2010, was US\$1,302,500. The price negotiated by Mr Aldrees was US\$1,050,000, a difference of US\$252,500 - slightly more than the unit price of a machine in the first proposal (US\$238,500).

<sup>9</sup> See *Peekay Intermark v ANZ Banking Group* [2006] 1 CLC 582 (CA): a case where the true position appeared clearly on the face of the documents forming the very contract which the claimant said it was induced to enter by the misrepresentation.

nor the quotation referred to the Terms and Conditions. Page 4 of the quotation was headed “Commercial Details”, which stated what the price did and did not include but made no mention of any terms and conditions. Under the heading “Total Proposal Value” on page 6 of the quotation, the terms of the warranty were set out together with the terms of payment: there was, again, no reference to any terms and conditions.

146. Rotex submitted that the reference to “*the above and attached*” was sufficient to incorporate into the offer Rotex’s terms and conditions that were attached to the e-mail, although not otherwise mentioned.
147. Following the meeting between the parties on 10 June 2010, to which I have already referred, which was attended by Mr Smith on behalf of Rotex, Mr Smith told Mr Paulsen that Mr Aldrees was looking for a discount of about 20% and said that he could expect a call from Mr Aldrees. Mr Aldrees then spoke to Mr Paulsen (either later that evening or on the following day) and negotiated a discount of nearly 20% (19.4%), giving a total price of \$1,050,000, as against a list price of \$1,302,500. Mr Smith had no authority to negotiate a discount of that order which is why the matter had to be referred to Mr Paulsen.
148. On the following day, 11 June 2010, Mr Paulsen sent an e-mail to Mr Smith in which he summarised his understanding of the agreement with Mr Aldrees and set out the details of the price that had been agreed. In that e-mail Mr Paulsen said “Terms: ?”: he did not mention the terms of payment or the nature and terms of the warranty. The e-mail concluded:
- “Great job Neil. Let me know if I missed anything. As soon as you get the official PO get the data to Colin so we can start to coordinate production. Andrew has already alerted Cincinnati.”
149. Later that day Mr Smith sent an e-mail to Mr Aldrees, to which was attached: Critical Spares Lists, 1 Years Spares Lists Rev 1, Rotex’s proposal MQ272781 and Rotex’s Terms and Conditions of Sale. However, in this quotation, in the section headed “Commercial Details”, there was reference to Rotex’s Terms and Conditions - it said “*See attached general terms and conditions of sale*”. This was obviously a reference to the Terms and Conditions of Sale that had been attached to the e-mail. The Commercial Details also set out the details of the warranty and terms of payment.
150. Towards the end of that e-mail Mr Smith said:
- “following your official acceptance and my return to the UK . . . we will commence with the primary engineering phase where we will provide you with design drawings and layout drawings for your acceptance.”

This suggests that no contract was to come into existence until Aldrees had formally accepted Rotex’s quotation.

151. During the afternoon of 12 June 2010 Mr Smith spoke to Mr Aldrees, after which he sent an e-mail enclosing an amended spares list and attaching a drawing for layout purposes. He said that he was awaiting Mr Paulsen’s response “*regarding the warranty*”, following which he said that he would reissue the final quotation. This might suggest that the proposal which had been sent the previous day was to be

treated as an interim proposal, rather than a final offer capable of acceptance. However, the e-mail concluded by Mr Smith saying: “*Looking forward to receiving the official PO tomorrow*”.

152. The following day, 13 June 2010, Aldrees issued its Purchase Order, which contained the following provisions:

WARRANTY:

Mechanical warranty for 24 months from date of start-up. Warranty does not cover fair wear and tear consumables.

Terms & Conditions

20% with order at 180 days.

80% with Submission of legalised documents at 180 days.

153. On 16 June 2010 Mr Smith sent Mr Aldrees e-mail in the following terms:

Dear Mr Aldrees

I hope you are well.

I got your voicemail message this morning, I actually departed from The Kingdom on Tuesday morning at 2:20 am, I then slept for the most part of yesterday.

I have spoken to Dick [Mr Paulsen] and he has advised me that the negotiated price is based on my offer, i.e. the payment terms (especially the 180 days, this is not possible) and the warranty period. Please amend PO and resubmit so we can start with design stage as discussed.

154. So, at this point the parties appear to have reached an impasse about the payment terms and the warranty period and Rotex was pressing for a purchase order that corresponded with its quotation. On 17 June 2010 Mr Paulsen sent an e-mail to Mr Aldrees in the following terms:

Dear Mr Aldrees,

Neil Smith indicated that there is still an issue regarding your PO for our Equipment regarding the terms of payment. I am currently in Cincinnati and can be reached at my US Cell# below.

When you and I spoke and agreed to a price for this project it included the terms listed on Neil's quotation MQ27278 Rev 1. We agreed to supply the equipment at a significant discount to you, and the terms were certainly a consideration in this decision. My understanding was that we had come to a mutually beneficial agreement - a win-win in your words, but your PO HMD/M/CEO/0151/10 does not reflect the agreed upon terms.

We cannot agree to the terms you have listed on the PO. Our agreement was for payment terms as follows:

- 30% Invoiced and due with the order
- 30% upon purchase of major items, which will be invoiced in approximately 30 days
- 40% upon submission of shipping documents prior to dispatch through an irrevocable letter of credit

We require full payment prior to shipment, as we do for all purchasers of this equipment.

We had also provided to extend the mechanical warranty to 18 months after the delivery or 12 months after start-up, whichever occurs first.

You negotiated a very good price for this package of equipment and spares and we are very pleased to have reached an agreement to supply this to you, however if our agreements are not binding, then we are off to a bad start.

I appreciate if you would reissue the above-mentioned PO with the terms we agreed to over the phone last week. I am sorry that our position is firm on this.

155. However, on 21 June 2010 Mr Aldrees and Mr Paulsen had a further conversation in which Mr Paulsen agreed to revise the payment terms to the following, confirmed by letter of credit:

50% of the contract price payable on sight against submission of the following documents:

Invoice  
Inspection Certificate  
Signed receipt from customer's nominated carrier on collection of goods

40% of the contract price payable at 90 days from submission of the above documents

10% of the contract price payable on submission of Customer's Acceptance Certificate

Acceptance is evidenced by successful mechanical operation and achievement of at least 92% recovery of on spec product per the tests performed by Neil Smith.

156. There then followed two e-mails from Mr Aldrees to Mr Smith on 26 June 2010 in which Mr Aldrees requested minor alterations, such as changing the price to CIF Riyadh instead of Ex-Works UK and then to CIF Jeddah.
157. On 28 June 2010 Mr Smith sent an e-mail to Mr Aldrees enclosing the second revision of the quotation, MQ27278 Rev 2. In the section headed "Commercial Details" the words "*See attached general terms and conditions of sale*" appeared again, but on this occasion no terms and conditions were attached. The terms of payment had been altered in accordance with Mr Paulsen's e-mail of 21 June 2010, but the warranty was still stated to be for 12 months from date of start up or 18 months from delivery ex-works, whichever was sooner.
158. In relation to this e-mail, Rotex submitted that the other documents that had been sent with the previous quotation were not sent again because they remain unchanged. This may be so, but in my view it does not alter the fact that no terms and conditions were attached to the Rev 2 quotation.
159. On 13 July 2010 Mr Aldrees sent an e-mail to Mr Paulsen asking him to ask Mr Smith to revise the proposal MQ27278 Rev 2 in order to revise the payment terms so as to accord with the agreement that he had since reached with Mr Paulsen to the effect that

Aldrees would pay 50% upon shipping (instead of order), on presentation of a bill of lading, and then 40% after 90 days.

160. In fact, before this could be done, on 14 July 2010 Aldrees issued a further Purchase Order. This referred to Rotex's quotation MQ27278 Rev 1, but it is accepted by Rotex that this was a typing error for the Rev 2 quotation. This Purchase Order incorporated the recently revised terms for payment, but in relation to the warranty it stated that the mechanical warranty was to be for 24 (not 12) months from date of start up and there was no reference to any limitation of the warranty period by reference to the date of delivery.
161. There were no further exchanges between the parties following this Purchase Order, and Rotex went ahead and in due course supplied the machines.

*The contentions of the parties*

162. Although there is a dispute between the parties as to when the contract was concluded, the real issue between the parties is whether or not Rotex's standard terms and conditions were incorporated in the contract. Mr Chapman submitted that the contract was concluded on either 10 or 11 June 2010, on the basis that some matters, such as the payment terms and the warranty, would be resolved subsequently. Thus, said Mr Chapman, since the question of Rotex's terms and conditions was not one of the matters to be agreed, the references to them in subsequent quotations were irrelevant. Mr Chapman's alternative case was that the contract was varied when the terms of payment and the warranty were agreed: there was no such variation in relation to Rotex's terms and conditions.
163. The submission of Mr Stansfield was that the formation of the contract was "*a progressive consensus that was reached over a period of time*" (Day 10/101). He submitted, therefore, that the whole of the correspondence had to be considered: in support of this submission he cited *Pagnan SpA v Feed Products* [1987] 2 Lloyd's Rep 601. That submission is correct, but the decision in *Pagnan* is also authority for the proposition that parties may intend to be bound on an interim basis even though there are further terms still to be agreed: see Lloyd LJ (as he then was) at page 619.
164. Mr Stansfield submitted that the contract was concluded when Aldrees sent in its Purchase Order and Rotex thereafter proceeded to manufacture and supply the goods. Consistently with this, Rotex accepts that the Purchase Order altered the warranty period and that, since it did not object, it is fixed with it. But Mr Stansfield submitted that when the correspondence is considered as a whole, it is clear that Rotex's standard terms and conditions were incorporated.
165. In support of its position that the contract was not concluded until Aldrees issued its purchase order, Rotex relies on the evidence of Mr Aldrees that the intention of the parties was that Aldrees would issue its purchase order and then the contract would be made (see Day 2/129-130).
166. However, Rotex's position in relation to the fact that no terms and conditions were attached to the Rev 2 quotation has not been entirely consistent. In its opening submissions, at paragraph 525, it gave as one of the grounds in support of its assertion that its terms and conditions were incorporated that Aldrees' purchase order dated 14

July 2010 referred to quotation MQ27278 Rev 1, and that this expressly incorporated Rotex's terms and conditions which were attached to it. But at paragraph 180 of the same submissions it said that it was apparent that the references to Rev 1 in that purchase order were intended to be references to Rev 2. The latter position was, realistically, the one taken in Rotex's closing submissions.

*The authorities*

167. In *Transformers & Rectifiers v Needs* [2015] EWHC 269 (TCC) I reviewed some of the relevant authorities on the incorporation of terms, at paragraphs 14-31. I said this:

- “14. In *Hardwick Game Farm v SSAPA* [1969] 2 AC 31 there was a series of oral contracts between SSAPA and its supplier, Grimsdale, for meal to be fed to game birds. Each contract was followed by a Contract (or Sold) Note sent by the sellers which contained on the back what were described as “Conditions of Sale”. The buyer's agent knew that there were conditions on the back of the Contract Notes but had never read them.
15. There had been many previous dealings between the parties of a similar character. In each case the contract was followed by the dispatch of the Contract Note with the same standard terms on the reverse. In both the House of Lords and the Court of Appeal it was held that the conduct of SSAPA in accepting these Contract Notes without making any comment, query or objection about the Conditions of Sale was conduct which would lead Grimsdale, the seller, reasonably to believe that SSAPA intended to enter into the contracts on those terms. However, it is important to note that the transactions followed a consistent pattern with documentation in precisely the same form on each occasion.
16. In *Circle Freight International Ltd v Medeast Gulf Exports Ltd* [1988] 2 Lloyd's Rep 427, the course of dealing consisted of eleven contracts in the previous six months. On each occasion the contract had been made orally by telephone but the invoice for the carriage charges sent at a later date stated that all business was transacted by the carrier under the current conditions of the Institute of Freight Forwarders, a copy of which was available on request. A copy was never requested. The consignor's managing director accepted that he knew that carriers by road often dealt on standard terms which addressed questions of risk of loss or damage, but said that he had not noticed the reference to the IFF conditions in the invoices sent after each of the contracts had been concluded. The Court of Appeal held that the IFF conditions were incorporated into the contract.
17. At page 433, Taylor LJ noted that the consignor's managing director knew that some terms applied and that forwarding agents might impose terms which would frequently deal with risk, but never asked for a copy of the terms. In addition, he said that the terms were not particularly onerous or unusual. Taylor LJ then said this:  
  
“... I consider that reasonable notice of the terms was given by the plaintiffs. Putting it another way, I consider that the defendant's conduct in continuing the course of business after at least 11 notices of the terms and omitting to request a sight of them would have led and did lead the plaintiffs reasonably to believe the defendants accepted their terms. In those circumstances it is irrelevant that in fact [the managing director] did not read the notices.”



18. Bingham LJ (as he then was) said, at page 435, that the only possible answer to the question “Has reasonable notice of the terms been given?” was that it had.
19. Again, this appears to have been a case where the course of dealing consisted of a number of transactions carried out in precisely the same way.
20. The facts of *Balmoral Group v Borealis (UK)* [2006] EWHC 1900 (Comm) were a little more complicated. Between 1994 and mid-2002 Balmoral made nearly 400 purchases of polyethylene from one or more companies in the Borealis group. By a fax dated 18 January 1995 Borealis made it plain that its prices were quoted “... subject to normal terms and to current conditions of sale”, and these terms were put on the back, or as one of the pages, of the invoices submitted by Borealis to Balmoral. These invoices were seen and initialled by Balmoral’s managing director: he realised that there were terms on the back of the invoices but he did not study them.
21. From December 1995 Balmoral’s purchase orders referred to Balmoral’s terms, albeit in rather poor typescript at the bottom of the purchase orders, but these were never otherwise referred to or provided to Borealis. Christopher Clarke J (as he then was) found that there were no customary terms in the polymer trade in the UK in the sense of terms which are so “... certain, notorious and reasonable ...” that anyone purchasing polymer must be taken to have contracted on those terms, unless expressly excluded or otherwise agreed. But he did find that suppliers of polymer in the UK habitually seek to sell on their standard terms and conditions.
22. The procedure was that when an order was received someone at Borealis, after checking that the price on the order was the same as that on the price list, would check with the supplying plant that delivery could be made. If it could, someone at Borealis would confirm the order (probably by telephone) to someone at Balmoral. Delivery would then take place and, a couple of days thereafter, an invoice would be sent to Balmoral with Borealis’s terms on the back.
23. Having considered the *Circle Freight* and *Hardwick Game Farm* cases, together with other authorities, Christopher Clarke J said, at [348]:

“Whether or not one party’s standard terms are incorporated depends on whether that which each party says and does is such as to lead a reasonable person in their position to believe that those terms were to govern their legal relations. The Court has to determine what each party was reasonably entitled to conclude from the acts and words of the other ... The question is one of fact to which prior authority may form an uncertain guide.”
24. Christopher Clarke J concluded that, since Balmoral had purchased material at the quoted prices and had paid the invoices submitted by Borealis with the knowledge of Borealis’s conditions and without ever suggesting that they were not applicable, Borealis was reasonably entitled to assume that Balmoral accepted that its conditions applied.
25. In *Sterling Hydraulics Ltd v Dichtomatik Ltd* [2007] 1 Lloyd’s Rep 8 His Honour Judge Havelock-Allan QC had to consider a “battle of the forms” case. The claimant, SHL, always placed its orders with the defendant, DL, using its standard form of purchase order. This said:

“Please supply the following subject to the terms and conditions as set out below and overleaf.”

The purchase order was sent by fax, so that there were no terms and conditions “overleaf”, but instead the order was sent as two separate pages, expressly identified as “Page 1 of 2” and “Page 2 of 2”. Page 2 consisted of the terms and conditions.

26. DL sent an acknowledgement of order by fax back to SHL. It was printed by the computer onto two sheets of paper bearing DL’s printed letterhead. At the foot of the second page of the acknowledgement appeared the following sentence: “Delivery based on our General Terms of Sale”. DL’s Sales and Delivery Conditions were printed on the reverse of the acknowledgement of order, but the practice of DL was to send acknowledgements of orders by fax without faxing the reverse. The parties had been dealing with each other on this basis for about five years.
27. DL’s argument was that its acknowledgement of order was a counter offer, rather than an acceptance of SHL’s order. It submitted that its counter offer was accepted by SHL taking delivery of the goods. HHJ Havelock-Allan concluded that the words “Delivery based on our General Terms” at the foot of the acknowledgement of order was not sufficient to convert the acknowledgement of order into a counter offer. He said that the failure to send the terms on the reverse of the acknowledgement of order was not fatal to the incorporation of those terms because the words at the foot of the page did not refer to terms “on the reverse” or “overleaf”, but stated simply “Delivery based on General Terms of Sale”.
28. Nevertheless, the judge concluded that the words of incorporation used by DL, without an accompanying copy of the terms in question, did not provide adequate notice that the acknowledgement of order was not acceptance of the order but a counter offer.
29. In *Tekdata Interconnections Ltd v Amphenol Ltd* [2009] EWCA Civ 1209, Longmore LJ summarised the issue before the court in the following terms, at [1]:

“This appeal raises the question whether in what is sometimes called ‘the battle of forms’, there can be circumstances in which a traditional offer and acceptance analysis can be displaced by reference to the conduct of the parties over a long-term relationship. An offer to buy containing the purchaser’s terms which is followed by an acknowledgement of purchase containing the seller’s terms which is followed by delivery will (other things being equal) result in a contract on the seller’s terms. If, however, it is clear that the neither party ever intended the seller’s terms to apply and always intended the purchaser’s terms to apply, it is conceptually possible to arrive at the conclusion that the purchaser’s terms are to apply. It will be a rare case where that happens. Do the facts of this appeal amount to that rare case?”
30. He went on to describe the course of dealing in the following terms, at [7]:

“The judge found that Amphenol acknowledged the purchase orders by sending an acknowledgment to Tekdata. In law it could only be at that date at earliest that a contract for the purchase and sale of the specified connectors came into existence. The acknowledgment, however, stated that Amphenol’s terms and conditions were to apply and the traditional view would be that, if no further documentation passed between the parties and if Tekdata took delivery of the connectors, the contract would be on the terms

of Amphenol's acknowledgement. The judge, however, held that it was never intended that Amphenol's terms should apply because the parties had always intended that Tekdata's terms were to apply. He seems to have concluded, although he did not expressly say so, that the clause (at the bottom right hand corner of the acknowledgement) about the application of Amphenol's terms was to be ignored and that the contract came into existence when the acknowledgment was returned to Tekdata."

31. Dyson LJ said this, at [25]:

"... it is not possible to lay down a general rule that will apply in all cases where there is a battle of the forms. It always depends on an assessment of what the parties must objectively be taken to have intended. But where the facts are no more complicated than that A makes an offer on its conditions and B accepts that offer on its conditions and, without more, performance follows, it seems to me that the correct analysis is what Longmore LJ has described as the 'traditional offer and acceptance analysis', ie that there is a contract on B's conditions."

168. At paragraph 42 of that judgment I summarised what I considered to be the relevant principles to be derived from these authorities. My summary, so far as is relevant to the issues in the present case, was in these terms:

- "i) Where A makes an offer on its conditions and B accepts that offer on its conditions and, without more, performance follows, the correct analysis, assuming that each party's conditions have been reasonably drawn to the attention of the other, is that there is a contract on B's conditions: see *Tekdata*.
- ii) ...
- iii) The course of dealing by the party contending that its terms and conditions are incorporated has to be consistent and unequivocal: see *Sterling Hydraulics*.
- iv) ...
- v) A party's standard terms and conditions will not be incorporated unless that party has given the other party reasonable notice of those terms and conditions: see *Circle Freight*.
- vi) It is not always necessary for a party's terms and conditions to be included or referred to in the documents forming the contract; it may be sufficient if they are clearly contained in or referred to in invoices sent subsequently: see *Balmoral* at [352], [356].
- vii) ..."

I did not understand any of this to be contentious.

169. But, more fundamentally, where it is said that some of the terms of the contract are contained in a document which has not been signed or otherwise formally accepted by the party affected, it is necessary to prove that those terms were intended to be incorporated as terms of the contract or to have contractual effect: see *Chitty on Contracts, Vol 1*, 32<sup>nd</sup> Edition, at paragraph 13-002. Once this is done, it is then necessary to prove that the party affected had reasonable notice of the relevant terms.
170. In *Circle Freight International v Mideast Gulf Exports* [1998] 2 Lloyd's Rep 427, a decision relied on by Mr Stansfield, the Court of Appeal referred to a decision of Donaldson J (as he then was), SA [1978] 2 Lloyd's Rep 470. In that case, after referring to what Diplock LJ said in the *Hardwicke Game* case (at [1966] 1 Lloyd's Rep 197), namely that the test to be applied is not what the parties actually thought were their rights and liabilities, but what each by his words and conduct led the other party to believe were the liabilities which he was accepting and the concomitant rights which he was granting. Donaldson J went on to say this:

“I would offer a further variant, which may be easier for commercial men to apply. Would the parties have agreed that a particular term formed part of the contract if they were reasonable men looking at the matter objectively in the knowledge that no adverse consequences could flow from the answer. I add this latter qualification because even the most reasonable commercial man will become a little less than objective when told that the answer could cost him US\$ 3 million. The term will only be contractual if the parties' answer would have been a definite “Yes”. “Possibly” will not do.”

*My analysis and conclusions on the formation of the contract*

171. I reject the submission that a contract was concluded at the meeting of 10 June 2010. It is quite clear that Mr Aldrees was looking for a substantial discount on the list price of the machines and it is not in dispute that Mr Smith had no authority to negotiate a discount of the order being sought by Mr Aldrees. It seems to me, therefore, that no agreement was or could have been reached during that meeting.
172. I consider that Mr Chapman is on rather stronger ground when he suggests that the contract was concluded during the conversation between Mr Aldrees and Mr Paulsen on 11 June 2010. However, although by then many of the essential terms had been agreed, it is clear that Rotex was not prepared to do anything until it received a purchase order from Aldrees, and that it made this position clear at the time: see, for example, Mr Smith's e-mail of 11 June 2010, which I have set out above (which reflected what Mr Paulsen had said in his e-mail earlier that day to Mr Smith). As I have already mentioned, it was conceded by Mr Aldrees in cross-examination that no contract would be made until Aldrees had issued its purchase order.
173. The Purchase Order which Aldrees sent on 13 June 2010 was not an acceptance of Rotex's quotation because it contained significantly different provisions in relation to the terms of payment, which Rotex rejected. The terms of payment were then subsequently agreed between Mr Aldrees and Mr Paulsen, and Rotex's quotation Rev 2 incorporated the revised terms. That quotation was purportedly accepted by Aldrees' Purchase Order dated 14 July 2010, but it was in truth a counter offer because of its conflicting provisions in relation to the warranty. I therefore agree with

Rotex that the contract was concluded when Rotex proceeded to manufacture and supply the machines without protest following receipt of that Purchase Order.

174. But this does not dispose of the issue about Rotex's terms and conditions. I agree with Mr Stansfield that Rotex's terms and conditions had to be, and were, sufficiently drawn to Aldrees' attention because it was provided with a copy of them on two separate occasions. However, in my opinion, although that was necessary in order for the terms to be incorporated, it was not a sufficient condition.
175. In my view, before the question arises as to whether sufficient notice was given of the conditions, there has to be some form of words (or, perhaps, some conduct) which incorporates the conditions, whether by reference or directly, into the contract. For example, if Rotex's quotations had said words to the effect "*subject to our standard terms and conditions which are available on request*", that might have been sufficient (see, for example, *Sumukan Ltd v Commonwealth Secretariat* [2007] 2 Lloyd's Rep 87). But if the terms and conditions were not in fact available on request, they could not be incorporated by that form of words.
176. Similarly, in the cases where terms and conditions were said to be on the reverse of an offer sent by fax, but the reverse side was never sent, that in my view would be fatal to any submission that they had been incorporated. That seems to have been the implication of what His Honour Judge Havelock-Allan QC said in the *Sterling Hydraulics* case, and I agree with him. So, in my judgment, if a party says that it is contracting subject to terms which are to be found or are available in a particular place, and those terms are not in that place, that will usually be fatal to their incorporation. But if, as in the *Sterling Hydraulics* case, a party's offer states that it is contracting subject to its standard terms and conditions, that would usually be sufficient if a copy of those terms and conditions has been provided to the other party.
177. Since it is now common ground (and if it was not I would have concluded that it was the case) that Aldrees' Purchase Order dated 14 July 2010 was made by reference to Rotex's quotation MQ 27278 Rev 2, the words of incorporation upon which Rotex relies are "*See attached general terms and conditions of sale*". But, as is accepted, no terms and conditions were attached to that quotation.
178. Mr Stansfield submits that since the terms and conditions were attached to the earlier quotation, which contained precisely the same words of incorporation, any reasonable businessman in the position of Aldrees would have understood that those were the terms to which reference was being made. I do not accept this: when faced with the document which, like its predecessor, said "*see attached general terms and conditions of sale*" but where no such terms and conditions were attached, is the reasonable businessman to assume (a) that the seller has inadvertently omitted to attach the terms or (b) that the seller did not intend to attach the terms but failed (in error) to delete the words "*see attached general terms and conditions of sale*" from the previous version of the quotation?
179. If there had been a significant history of negotiations during which Rotex had attached to every quotation a copy of its terms and conditions and had made reference to them in each quotation, then there would be quite a strong case for saying that the failure to attach the terms and conditions to one particular quotation would be seen by the reasonable businessman as an oversight. However, in this case, there was no

reference to Rotex's terms and conditions in its first quotation, or in the covering letter, although a copy of the terms and conditions was attached to the covering e-mail, and so at that stage a reasonable businessman would in my view be entitled to conclude that Rotex might not be insisting on contracting subject to those terms and conditions. By contrast, the second quotation made it clear that Rotex was at that point intending to contract on those terms and conditions. If, then, the third quotation again refers to "*the attached general terms and conditions*" but no terms and conditions are attached, what is the reasonable businessman to conclude?

180. Applying the test suggested by Donaldson J in the *SIAT di del Ferro v Tradax Overseas* case to the circumstances set out in the previous paragraph, I would expect the reasonable businessman to conclude that Rotex's terms and conditions were possibly incorporated, but not that they definitely were incorporated. But, as Donaldson J pointed out, "possibly" is not good enough.
181. Putting it another way, where a contracting party has not been consistent in its approach to the incorporation of its terms and conditions, I can see little warrant for treating it as having done what it has not done. In this case the words of incorporation were clear and unambiguous - "*see attached general terms and conditions of sale*" - but since no such conditions were attached, there was nothing to see. It would in my view take a much stronger case to override the unambiguous meaning of the words by treating as having been attached that which had not been attached.

*The true construction of the terms and conditions*

182. The exclusion of liability upon which Rotex relies is contained in clause 13.3 of its Terms and Conditions. Clause 13 provides as follows:

"13.1 In respect of goods manufactured by the Seller (excluding expendable items such as, but not limited to, conveyor bands, transmission connections, cleaning equipment and electrical accessories) the Seller shall within a period of 12 months from the date of delivery repair or, at the Seller's option, replace any goods which are proved to the Seller's satisfaction to be defective in design material or workmanship provided always that this obligation will not apply where:

- (a) the goods have been altered in any way whatsoever or have been subjected to misuse or unauthorised repair; or
- (b) the goods have been installed or connected by someone other than the Seller or a person approved by the Seller; or
- (c) the Buyer has failed to observe or perform the requirements or any maintenance procedures relating to the goods; or
- (d) the Buyer has failed to notify the Seller of any defect or suspected defect immediately the same comes to the Buyer's knowledge; or
- (e) the Buyer is in breach of this or any other contract made with the Seller
- (f) where the defect arises from a defect in the Buyer's own design drawings or specification or where the goods have not been properly stored.

13.2 Where the Seller is not the manufacturer of the goods the Seller shall use reasonable endeavours to make over to the Buyer the benefit of any warranty or guarantee given by the manufacturer of those goods.

13.3 Save as provided in Clause 13.1 and 13.2 the Seller shall be under no liability under the contract for any personal injury, death, loss or damage or any kind

whatsoever whether consequential or otherwise including, but not limited to, loss of profits and to the full extent permitted by Law the Seller hereby excludes all conditions, warranties and stipulations expressed or implied, statutory, customary or otherwise which but for such exclusion would or might subsist in the Buyers favour except that such exclusion will not apply to any implied condition that the Seller has or will have the right to sell the goods when the property is to pass. Under no circumstances will the Seller or his servants, agents, or sub-contractors be liable for any loss or damage of any kind whatsoever (except arising from death or personal injury) whether consequential or otherwise caused directly or indirectly by any negligence on the Seller's part or on the part of any of the Seller's servants, agents or sub-contractors in connection with or arising out of the manufacture or supply of goods or in connection with any advice or statement given or made by or on the Seller's behalf.”

(Mr Chapman's emphasis)

183. Aldrees makes two points in relation to this clause. First, it submits that on its true construction the clause does not exclude liability for this claim. Second, it submits that the clause, which it submits was unduly onerous, was not incorporated as it was not brought to the attention of Aldrees.
184. In relation to his first point, Mr Chapman submits that clause 13 does not deal with breaches of warranty regarding performance but is concerned only with defects, and so the exclusion of liability in clause 13.3 is confined liability which arises out of the goods being defective in design material or workmanship.
185. I cannot accept this. It seems to me that clause 13.1 is providing a limited guarantee where goods are defective in design, material or workmanship and that, subject to this limited guarantee, with one exception all other liability is excluded by clause 13.3. If the clause as a whole was only concerned with defects, there would be no need for the one exception, which is the carve out from the general exclusion of liability in clause 13.3 - which relates to implied conditions that the seller has or will have the right to sell the goods when the property is to pass. But even without this, as a matter of ordinary language it seems to me that clause 13.3 contains a general exclusion of liability, subject only to the limited guarantee provided in clause 13.1 and the obligation to give the buyer the benefit of any manufacturer's guarantee in clause 13.2.
186. So, if I had concluded that Rotex's Terms and conditions were incorporated, I would reject Mr Chapman's submission that, as a matter of construction, they did not exclude liability for Aldrees' claim.
187. As to Mr Chapman's second point, that the exclusion was unduly onerous and that sufficient notice of it was not given to Aldrees, Rotex relies on the fact that Mr Aldrees admitted that he had received the terms and conditions but that he did not read them (Day 1/177). Further, Rotex relied on the fact that some of Rotex's competitors traded on very similar terms (see paragraphs 544-545 of its closing submissions) and submitted that they were typical of the terms which manufacturers of process equipment typically use in order to protect themselves against exposure to the considerable losses which might be caused by failures of the machinery supplied.

188. Whilst it is true that Rotex's terms and conditions do contain a wide exclusion of liability, there is evidence other suppliers in the industry adopt similar standard terms and accordingly I do not regard clause 13 of Rotex's terms as being unduly onerous.
189. For these reasons, I reject Mr Chapman's submissions that clause 13 would not be effective to protect Rotex had it been incorporated.

### **The events from June 2013 to February 2014**

190. As I have already mentioned, between 3 and 7 June 2013 Mr Smith visited the Aldrees site with a view to carrying out the "wet" commissioning of the machines. However, there was a problem with the machinery that delivered the sand to the Rotex silos, and so the latter had to be filled manually. It is not clear precisely what happened during this visit. Mr Smith did not mention it in his witness statement and it was quite clear that he had no recollection of it whatever, although the contemporaneous travel documents disclosed at the beginning of the trial show that he did make the visit.<sup>10</sup>
191. At paragraph 15 of his witness statement, Mr Turk simply said that "*Neil Smith of Rotex and XOL Automation commissioned the machines as planned*". I find that this did not happen either, but I accept that at least one machine was commissioned and carried out a production run as recorded in the "war room document".
192. But whatever the extent of the commissioning<sup>11</sup> that was carried out in June 2013, the contemporaneous documents show that there were numerous problems in getting the machines to work properly. There was an immediate problem with blinding, and Mr Turk explained (at paragraph 20 of his witness statement) that Aldrees decided to operate machines Nos 4 and 5 only to start with in order to try and resolve the blinding and production issues.
193. On 2 September 2013 Mr Turk sent Mr Smith a sieve analysis. In an e-mail dated 7 October 2013 Mr Smith commented that the "*finer and oversize content is greater than that of the sample we tested*". However, when he was asked about this he agreed that the figures (1.6% + 0.8%) showed that his comment was wrong, because the amount of fines in the sample he tested was 5.2% (Day 7/61).
194. On 11 September 2013 Mr Turk reported to Mr Smith that Aldrees had tested the machines with the recommended amount of balls and appropriate cleaning, but the screens blinded after 2 hours of operation. When asked about this, Mr Smith agreed that it was a very serious problem. He then said (Day 7/59):

"To be honest with you, I was not aware that the incorrect mesh was fitted at this point. I was not aware it was fitted until earlier this year, to be honest with you, until Mr Lieberwirth's report. But it answers a lot of questions on the early stages.

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<sup>10</sup> As I have mentioned, shortly before the trial Mr Turk produced a copy of a photograph that he had uploaded to his Facebook account on 6 June 2013. It showed him and Mr Smith at the plant. Mr Turk was holding a bag of sand. The caption, in Arabic, said: "*First production of our plant*". Mr Turk said that this was from the first production run of machine No 3 (Day 3/80-81). This prompted the further disclosure by Rotex of documents showing Mr Smith's travel arrangements during that month.

<sup>11</sup> For convenience, I will use the term "commissioning" without intending any implication that it was commissioning that complied with the contract.



...The blinding, looking back, was the incorrect mesh specification fitted”

195. Although Aldrees had been advised to increase the number of balls to 4 per pocket (but with the meshes as originally provided), this did not prevent the blinding and so additional balls were added but the problems with blinding, and with an excessive level of fines in the product, continued.
196. On 12 September 2013 a sieve report of the feed in the Rotex silo showed that there were 3.6% of fines and that about 30% of the feed was retained on the 355 and 500 µm meshes, as against 5.2% and 17.5%, respectively, in the April 2010 sample.
197. On 15 September 2013 Mr Turk sent an e-mail to Mr Smith asking if he had received the shipment “*of our raw materials*” and whether there was any update about the meshes. Unfortunately, that sample went missing.
198. On 6 October 2013 Mr Turk sent an e-mail to Mr Smith in which he said:

“Dear Neil,

about the statues [sic] of our minerals separator, is there any update? can you please send us a mesh slightly bigger than our current mesh “size 120”? we would like to test that to see if the blinding will be the same.

also, in meanwhile what the things [sic] we can do to solve the problem? please tell me anything you found it useful . . . and we [sic] you can come to our site for solving this matters?”
199. On about 9 November 2013 Aldrees received new meshes, and 145 µm meshes were fitted to the lower decks, but the level of fines in the product was in excess of 3% and, in addition, 20% of the material discharged as oversize was within the product size.
200. Mr Smith visited Aldrees on 4/5 December 2013. His report of that visit recorded that the issues being experienced by Aldrees at the time were a high percentage of fines in the product as a result of blinding (the screens were completely blinded within 2-3 days of start-up), and a high loss of product to the oversize fraction. He noted also that machine No 1 was reported to be vibrating. The report by Aldrees of this visit records the same problems.
201. Mr Smith noted also that the PSD in the feedstock had changed and that moisture within the feed “*has exceeded 1% on occasion*”. It is not clear what he meant by this, but Mr Turk said that he told Mr Smith that there had been a problem with the level of moisture in the feedstock on one occasion and that he (Mr Turk) assumed that it was no higher than 1%. Leaving aside the precise moisture level, I find that the note by Mr Smith is consistent with Mr Turk’s evidence and that there was only one occasion prior to this visit when there was excessive moisture in the feedstock.
202. Mr Smith recommended increasing the number of balls to 6 in pockets which had rumble strips, and to 5 in all others. However, he noted that this was unsuccessful. In relation to machine No 1 he recorded that the vibration was the result of a resonance/structural issue. There were no alternative meshes on site and so changing them was not an option. When the machines were run there was immediate blinding of the bottom deck meshes and gradual blinding to the meshes of the middle deck.

203. Mr Smith also recommended that bevels were to be fitted to additional pockets, a permanent application to the screens, and that six balls per pocket were to be used on machine No 5. New meshes were ordered with a view to fitting them to machine No 4 (having modified it in a manner similar to the modifications carried out to machine No 5). In the meantime, the machines were to be run with a low feed rate. Mr Smith noted that, given the level of available product in the feedstock, if a machine was producing 35 tph it was probably receiving in excess of 50 tph.
204. Mr Turk said that during this visit Mr Smith asked what level of fines would be acceptable to Aldrees' customers. Mr Turk checked with the marketing department and was told that the customers did not want the fines to exceed 0.9% (paragraph 44 of his witness statement). This, of course, was more restrictive than the original specification: which required 98% of the product to be within specification, but without any sub-limit on the level of fines or oversize.
205. The new requirement for the level of fines to be below 0.9% was recorded in Mr Smith's visit report as being a revision to the original specification, and he noted that:
- “Hamed Aldrees and Partners accept the yields may change as a consequence of the revised specification and the varying feed particle size distribution.”
206. In relation to machine No 4, Mr Smith recommended changing the screen on the middle deck from 250  $\mu\text{m}$  to 241  $\mu\text{m}$  (wire mesh), and that on the bottom deck to 165  $\mu\text{m}$  (polyester mesh). In relation to machine No 5, Mr Smith recommended changing the middle deck screen to 213  $\mu\text{m}$ , but to keep the screen for the bottom deck at 145  $\mu\text{m}$  (which, by then, had been fitted in place of the 118  $\mu\text{m}$  mesh originally supplied)<sup>12</sup>. The object of these changes was to reduce the blinding, although fitting a 165  $\mu\text{m}$  mesh to the bottom deck of machine No 4 would involve the loss of product between 165  $\mu\text{m}$  and 118  $\mu\text{m}$ .
207. On 5 January 2014, Mr Turk sent an e-mail to Mr Smith to confirm that they had carried out the changes to machine No 4 but, with an output of about 14 tph for about five hours, the analysis of the product showed that the level of fines ranged between 0.79% and 0.87% (and thus within the new limit for fines) and that the level of oversize was 0.194% on one sample and 0.174% on another. These results showed that the samples were also within the original specification. However, according to Mr Turk, there was no appreciable improvement in the blinding.
208. However, two days later, the level of fines in the product from machine No 4 had increased to between 1.3% and 1.5%. By this time Mr Turk had been told that the level of fines was to be no greater than 0.8%. In an e-mail of the same date, 7 January 2014, Mr Turk told Mr Smith that:

“I want to inform you that our customers are changing their [standards] for the new year. The [standards] vary from one customer and another, but generally the allowed fine materials in the product (below the 105  $\mu\text{m}$ ) shouldn't exceed 0.8%.”

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<sup>12</sup> Although this mesh had openings of 145  $\mu\text{m}$ , the overall aperture percentage was 47% - very close to 46%, which was the overall aperture percentage of the 118  $\mu\text{m}$  mesh that should have been fitted originally.

209. At paragraph 214 of its Closing Submissions Aldrees submitted that this reduction in the level of fines should not have led to any difficulty because test 2296A recorded the level of fines in the product at 0.7%. However, this submission overlooks the fact that the fines content of the PSD which Aldrees had given to Rotex in March 2010 (0.75%) was considerably lower than that of the sample provided the following month, which showed a fines content of 5% (as Mr Smith noted in his test report dated 20 April 2010).
210. In an e-mail dated 13 January 2014 from Aldrees to Rotex, but sent by mistake to Anna Rutherford, an employee of Rotex who worked in its sales department, Aldrees said:
- “The application was for silica sand with 200 T/Hr and separation of: 500 & 106 Micron, and specification of: 98% 500 to 106 Micron.
- According to your laboratory report (Num: 2269) based on a sample of our raw materials, the fines percentage in the final product was 1.65%.
- The first time the (sic) machines ran with materials was at 6/6/2013 During the commissioning visit by Mr Neil Smith, and from then until now, the machines were unable to deliver sand with quality and the specification mentioned above. We are having a problem with the fines in the final product, the fines are reaching high levels, due to the blockage “blinding” of the meshes.
- There were a follow-up and communication with your company in the UK and allot (sic) of experiments and actions done on this (sic) machines to solve this matter, also another visit from Mr. Neil on: 4/Dec/2013 But until now, the problem still unsolved.
- We are hoping that you appreciate our situation that we are not able to produce silica sand by this (sic) machines because the quality level of the final product is not meeting with our customers requirements.”
211. This was the first formal complaint by Aldrees about the performance of the machines. By this time the 145 µm mesh had been fitted to the bottom deck of at least one of the machines, but the e-mail preceded the change to the 170 µm mesh. However, the limit on the level of fines in the product had by then become 0.8%, and not the overall 2% limit on fines and oversize as originally specified (and referred to in the letter).
212. On 16 January 2014 Mr Smith sent an e-mail to Mr Turk in which he said:
- “Please replace lower stainless steel mesh on machine 4 with the 170 micron synthetic screens (leave the 213 micron screens in place on the middle decks). **I expect better blinding control and additional fines removal by doing this.** Would you agree that the smaller 213 opening of the middle deck is reducing the blinding on this deck?
- I think we have now solved the blinding issue on the lower deck so we can now work on the cut point . . . **I will look at alternative meshes for the bottom in light of the new specification** and organise some synthetic meshes for the middle deck if you feel blinding is still a problem here.”
- (My emphasis)
213. In my view, it is clear from this e-mail that the reason for adopting the 170 µm mesh for the bottom screens was to further reduce the blinding and level of fines in the

product. This conclusion is supported by Mr Smith's later statement (in an e-mail dated 12 May 2015) that "*The mesh fitted to the lower deck is 172 µm and synthetic. This mesh was selected due to blinding*". However, the reference to looking "*at alternative meshes for the bottom in the light of the new specification*" can only have meant alternative meshes to the 170 µm mesh with a view to ensuring that the new limit of 0.8% fines could be achieved.

214. The case advanced by Rotex at the trial was that the 170 µm mesh was introduced in order to achieve the required new level of fines (of below 0.8%), but in my view that is not consistent with a fair reading of this e-mail. It seems to me that at least the dominant purpose for choosing the 170 µm mesh was to control the blinding, even though that would in turn result in a reduction of the level of in specification material (above below 106 µm and below 170 µm) in the product.

215. On 11 February 2014 Mr Turk sent Mr Smith an e-mail in which he said:

"The fines level is not exceeding 0.5% on 37 TPH, tomorrow I will increase it to 45 TPH and check what happens."

216. On 13 February 2014, Mr Turk sent a further e-mail to Mr Smith in which he said:

"Everything is good now, the fines level is not exceeding 0.5%, I'm increasing the feeding every 2 or 3 days, we have reached 37 TPH on both #4 and #5."

If Mr Turk was achieving a throughput of 37 tph whilst keeping the level of fines below the new limit of 0.8%, this might suggest that a higher throughput could have been achieved if Aldrees had instead been working to the original specification.

217. At paragraph 89 of his witness statement Mr Aldrees said:

"Rotex's advice to change the bottom mesh meant that we were losing a significant amount of product between 0.118 mm and 0.145 mm, then 0.165 mm and eventually 0.170 mm. Consequently, Aldrees also decided to change the top mesh specification from 0.500 mm to 0.438 mm. This was so that we were able to sell a finer grade of silica sand (i.e between 0.150/155 mm - 0.420 mm) and so hopefully achieve a higher price. It was directly as a result of the product lost because of Rotex's advice to change the bottom mesh specification that we did this."

218. Whilst it might be inferred from this that Aldrees had changed its top mesh to 0.438 mm shortly after it was decided to fit 170 µm mesh screens to the bottom decks, the evidence discussed later in this judgment suggests that this change did not take place until much later in 2014. Accordingly, I find that it was not a direct consequence of the decision to fit 170 µm meshes to the bottom decks.

### **Commercial production – February 2014 to September 2015**

219. The e-mail of 13 February 2014 was the last communication from Mr Turk to Mr Smith about production for more than a year (although there was the occasional e-mail from Mr Turk to Mr Smith requesting further meshes).

220. However, in his first witness statement Mr Turk said that running the machine at 37 tph could not be continued because the blinding increased again, and he said that they were not able to reach 45 tph. But in cross examination, when he was asked about the entry in the minutes of the weekly meeting of directors<sup>13</sup> held on 6 March 2014 which said “*Shakers No. 4 and No. 5 are functioning properly by the ratio of 40 tonnes per hour*”, he agreed that the feed rate must have been close to 50 tonnes per hour: “*Yes, of course*” (Day 4/40). But a few minutes later, when it was put to him that the figure of 40 tonnes per hour mentioned in the minutes was in respect of the output, Mr Turk said (at Day 4/42):

“It says the ratio of 40 TPH. I cannot say for sure if it is the output or the feed.”

221. A little later he explained that the relevant Arabic word can be translated as “ratio” or “range”, which is why he could not say whether it was the feed rate or the production rate. In the light of this I suspect that the English translation of the minutes should have read “*in the range of 40 tonnes per hour*” rather than “*by the ratio of 40 tonnes per hour*”. However, this does not assist in resolving the question of whether it referred to the rate of feed or the rate of production.

222. Whilst I do not doubt the honesty of Mr Turk, he was here giving evidence about fairly detailed matters that occurred over 3 years before he made his witness statement (and over 4 years before he gave evidence) and I think that the lack of consistency in his evidence on this topic was, perhaps understandably, not uninfluenced by the exigencies of the litigation. But at best, from Aldrees’ point of view, he could not assist the court about what the 40 tph represented.

223. Given the history of close communication between Mr Turk and Mr Smith during the few weeks in January and February 2014, I consider it inconceivable that if there had been any problems with the performance of the machines at any time thereafter Mr Turk would not have been in touch with Mr Smith straightaway. Although Mr Smith left Rotex’s employment for a few months in 2014, he did not leave until 31 May 2014 and so Mr Turk could have contacted him at any time during March, April and May 2014 about any production problems, but he never did so.

224. It is a remarkable feature of this case that, although Aldrees is claiming substantial damages as a result of lost production during 2014, it has not produced a single production record in support of this part of its claim. The only documents that throw any light on the level of production achieved during 2014 are the minutes of the weekly meetings of Aldrees directors and two e-mails from Mr Turk concerning the Production (or Productivity) Status for 2015: these are dated 3 and 14 November 2014.<sup>14</sup>

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<sup>13</sup> These minutes were prepared in Arabic, and so the copies that appear in the trial bundle were translations. Accordingly, a little caution must be exercised when taking these documents at face value.

<sup>14</sup> These documents are dated using the US style, so the first is dated "11/3/2014" and the second "11/14/2014". In some of its submissions Rotex has wrongly treated the former as being dated 11 March 2014 (paragraph 235 of its Closing Submissions) - however, nothing turns on this error.

225. I will discuss these e-mails in more detail below, but for the moment it is sufficient to note that each of them contained the statement that “*one Rotex shaker can produce a quantity of about 30 to 40 tons (sic)*”. A calculation a few lines further down made it clear that these figures were tph. Mr Turk accepted, as was obviously the case, that these figures were referring to production (as opposed to feed).
226. I have already mentioned that the minutes of the weekly meeting of the Aldrees directors on 6 March 2014 recorded that:

“Shakers No. 4 and No. 5 are functioning properly by the ratio of 40 tonnes per hour and the screens for the remaining shakers are ordered.”

In the absence of any evidence or information to the contrary or an incorrect translation, I infer from the use of the expression “*functioning properly*” that the machines were functioning in accordance with the contract which, in this context, would mean operating at a feed rate of 50 tph (or about 40 tph in terms of output). This would also be consistent with the later reference to the machines being able to produce “*a quantity of about 30 to 40 tons*” (the words “tons” and “tonnes” appear to have been used indifferently, possibly as a result of translation, and I do not attach any significance to the difference).

227. A comment similar to that in the minutes for 6 March 2014 appeared in the minutes of the weekly meetings held on 20 and 27 March, and 3 and 24 April 2014. However, the minutes of the weekly meeting of 8 May 2014 recorded that:

“Shakers No 2, No 3, No 4 and No 5 are functioning great - preparing to work on shaker No 1.”

As I have already noted, it was when asked about these minutes that Mr Aldrees questioned the translation of the word “great” (Day 2/58). He said he thought that the Arabic word in the original minutes was “jayid”, which he said meant “good”. He said also that or “jayid jiddaan” was “very good”, and that “mumtaz” meant “excellent”. Mr Aldrees was then shown a copy of the original minutes in Arabic, where the word used was “mumtaz”: Mr Aldrees then translated that as meaning “great”, contrary to what he had told the court a few minutes earlier.

228. The minutes of the following meetings for 15, 22 May and 1 June 2014 had the same comment. The minutes of the weekly meeting for 21 August 2014 referred to various adjustments that were being made to the Rotex line and noted that the “*preparation and operation*” of Rotex line No 1 was expected at the end of the month. This machine was the last to be put into service and was the machine that had been manufactured originally to process limestone, and therefore required modification before it could process silica sand, and was the machine which had experienced vibration problems.
229. The minutes of the weekly meetings for 30 October, 6 and 13 November 2014 recorded that all five Rotex lines were “*functional*”. Pausing there, I find that the first two machines (Nos 4 and 5) were in commercial production by 6 March 2014, and probably from the end of February 2014. The minutes of these meetings as a whole show that machines Nos 2 and 3 were not brought into operation until about the beginning of May 2014. In the case of those two machines, that was as a result of the

lack of suitable meshes. Whilst Aldrees makes no claim in relation to the provision of spare parts by Rotex, without the required meshes it was unable to mitigate the consequences of any breach of contract by Rotex in relation to the second two machines and there has been no suggestion that the late delivery of the necessary meshes for the second two machines was in any way caused or contributed to by Aldrees.

230. The fifth machine, No 1, which was originally intended to be used for limestone, required further modification and parts in order to convert it to silica sand production. In addition, it suffered from a vibration problem which required some modifications to the structure of the machine (see the first statement of Mr Turk, paragraph 16). There is no information which points directly to the precise date on which it came into production. The minutes of the weekly meeting for 21 August 2014 noted that it was expected to come into production at the end of the month, and the minutes of the meeting of 30 October 2014 record that all five lines were “*functional*”. However, two weeks before that, the minutes of the meeting held on 16 October 2014 noted, against the words “Preparation of Rotex line”, “*preparation is done*”. However, the minutes went on to record that the sensor system was being calibrated to be operated safely, and that this was expected on 23 October. In the light of these documents, I find that the fifth machine probably came into production on 23 October 2014.
231. On 3 November 2014 Mr Turk sent an e-mail to Mr Michel entitled “Draft of the Production Status of 2015” in which he noted, under the heading “Dried Sand Production”, that:

“One Rotex shaker can produce a quantity of about 30 to 40 tons”

He then produced a figure for the daily production (of five machines), calculated as follows:

“Daily productivity of Rotex shakers = 30 tons \* 5 shakers \* 10 working hours = 1500 tons”

He therefore adopted the figure at the bottom of the productivity range for his estimate of future performance. On 14 November 2014 he sent a further e-mail in similar terms, this time headed “Productivity Report of 2015”. This e-mail contained a further section headed “Washed Sand Product”, under which Mr Turk noted:

“Washing plant is currently working with a production capacity estimated of 60% of its capacity. Increasing the percentage will be gradually over 21 days as controlling the performance of the plant is conducted accurately. The washed product current measurement is 100-500.

Daily production of washed sand: 455 tons

Monthly productivity of the washed sand including the calculation of suspensions resulting from modifications and maintenance: 455 tons x 26 days x 77.3 = 9144 tons.”

232. Unsurprisingly, Mr Turk accepted in cross examination that the figure for dried sand production of about 30 to 40 tons [sic] undoubtedly referred to the amount of product (Day 4 /44). Mr Turk was not asked about the washing plant.

233. However, Mr Michel was asked about it, and it was put to him that if the monthly production of washed sand was around 9,000 tons at 60% of capacity, then production at 100% capacity would be about 15,000 tons per month. Mr Michel agreed that this was correct, but he then interrupted Mr Hargreaves to add (at Day 4/118):

“But this is estimating. Excuse me. This is estimation.”

234. In further submissions dated 26 June 2018, Aldrees made the point that Mr Turk had never been asked to clarify whether the figures for the production of the Rotex machines were derived from actual performance data. It was submitted that it was unlikely that he could have done so as such performance was inconsistent with the actual production records from 2015 onwards. It was therefore submitted that the forecast was “*aspirational rather than evidence of actual production*” (paragraph 5 of Aldrees’ Submissions in Reply dated 26 June 2018).

235. I suspect that the submission may have been put in this way to correct an error that Mr Chapman made during the course of his oral submissions. At Day 10/75-76, Mr Chapman submitted that the e-mail of 14 November 2014 was only put to Mr Turk in cross examination at Day 4/117, and the point was then made that it had not been put to him that the figures in the e-mail represented actual performance of the Rotex machines, rather than an estimation. Mr Chapman submitted further that the title of the e-mail, “Productivity report of 2015”, meant that it was necessarily forward looking “*as to the production to be expected in 2015*”. (Day 10/77).

236. This submission may have confused two things. First, the passage in the evidence to which Mr Chapman was referring was in fact the cross examination of Mr Michel, not of Mr Turk. Second, Mr Michel’s reference to the figures being an estimate was to the figures for the washed sand, and not the dried sand.

237. Whilst I accept that the e-mail of 14 November 2014 was intended as a forecast of production for 2015, the statement “*one Rotex shaker can produce a quantity of about 30 to 40 tons*” seems to me to be an unambiguous statement of what the machines were capable of producing and that could only have been based on performance to date. It is also consistent with what was recorded in the minutes of the directors’ meetings, if the reference to “*40 tonnes per hour*” referred to the output. The element of forecast was reflected by the fact that Mr Turk took the lower figure of the production range for the purpose of estimating the future rate of production for 2015. I therefore reject the submission that the quantity of 30 to 40 tons/tonnes per day was an estimate.

238. There were no further references in the contemporaneous documents during 2014 to the capacity of the Rotex machines. However, in December 2014 local lawyers were instructed to write to Rotex in order to complain about the failures by Rotex to provide spare parts when ordered by Aldrees and the poor quality of the meshes which were supplied. The latter were said to last for not longer than 10 days. As a result of these failures, it was alleged that Aldrees had lost more than \$2.5 million by way of lost production. The remarkable thing about this letter, given the present litigation, is that it said nothing about the inability of the machines to achieve the promised throughput. The complaint related solely to the failure to supply spare parts, and the poor quality of the 30 or so meshes that were supplied.



239. When asked about this, Mr Aldrees had no satisfactory explanation. All he could say was that it was like “*beating a dead horse*” (at Day 2/53-54). But this was no answer: the “horse” of poor production since February 2014 had not even reared its head, let alone been beaten. One might have expected Aldrees to rely on its production records in order to support a claim made on the basis of the inability of the machines to accept a feed rate in excess of 20 tph, but this has not been done because, according to Mr Turk’s witness statement, Aldrees was “*not able to access*” historical daily production records prior to February 2015. There has been no satisfactory explanation as to why the production records were inaccessible or as to the steps taken in order to recover the data.
240. Faced with these difficulties Aldrees seized upon the “war room document” which, amongst other things, recorded complaints from customers, because it appeared to show that in 2015 there was still an open issue with blinding on the Rotex machines. This related to an entry that had been first made in 2013. Mr Anderton was asked about this in cross examination and he said that Rotex was poor at updating these documents, and that he was sure that there had not been a continuing issue with blinding during 2014. He said that it was early in 2014 that Mr Smith left Rotex for a few months<sup>15</sup>, during which time Mr Anderton was entirely responsible for liaising with Aldrees. He said that he heard nothing from them during that time, which is consistent with the contemporaneous documents (Day 7/182-183).
241. In early November 2014 Aldrees changed the meshes on the top decks from 500 µm to 438 µm in order to enable it to sell a finer grade of silica sand (between 150/155 µm and 420 µm): see paragraph 89 of the witness statement of Mr Aldrees quoted above. I have already rejected the assertion made by Mr Aldrees that this was done as a consequence of fitting the 170 µm meshes to the bottom decks.
242. Although Mr Aldrees said (at paragraph 97 of his witness statement) that this change took place in May 2014, there is nothing to support this. There is no direct evidence as to precisely when Aldrees changed the top deck screen to 438 µm, although Rotex suggests that this was during or shortly before November 2014 (see paragraph 8 of its Submissions in Response). At Day 2/86, it was put to Mr Aldrees that the change was made in about late October/November 2014, to which he said “*I think so*”. There is an e-mail from Mr Turk to BU (Mining) dated 17 June 2014 in which he ordered 438 µm meshes for the upper deck, so they could not have been fitted until well after that.
243. Since the change of top mesh to one of 438 µm resulted in a drastic reduction of the amount of product, probably by a factor of up to almost 50%, I find it unlikely that this change was made more than a few days before Mr Turk’s e-mail of 11 November 2014 containing his Productivity Report for 2015: it is otherwise difficult to see how he could have expected the Rotex machines to maintain a production rate of 30-40 tph in 2015. I therefore conclude that the change of the top meshes probably occurred no earlier than the week commencing 6 November 2014.
244. At about the same time Aldrees and Rotex were in dispute about the supply of spare meshes. This dispute is what gave rise to the lawyer’s letter that I have already mentioned. Further, because Aldrees had not paid the final 10% of the price, which Rotex considered to be overdue, Rotex decided to put the further provision of spares

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<sup>15</sup> As already mentioned, Mr Smith left Rotex on 31 May 2014. He returned the following October.

on hold. Relations became strained and eventually a meeting was arranged between representatives of Rotex and Aldrees, which took place in Riyadh on 22 April 2015.

245. Mr Smith took the opportunity to visit the Aldrees plant on 25 April 2015 following the meeting. There is a brief note of that visit prepared by Mr Turk, in which he noted the following:

**Findings**

Blinding of the top deck, which results in loss of the product with the over size.

...

2-The current top mesh we're using is 438 µm, this makes the production quantity lower than expected since we're removing a lot of the feed materials (as it shows in the sieve analysis, about 28% of the feed is between 425 µm & 500 µm this materials are [sic] lost through the oversize resulting in a drop of the quantity).

In addition, Mr Turk set out the PSD of a sample of the feed that had been taken on 23 April 2015 on which he had given to Mr Smith. The figures are set out below.

246. There is no explanation for this blinding of the top deck, apart from the change in the top deck mesh from 500 µm to 438 µm, and the loss of production must have been at least in part attributable to this. It does not, of itself, provide any evidence of any failure by the Rotex machines to achieve the promised performance. Aldrees were, in effect, using the machines in a way that was not contemplated at the time of purchase in order to achieve a specification that included 0% oversize material.
247. The following month Mr Smith sent an e-mail to Mr Turk, on 12 May 2015, setting out his conclusions following the visit. He said this:

“The main issue you have for reduced production level is due to the 0% > 500 micron requirement and the fact you are screening at 438 micron to achieve this, in addition to blinding but [sic] I believe you may be overfeeding the units slightly but your recent modifications to the sieve frames are providing good results.

...

**Top mesh Evaluation:** Screening at 438 micron, you are losing all the product sized material between 415 micron and 500 micron and this is affecting your plant output significantly. Please see feed PSD you provided during my visit for 23.04.2015

600 Mic – 9.550%  
500 Mic – 10.227%  
425 Mic – 27.972%  
212 Mic – 19.065%  
180 Mic – 13.071%  
150 Mic – 8.331%  
125 Mic – 6.265%  
Pan - 5.520%

To be clear. Screening at 500 and 100 micron during the test, we discharged 83% of the entire fee as product which included on size with up to 2% overs and fines. If we recovered an 83% yield with 12.1% being removed as oversize with the rest discharged as fines.

Screening at 438 micron, the oversize yield, based on the feed above increases to 47.749% (9.55 + 10.227% + 27.972%) from 12.1% with lots of product contained in the waste fraction. 47.749% oversize, equates to about 95.5 TPH at a feed rate of 200 TPH to 4 machines so nearly half the feed is discharged as waste at the moment.

In addition, the available on size material is reduced from 87% 0.1 mm to 0.5 mm to 46.7% between 0.125 and 0.45 mm. That equates to 93.4 TPH (was 166 TPH in the test) if the 4 machines are fed at 50 TPH each. Divide that by 4 and we would expect each unit to discharge 23.4 TPH (ignoring product finds retention from the bottom deck now).

...

**Lower Deck:** The mesh fitted to the lower deck is 172 micron and synthetic. This mesh was selected due to blinding. The blinding is now more controllable with the modified ball pockets but screening at 172 micron, we would expect you to lose a little product sized material below 180 micron as you would expect. Because you are cutting at 172 micron, we would expect the product fraction to retain allot [sic] of the 150 micron to 180 micron product and about 50% of the <150 micron to 106 micron which is indicated in the final product specs. That means the product class at the lower end is low and output may further is [sic] reduced due to overfeeding and blinding. With this in mind we should wait until we have done the tests according to your new requirements before ordering 1200 meshes.”

248. Aldrees submits that these figures do not show that the amount of available product in the feed had dropped to 46.7% and that it was wrong (and misleading) of Mr Smith to have suggested this. However, whilst making this point in its Reply Closing Submissions, Aldrees did not suggest what the correct figure was. Since Aldrees was operating the machines with a top screen of 438 µm and a bottom screen of 170 µm, the fractions on the 500 and 600 µm sieves and on the 125 µm sieve and the pan were all unavailable as product. That reduces the available product in the feed to 68.5%. In addition, a proportion of the amount retained on the 150 µm and the 425 µm sieves (36%), possibly the majority of it, would be unavailable as product because it would fall outside the 438 µm and the 170 µm cuts. There is no way of calculating it, but conservatively taking one third of the 36% retained on the 150 µm and the 425 µm sieves, the figures suggest that the available product in the feed was no more than about 56.5%, and possibly less. In my view, it is probable that the output would have been reduced by the order of 35%, and possibly more.<sup>16</sup> That is very significant: an output of 40 tph would be reduced to no more than 26 tph.
249. I have not overlooked the fact that under strong cross examination both Mr Aldrees and Mr Turk were persuaded to say that Mr Smith’s figure of 46.7% “*makes sense*” (Mr Aldrees at Day 2/121), or that he agreed with it (Mr Turk at Day 4/51). However, I do not consider that either of them had really understood the figures and, under the pressure of cross examination, this is not very surprising.
250. Aldrees makes a further point based on a graph that is set out at paragraph 64 of the same submissions. This is said to show that, whilst the amount of available product in

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<sup>16</sup> If the available product in the feed is 87% and the machine is working at 94.4% efficiency (per Lab Report 2269A), then the recovered product will be 82%. If the available product is only 56.5%, then at the same rate of efficiency the recovered product will be 53.3%, so the drop in production is 35%. However, this takes no account of any additional loss caused by the blinding of the top mesh or the possibility that the available product in the feed was less than 56.5%.

the feed is variable, “*the average is close to the 87% that was present in the original sample*”. As a matter of impression from looking at the graph, I doubt if this is so. However, what is much more significant is that the graph shows that between about February and November 2015 the available product in the feed varied between 50 and 90%, with nearly all the samples below 87% and an overall mean of about 70-75%. This alone would cause a drop in production of about 13.5-19.5% over that period.

251. An interesting commentary on the events during this period is to be found in an e-mail from Mr Smith to Mr Renn dated 20 May 2015. In that e-mail Mr Smith said this:

“At start-up (2013, 3 years after supplying the units) we faced some blinding issue. This was made worse because the machines were fitted with the old style MS sieve frames where the ball pockets are 12” x 12”. To assist, we welded some strips in and even changed the bottom mesh to polyester. Soon after, we reached the desired output and all was ok apart from the fact that the unit was still blinding and needed to be stopped and cleaned every 2 or 3 days.<sup>17</sup>

Recently we received complaints about a drop in production. Aldrees was complaining that they could only produce 25 tph per machine and not 42 tph. We attended a meeting in Riyadh and as a result I revisited site the same weekend to see what was happening. See my e-mail below to Mr Turk, the plant manager for more details.

#### **Findings**

More detail below but the important one was that they had changed their product specification and as a result, they had changed the screen mesh specifications for all units. With the new meshes, the yield has reduced significantly. This is made worse by the fact that they told us they got the sand from 7 or 8 different reserves and the PSD varied. It is quite easy to establish why the production has dropped and in reality they are producing what I would expect with the meshes fitted. I would even go so far to say they are probably overfeeding the units as a result.

#### **New Product Specification**

98% 0.1 mm to 0.5 mm with 0% +0.5 mm. The 0% +0.5 mm requirement is killing the duty. I have urged them to reconsider and revert to the original specification, because the +0.5 mm was very small, but it significantly increased product output. No response from them yet but this is our main argument.

#### **Meshes fitted now**

Top mesh - 438 micron  
Middle Mesh - 212 micron  
Bottom mesh - 172 micron synthetic”

(My emphasis)

252. So whilst it may be that in these e-mails Mr Smith overstated the extent to which product was being lost, the conclusion remains that the change to a 438 µm top mesh (resulting from the requirement for a 0% oversize in the product), the blinding on the top mesh and the reduction in the available product in the feed significantly reduced the output from then onwards even if it was not “killing” it.

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<sup>17</sup> This might suggest that the blinding was never resolved, but there is no hint of that in the contemporaneous documents from mid February 2014 onwards.

253. As I have already concluded, the fitting of the 438  $\mu\text{m}$  mesh to the top decks in November 2014 probably caused a reduction in output of 35%, and possibly more.
254. In paragraphs 58 and 62 of its Reply and Defence to Counterclaim Aldrees pleaded that the top mesh reverted to 500  $\mu\text{m}$  on 21 August 2015, and that it abandoned the 0% oversize specification at the same time. Rotex does not accept this: it points out that there is no documentary evidence whatever that shows that this change took place or, if it did, when it took place. In addition, Rotex does not accept that a 0% oversize specification was abandoned in relation to all the product.
255. In an e-mail dated 30 June 2015 Mr Turk made an order for a year's supply of spare meshes. These included 360 meshes of 475  $\mu\text{m}$  and 120 meshes of 500  $\mu\text{m}$ . In relation to the latter, Mr Turk said that he would like to try them on one or two machines "*to see if the > 500  $\mu\text{m}$  is under a controllable limit without exceeding the spec too much*". At paragraph 92 of his first witness statement, he explained that what he meant by this was that he wanted to see if Aldrees could use them "*without exceeding oversize in the product too much*". I take this to mean that he was still working to a specification which required nothing in the product in excess of 500  $\mu\text{m}$ .
256. In an e-mail dated 16 August 2015 Aldrees chased up its order for meshes, saying that it needed 480 top deck meshes most urgently because "*they will be in a critical condition by end of September*". It was also requesting 350 meshes for each of the middle and bottom decks. The size of the meshes is not mentioned, but so far as the top decks are concerned, it must refer to replacements for the meshes that were currently fitted, which would have been the 438  $\mu\text{m}$  meshes, but there is no indication of the size of the meshes for the top decks that had been ordered. On 27 August 2015 Rotex sent an e-mail to Aldrees to say that they were currently working on the order, and that they recognised the urgency of the need for the top meshes and were expediting this. It therefore seems very unlikely that the top deck meshes were changed on 21 August 2015.
257. At paragraph 93 of his first witness statement, Mr Turk says that these meshes arrived in September 2015. Then he said:

"All we were doing by replacing the top deck mesh to 0.500 mm was to go back to the mesh specification that we were using from commissioning in 2013 which resulted in blinding and a low feed rate..."

In the following paragraph he then said:

"Also, based on either a 0.475 mm or a 0.500 mm top deck mesh we were still losing the product between 0.170 mm and 0.118 mm because of Rotex's recommendation that the bottom deck mesh be changed to try and control the blinding on the bottom deck (and therefore undersize material in the product). I later changed the order to increase the number of 0.500 mm meshes to 200 (from 120) and decrease the 475 micron meshes to 280 (from 360). I suggested that we might mix the top deck meshes to try and increase output but keep the oversize material in the product to an acceptable level."

Finally, at paragraph 110, Mr Turk said:

“We did change the top deck mesh to 0.438 mm in May 2014, but we changed back to 0.478 and 0.500 mm top deck meshes in September 2015 when the replacement meshes had arrived and following Neil Smith’s recommendation that we do so. As can be seen from the production reports, this has not resulted in an increase in production.”

258. In relation to this last paragraph, I have already found that the change to the 438 µm mesh did not occur in May 2014, but in November 2014. But the difficulty with the rest of the paragraph is that Mr Turk does not say either how many machines were fitted with the 478 µm mesh and how many with the 500 µm mesh, or to what specification Aldrees was operating once they were fitted.
259. Unfortunately, Mr Turk’s oral evidence on this point was also not at all clear. The cross-examination proceeded as follows (at Day 4/70-71):
- “A. ...I would say around August - it was August 21. I cannot remember for sure which one - the exact date we fitted the 500 microns.
  - Q. But you didn’t abandon the 0% oversize specification because that was still a requirement of your customers, wasn’t it?
  - A. It is not actually requirement of our customers. Our customer doesn’t have this requirement. This is what I simply told Mr Neil Smith in my e-mail 2014. But it is not a customer –
  - Q. Why would you tell him that? Why would you have told Mr Smith that if it wasn’t true?
  - A. I would say that I don’t have - I didn’t want to explain a lot of data with him or share internal - the content. So I would just make my short, this is more suitable for our customers.
  - Q. Mr Turk, I’m going to suggest to you that you did not abandon the 0% specification and you did not refer [sic] to 500 microns. Do you accept that?
  - A. No. We did refer [sic] to 400/500 microns [overspeaking] back to 500 microns.
  - Q. Mr Turk, even in your own witness statement you said you went back to 500 and 475 microns. Had you forgotten that?
  - A. No. We - I refer to Mr Neil e-mail where he said that we can check the 500 micron and 475 to maintain a 0% specification, but after that we used up our 425 micron and we went straight to 500 microns completely.”
260. During this exchange Mr Turk was careful not to say that Aldrees never supplied product to a 0% specification after it reverted back to using the 500 µm meshes for the top decks. I infer from this evidence that after this Aldrees still continued to produce some product to a specification that required 0% oversize.<sup>18</sup> However, there is no material upon which the court can assess to what extent this happened or what effect it had on the output from the Rotex machines. Nevertheless, since there is no evidence to the contrary, I find that there was a change to the top deck meshes in September 2015, although how many machines were fitted with 500 µm meshes and how many with 475 µm meshes is unclear.

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<sup>18</sup> See also paragraphs 275 to 279 below.

261. Another factor relied on by Rotex is the fact that in January 2015 there was a drop in the price of sand to 115 SAR/tonne (from 129 SAR/tonne - about 10%). This would obviously have had an adverse effect on Aldrees' profit margins.
262. However, there is a further factor in play upon which much reliance was placed by Rotex, and that is the problem of "near size".

*The near size problem*

263. I have already discussed this in general terms, but it is necessary to say a little more about it at this point. If the PSD in the feed material is such that there is an excessive proportion of material in the 425-500  $\mu\text{m}$  and 500-600  $\mu\text{m}$  fractions, which was referred to as "coarse near size", then the screening of the 500  $\mu\text{m}$  mesh will become inefficient for the reasons that I have already given. The problem can be alleviated either by increasing the size of the screen or by reducing the feed rate, as Professor Lieberwirth agreed (Day 8/91): each of these measures increases the chance that every particle below 500  $\mu\text{m}$  will find an aperture in the mesh. However, in the case of a machine that is already built, the only likely option is to reduce the feed rate.
264. However, if the feed rate is reduced too much, particles landing on the top mesh may get "bounced" off by the balls in the pockets below the mesh in the way that I have already explained (because there are no particles above them to prevent this from happening). This also results in material that is in specification being discharged as oversize.
265. A further feature, peculiar to the Aldrees plant, is what is known as the recirculation line. If the machines were discharging too much material as oversize that was in fact in specification, that material would be fed back through the machines via the recirculation line. I agree with Rotex that this could create or aggravate a near size problem because it distorts the PSD of the feed.
266. Rotex placed great emphasis on the near size problem, whilst Aldrees dismissed it as a red herring. Unsurprisingly, perhaps, I find that the true position is somewhere between these two extremes.
267. When Mr Smith analysed the PSD of the feed sample that he was sent in April 2010 he found that the proportion of coarse near size (the percentage retained on the 425  $\mu\text{m}$  and 500  $\mu\text{m}$  sieves) was 9%. For the purposes of the trial, Rotex prepared a graph (Exhibit 2) which showed the percentage increase, between 13 November 2014 and 12 October 2015, in coarse near size as compared with the sample analysed by Mr Smith. The percentages varied between 42% and 354% and when Professor Lieberwirth was shown that these figures he expressed surprise at the degree of variation. However, as Aldrees has pointed out, between January and July 2016 the coarse near size was similar to that in the sample analysed in Lab Report 2269A.
268. Professor Lieberwirth noted that the feed material used during his tests was, in general, coarser than the material analysed by Rotex in 2010. However, there are no figures in his report showing or deriving the percentage of material retained on a 425  $\mu\text{m}$  sieve, so it is not possible to carry out a similar exercise with the material that he was using. But Professor Lieberwirth noted that whereas the proportion of oversize material in the sample analysis carried out by Mr Smith in 2010 was between 10.42%

and 10.6% (same sample, tested twice), the feed material that he investigated during his visit to the Aldrees site in August 2017 contained from 12.81% to 25.38% oversize material. It was Professor Lieberwirth's view, not shared by Mr Olmen, that the differences between the feed material that he tested and that tested by Rotex in 2010 were "*not material to the performance of the machines*" (Experts' Joint Statement, Issue 4).

269. I am prepared to accept this evidence, so far as it goes<sup>19</sup>, which is broadly consistent with the conclusions that I have reached in relation to Mr Olmen's evidence about the acceptability of variations in the feed (which I discuss later in this judgment). For example, I do not consider that an increase of, say, from 9% to 18% (a percentage increase of 100%) is probably material. But the exercise carried out by Rotex shows that during the period between February and August 2015, in particular, the increase was generally in the range of 100% to 300% (or 18% to 40% as a percentage of the feed).
270. I consider that where the coarse near size (that is, between 425 µm and 600 µm) was 20% or more of the feed, there was likely to be an adverse effect on productivity. However, it is not possible to quantify it on the material available.

### **Commercial production – September 2015 to July 2017**

271. Aldrees has prepared a graph showing the monthly output of the machines between February 2015 and July 2017. The average was 15.5 tph per machine. Until January 2016 the average was closer to about 17-18 tph, whereas after that it fell to about 13-14 tph. There are some interesting observations to be made about the pattern of production during this period. First, there is no obvious correlation between productivity and the periods of highest rainfall in Saudi Arabia (January, March and April). For example, production in January, March and April 2016 was slightly above the prevailing average, whereas production in June 2016 (when there is usually no rainfall) was very low; production in March and April 2017 was about average, whereas in January 2017 it was below average.
272. There was produced (as Exhibit 7) a table of daily production reports from 1 June 2015 to 21 March 2017. It is not complete (for example, there are no figures for May 2016 although there is a daily production report for that month).
273. The reports show also that there were the following periods when there was no production at all on one or more machines.

1 - 6 Dec 2015	All machines (but this may have been a period of religious festival).
19 Dec 2015 - 28 Jul 2016	No 5
18 Feb 2016	No 2
1 – 21 Mar 2016	No 3

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<sup>19</sup> It was qualified to some extent by the evidence that Professor Lieberwirth gave Day 8/91, when he appeared to accept that an increase in coarse material could result in a reduction in throughput.



26 Mar – 19 Apr 2016	No 3
27 – 29 June 2016	No 4
9 July 2016	No 4
1 – 8 Oct 2016	No 5
12 Nov 2016	No 4
26 Nov – 6 Dec 2016	No 2
29 – 30 Nov 2016	No 5
6 Dec 2016	No3
8 Dec 2016	No 4
13 - 14 Dec 2016	No 1
14 - 15 Dec 2016	No 4
27 Dec 2016	No 5
25 Jan 2017	Nos 3, 5
6, 8 – 18 Feb 17	No 3
11 Feb 17	No 4

274. The seven month period during which machine No 5 was not in production was the result of its hanger breaking, which Mr Smith attributed to the belt tension not being correct, although another explanation is a fault in the machines control software. The reason for machine No 3 being out of action in March 2016 was a vibration problem in the supporting steel structure (which was not made by Rotex). These incidents simply demonstrate that there appear to have been causes of low production that might have had nothing to do with the design or configuration of the machines.

275. During the summer of 2015 Aldrees was in the course of discussions with Haver Niagara (“Haver”) about the purchase of further screening machines. On 17 August 2015 Mr Turk sent an e-mail to Haver in which he said that Aldrees would like to request screening to the following specification:

“The input materials will be 0-3 mm silica sand, our desired output is 0-500 microns (with 0% above 500 µm) ....”

276. In response, Haver asked for a particle size distribution of the feed material. On 25 August 2015 Haver submitted a quotation for a vibrating screen for silica sand processing, which recorded the PSD for the feed material as being the following:

0.000 – 0.106 mm	=	3.29%
0.106 – 0.250 mm	=	18.64%

0.250 – 0.425 mm	=	32.61%
0.425 – 0.500 mm	=	32.80%
0.500 – 0.600 mm	=	8.05%
0.600 – 0.850 mm	=	2.31%
0.850 – 3 mm	=	2.30%

I infer that these figures must have been provided to Haver by Aldrees in response to its earlier inquiry. The coarse near size is over 40%.

277. On 10 March 2016 Mr Turk sent Haver a further PSD for the feed material which had 22.962% retained on the 500 µm sieve and 12.090% retained on the 425 µm sieve, being 35.05% in all. This appears to have been a particularly coarse sample because there was nothing below 250 µm. Mr Turk commented:

“...the feed isn’t stable but I believe that it will give an idea of the input.”

278. Mr Turk sent Haver a further e-mail on 5 June 2016 enclosing another sieve analysis, commenting that:

“...please notice the big changes of the input materials through the year.”

279. Although the evidence is sparse, it appears that Aldrees did not confine its production to product within the 100-500 µm range during 2015 or 2016 (see, for example, paragraph 4.2 of Mr Houghton’s report, at page 16). No sales plans have been disclosed showing the proposed annual or monthly output of each different product, although Mr Aldrees thought that there were annual sales plans (Day 3/21). There was also evidence that some float glass manufacturers required the product to be within the range 150-425 µm (see Day 2/64) or that 80% of the product had to be within that range (Day 2/82).

### **The sampling by the experts in July and August 2017**

280. The experts on both sides took samples at the Aldrees site, both from the mine and from various points within the plant. For Aldrees, samples were taken by Professor Lieberwirth. For Rotex, they were taken by Mr Anschutz at locations directed by Mr Olmen.
281. There was a fundamental difference in approach in the sampling of the feed. Professor Lieberwirth took his samples at the point where the feed left the silo and entered the screener. However, in order to do this the vibrator had to be switched off and so Professor Lieberwirth’s sample was taken from a stationary portion of the feed, effectively at the bottom of the silo above the screener.
282. Mr Anschutz said that this was not an appropriate point to take a sample because it was not possible to sample a free flowing stream of the material, which good practice required. This is because this is the only way to obtain a truly representative sample of the material entering the process. However, the main silo which fed the five Rotex screeners was fed from two different sources. The principal source was sand from the mine, which, after passing through the pre-screening plant, was poured onto a conveyor which took it up to the silo from which the Rotex machines were fed. On

17 July and on the morning of 19 July 2017 Mr Anschutz took some of his samples of the feed from a point at the foot of this conveyor.

283. A subsidiary source of sand was oversize (or near size) material that had been discharged from the Rotex screeners (having not fallen through the top deck) and was subsequently recirculated and fed again into the silo from which the Rotex machines were fed. Mr Anschutz took a sample from this conveyor on 18 July 2017 and again on the afternoon of 19 July 2017.
284. Mr Anschutz explained that in all cases he took his sample from a free flowing stream of material on the conveyor. However, as he acknowledged, this was not a representative sample of what was being produced by the machines during the sampling period for two reasons. First, there was a time delay - probably of 5-6 hours - between the moment when a particle of sand entered the silo and the moment when it reached the screener. Second, the oversize material which had been through the recirculation process was plainly of a different composition, in terms of particle size distribution, from the sand which came direct from the mine.
285. Mr Olmen said that the reason why the standards require a sample to be taken from a free flowing stream (and, according to Mr Anschutz, with a tool that has a length longer than the thickness of the stream and an opening at least 6 times the diameter of the largest particle diameter to be collected) is that it eliminates segregation (Day 9/6).
286. I can quite understand this, but I have difficulty seeing why, once the particles have become segregated, they should recombine at any point before reaching the silo or hopper. It seems to me that it must follow that the process of pouring the sand into the silo would again bring about de-segregation. I am prepared to accept that once the product has landed in the silo it will, in effect, form a plug of similar material. If further sand, with a different particle size distribution, is poured into the silo on top of it, there will be some blending with the existing product but only, I assume, at the interface (and, to some extent, where the material flows past the walls of the silo). Thus, broadly speaking, in the silo there will be a plug of one type of material with a plug of another type sitting on top of it. However, I can see no reason why, within each plug, the sand should not be well mixed.
287. If this is the case, then I cannot see what is wrong with taking a sample from static feedstock immediately above the feed gate to the Rotex machines, as Professor Lieberwirth did. I appreciate, of course, that simply putting a trowel into a stationary pile of material and taking out a sample will not produce a sample that is representative of the whole, unless the whole is already well mixed. However, for the reasons that I have already given, I can see no reason why the sand that is piled up above the feed gate should not be reasonably well mixed.
288. Of course, there will be a problem if the point at which Professor Lieberwirth inserted his sampling tool was the top section of a plug of material in the silo, because above it could be a plug of a different material, most of which would be the product giving rise to the output from the screeners during subsequent sampling of the emerging material.
289. However, as a matter of probability, the odds would be against this. I therefore conclude that, as between the sampling points taken by Mr Olmen and the sampling point taken by Professor Lieberwirth, the latter is likely to be more representative of

the material being processed by the screeners. However, I accept that Professor Lieberwirth's method has its limitations for the reasons that I have already given.

290. Another matter that may have tainted the sampling carried out by Mr Anschutz was that he did not appreciate that one of the machines had been differently configured, and so he was not aware of the need, when sampling the product, to ensure that only one machine was running.

### **The test carried out by Professor Lieberwirth in 2017**

291. Although both Mr Olmen and Professor Lieberwirth visited the Aldrees site in July and August 2017, respectively, Mr Olmen did not carry out any tests on the machines. The only testing of the machines themselves was carried out by Professor Lieberwirth. Prior to his testing, steps were taken for one of the Rotex machines (Rotex 4<sup>20</sup>) to be fitted with the meshes that should have been fitted when the machines were delivered. That is to say with a lower mesh which had an aperture of 118 µm and a wire diameter of 0.056 mm.
292. However, following his examination of the screen decks during his visit Professor Lieberwirth realised later (from one of his photographs – see Day 8/64) that the bottom mesh that had been fitted to Rotex 4 pursuant to these arrangements had an aperture of 117 µm<sup>21</sup> and a wire diameter of .0037 inches (0.094 mm). The effect of this increase in the diameter of the wire was that the open area of the screen (the total area of the apertures as a proportion of the total screen area) as fitted was much lower than it should have been: in order to match the open area of the mesh originally specified the area of the lower screen deck would have to be increased by about 50%. Accordingly, Professor Lieberwirth did not appreciate this fact when devising the tests to be carried out or when carrying them out.
293. The mesh supplied for the August 2017 tests had the same part number as that shown for the bottom deck on the Rotex spare parts list which accompanied proposal MQ27278 (but this was not the same as the mesh specified in the proposal itself, on page 3 - “0.118 mm Aperture, 0.056 mm diameter, 304/SS wire screen cloth, 48” x 90”). How this error occurred, and why the specified bottom deck mesh was never fitted to the machines when originally delivered, has never been explained.
294. An inevitable result of this incorrect provision of the bottom deck mesh prior to Professor Lieberwirth's visit was that he was unable to test any machine fitted with the bottom deck mesh described on page 3 of the quotation. What would have emerged if the correct mesh had been provided prior to Professor Lieberwirth's visit is a matter of speculation.
295. One feature of the machines that was noted by Professor Lieberwirth was that the feed material was discharged preferentially to the inner side of the deck because for some reason it is concentrated towards the inner side of the feed opening (see Figure 21 of his report). This means that there is a corner of the mesh at the feed end over which

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<sup>20</sup> Somewhat confusingly, Professor Lieberwirth used a different numbering system for the machines. I will use the description "Rotex N" when using Professor Lieberwirth's numbering.

<sup>21</sup> The difference of 1 µm in the apertures was said by Prof Lieberwirth to make no material difference to the performance of the mesh (at page 40 of his report).

- few or no particles pass. Professor Lieberwirth said that this effectively reduces the area of the screen that is used by the Aldrees machines and thereby reduces performance, a factor which is not taken into account when the results of laboratory tests are used to predict performance in the field: I have seen no reference to a similar distribution of feed to the laboratory machines. However, I find that this was a design or manufacturing defect which reduced the machines' productivity. Professor Lieberwirth did not quantify this but his photographs in his report suggest that the reduction in effective screen area was of the order of 10-15%.
296. The tests carried out by Mr Smith in 2010 and by Professor Lieberwirth in 2017 revealed two other reasons why the machines would not either deliver a product that contained less than 2% of fines below 106  $\mu\text{m}$  or would not achieve the required efficiency of 94.4% stated in the contract. The first is obvious, the second less so.
297. If the bottom deck mesh becomes blinded, so that the vast majority of the apertures are blocked, then it is obvious that many particles smaller than the size of the aperture will not fall through the mesh but will instead be discharged as part of the product. This was demonstrated by the testing of the Rotex 4 machine described at section 5.3.6 of Professor Lieberwirth's report. Put broadly, except for the short period after a mesh has been cleaned, the product from Rotex 4 did not achieve a level of fines below 2% unless the proportion of particles below 106  $\mu\text{m}$  in the feedstock was also below 2%: see Figure 55 of Professor Lieberwirth's report. I accept this evidence. However, since Professor Lieberwirth did not test the other machines (Rotex 1-3 and 5) at a feed rate other than 16 tph, there is no way of knowing how they would have performed.
298. What is less obvious is that if the level of agitation of the decks and the number of balls per compartment is high (two or more), particles that should pass through the top mesh may, in effect, be bounced out of the machine and discharged as oversize. Mr Smith demonstrated this in the tests described at paragraphs 50.1.6 - 50.1.13 of his first witness statement. In one test he found that the oversize fraction contained 49% of product sized material - in other words, particles that should have fallen through the top mesh had instead been discharged as oversize.
299. According to Mr Smith's witness statement, he and Mr Paulsen then decided to reduce the number of balls per pocket from two to one and to reduce the stroke from 89 mm to 51 mm (the length of the stroke effectively determines the amplitude of the vibrations). This had the effect of reducing the product sized material discharged as oversize from 49% to 19%.
300. The other machines, Rotex 1-3 and 5, were fitted with a bottom deck mesh made of a synthetic cloth with an aperture of 170  $\mu\text{m}$ . At a feed rate of 16.68 tph the fine fraction in the product was below 1% (but this was the only feed rate at which these machines were tested). In Professor Lieberwirth's view, this confirmed that the wire mesh with the wrong aperture fitted to the bottom deck of Rotex 4 was the cause of the blinding on that machine and the consequent high level of fines in the product (see section 5.3.3 of his report). I accept this opinion.
301. However, Professor Lieberwirth said that the corollary of this is that the use of a larger aperture of 170  $\mu\text{m}$  meant that "*substantial amounts*" of product sized material are lost as fines. Professor Lieberwirth was cross-examined about this in some detail

(at Day 13/120-122) and it was put to him that an analysis of the relevant test report (5-53-nc-1) prepared by Rotex showed that the product lost to the fines fraction was 0.26 tph (as against 1.12 tph lost to the coarse fraction). Professor Lieberwirth agreed that this analysis was correct.

302. In relation to the coarse fraction, Professor Lieberwirth explained that if the load of feed material on the screen is too low, the agitation by the balls will make the particles jump over the screen instead of settling on the screen and falling through an aperture. Conversely, he said that if the load is too great many particles do not have the opportunity to settle on the screen and are again discharged with the oversize. Somewhere between these two extremes, he said, there is an optimum combination of load and screen size. From the tests that he carried out on these machines, he thought that the optimum feed rate was somewhere in the region of 25 tph (see Day 13/122-124).
303. In addition, Professor Lieberwirth said that the cloth mesh has a much shorter life and is substantially more costly (I assume that this is attributable to the shorter life). This was not challenged.
304. Whilst the tests showed that there was no issue with oversize material in the product on Rotex 1-3 and 5 (it was effectively nil), there was a large quantity of product sized material in the oversize: about 35% of the oversize was below 500  $\mu\text{m}$ .<sup>22</sup> There is no evidence that this proportion was typical (for example, in November 2013 it was about 20%), but it does show that the loss of product to the oversize fraction could be considerable. Having regard to the problems with feed to the decks and the agitation of the balls identified by Professor Lieberwirth, and to the data relating to coarse near size from November 2014 onwards, doing the best I can I find that the loss of in specification product to the oversize fraction during production in 2014 was about 10%. It may well have been more, but I doubt very much that it would have been less.
305. Professor Lieberwirth's tests of the particle size distribution of the feedstock showed that it was "somewhat coarser" than the sample tested by Rotex in 2010, but a consequence of this was that the proportion of particles in the feed that was smaller than 106  $\mu\text{m}$  was almost invariably less than 2%. As a result, the required product quality of 98% within specification was generally achieved.
306. The use of a feedstock in which the proportion of material below 106  $\mu\text{m}$  was less than 2% meant that even if the bottom mesh was fully blinded the product would still be within the original specification so far as fines were concerned. Professor Lieberwirth's tests on Rotex 4 showed that, where the proportion of particles below 106  $\mu\text{m}$  in the feed material was 1.2% or less, feed rates of up to 55 tph or more could be achieved. The only exception to this was one test, which was carried out just after the bottom mesh had been cleaned, in which a product quality of almost 99% was achieved. The feed material in that test consisted of 2.1% of material that was below 106  $\mu\text{m}$ . However, this test was carried out with a feed rate of about 15.5 tph.
307. Professor Lieberwirth carried out 11 different tests on the Rotex 4 machine with a view to establishing its screening efficiency. These were carried out at feed rates that

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See the graph at Figure 51 of Professor Lieberwirth's report.

varied between about 12 and 57 tph. In only two cases was an efficiency greater than 94.4% achieved, and these were at feed rates of 15 and 23 tph, respectively. He said, in section 5.3.7 of his report, that “*The basic prerequisite for achieving a high screening efficiency is the good separation behaviour of the upper 503 microns screen deck*”. He surmised that one reason for the poor results was the intensive agitation of the material by the cleaning balls in combination with a low deck load at a low feed rate.

308. From these tests Professor Lieberwirth concluded that it was possible for the Rotex 4 machine, in the condition that he tested it, to achieve the required screening efficiency with feed rates of between about 20 and 30 tph, but that this could not be achieved at higher throughputs.
309. It is a little ironic that it was as a result of Rotex’s failure to provide the originally specified bottom mesh that Professor Lieberwirth was unable to test a Rotex machine as originally described in quotation MQ27278 during his visit in 2017. It is even more ironic that Rotex finds itself in a position to criticise Professor Lieberwirth’s report on this ground. Nevertheless, as a result of this his report does not demonstrate that the machines, as originally specified in the quotation and fed with material similar to the original samples, could not have achieved a throughput of 50 tph, with a screening efficiency of 94.4% and a product that contained no more than 2% fines or oversize. However, I am satisfied that the machines could not have performed as well as Rotex had indicated, namely that four machines could “*comfortably*” achieve a throughput of 50 tph, if only because of the one sided feed delivery that meant that use of the full screen area was not achieved.
310. Perhaps more significantly, I find that there is nothing in Professor Lieberwirth’s report that shows that the Rotex machines, if fitted with a 170 µm mesh, could not achieve an output of 40 tph of product complying with the original specification, suggesting a feed rate well in excess of 50 tph (after allowing for the excessive loss of product to the fines as a result of using a large aperture bottom mesh). Only one test was carried out on Rotex 5, and that was at a feed rate of 16.68 tph. Equally, the report does not show the contrary.

#### **The test carried out at the instigation of Mr Olmen**

311. Mr Olmen did not carry out any tests on the Rotex machines on site during his visit in July 2017 to determine output or screening efficiency. Rather, for this he arranged for laboratory tests to be carried out by Rotex using replicated sand (which is sand taken from local stocks and mixed to replicate that found in the field).
312. Mr Olmen accepted that the purpose of his tests was to explore the impact on production of sand having different moisture content, of using different feed rates and of using sand having a different composition (Day 8/187).
313. If there is one thing that this case demonstrates, it is that the laboratory tests carried out in the Rotex laboratory are poor predictors of the performance of the machines at the Aldrees site. I am not persuaded that the tests arranged by Mr Olmen were likely to do any better.

314. For this reason, and broadly for those given at paragraph 317 to 337 of Aldrees' Closing Submissions, I do not find Mr Olmen's tests to be of much assistance. In particular, as Aldrees pointed out, the sand used in Test 7, which was intended to replicate the tests carried out by Mr Renn in 2015, had a much lower coarse near size fraction (11.3% as against 20.3% in Mr Renn's test) and the fines (0.2%) were a fraction of those in Mr Renn's test (3.2%).

### **Aldrees' case on misrepresentation and breach of contract**

#### *The alleged representations and terms*

315. Aldrees contends that prior to entering into the contract it was represented by Rotex:

- (i) expressly, that each MM 3180-3 machine had a screening efficiency of 94.4%; and
- (ii) expressly, that three MM 3180-3 machines would be required to process 200 tph of silica sand; alternatively
- (iii) by implication, that each MM 3180-3 machine could be fed with silica sand at a rate of 66.6 tph at an efficiency rate of 94.4%; alternatively
- (iv) that if (which is denied, but as alleged by Rotex) it had been stated by Rotex that four MM 3180-3 machines would be required to process 200 tph of silica sand, it was an implied representation that each MM 3180-3 machine could be fed with silica sand at a rate of 50 tph at an efficiency rate of 94.4%.

(As already explained, "efficiency" means the proportion of available product in the feed which is recovered by the machine: for example, if the available product is 174 tph and the product recovered is 164.4 tph, the screening efficiency will be 94.4%.)

316. Aldrees' case in contract is that it was an express term of the contract that each of the MM 3180-3 machines:

- (i) would have a screening efficiency of 94.4%; and
- (ii) could be fed with silica sand at a rate of 66.6 tph at an efficiency rate of 94.4%; alternatively,
- (iii) if, as alleged by Rotex (but denied by Aldrees), it had been stated by Rotex that four MM 3180-3 machines would be required to process 200 tph of silica sand, it was an implied term of the contract that each machine could be fed with silica sand at a rate of 50 tph at an efficiency rate of 94.4%.

317. Rotex made a qualified admission to these terms, but only in relation to the lower feed rate of 50 tph; the qualification being that the sand fed to the machines would be "*sand as per the supplied sample*", and, in particular, that it would be sand in which there was at least 87% of available product and which had a moisture content of less than 0.3%, and that there could be oversize and fines in the product up to a maximum of 2%.



318. I would not be prepared to accept any suggestion that the sand fed to the machines had to be exactly “*as per the supplied sample*” (save that I would accept the limit on the moisture content). That cannot have been the intention of the parties for at least two reasons. First, everyone in the industry knows that sand mined from the desert is a natural product and that there will invariably be minor differences from sample to sample. Second, Aldrees had supplied Rotex with a typical PSD in March 2010, which differed from the PSD of the sample sent the following month and, in some respects, quite substantially (for example, the level of fines in the March PSD was about 0.8%, as against 5% found in the sample).
319. Although it is very much the heart of this case, this was not an issue that was addressed directly by Rotex, although its expert, Mr Olmen, said, at paragraph 4.4.8 of his report that he would only expect natural variations in the particle size distribution of the raw sand coming out of the mine to be approximately 3-4% (plus or minus) for each sieve in a sieve analysis for coarse and mid-size material, and less than 1% (plus or minus) for each sieve in a sieve analysis for fine material.
320. This was further explained in his addendum report, dated 2 March 2018, where Mr Olmen said this:

“2. That paragraph [4.4.8] is based on my 50 years’ experience of running a sand plant. The variations described in paragraph 4.4.8 of my report are in relation to the particle size distribution of mined sand. Variation of the mined sand is a result of the depth rather than moving across the mine. As you go down the mine you will encounter sections that contain more fine or more oversize material for example. Therefore, once the sand has been mined it is mixed together.

3. To assist the Court, I give the example of doing a particle size distribution analysis of this mixed mined sand on two days.

4. On Day 1 the analysis shows the coarse and mid-size material (for example on the 500 and 355 sieve) 10% material. If one day 2 that same analysis shows that the material on that sieve has reduced to 7% or increased from 10 to 13% on that sieve it would not be a surprise and not cause any concern. Anything more than that would cause concern and further investigation into the mine and where the sand was being taken from.

5. For fine material (for example the 106 sieve), I would only expect to see a variation of plus or -1% on a day 1 and day 2 of the mixed mine sand.

6. These are variations that I would expect to see in the mixed mine sand. As stated in the last two sentences of paragraph 4.4.8 of my Report of 24 November 2017, I would not expect these variations to reach the feed to the screeners on a typical sand processing plant by an experienced industrial sand producer. The processing of the sand from mixing it to feeding the screeners, as described in my report, is used to ensure what is being fed to the screeners is consistent (with any negligible variation in particle size distribution) which in turn

allows for a consistent feed rate and output from the screening machines.”

321. The processing of the sand, to which he refers in paragraph 6 quoted above is being described in his report, is a reference to what he said at paragraph 2.1.5 of his report. There he said:

“2.1.5.1. It is industry wide best practice to run mined sand through a washing plant before running it through dry sand screening machines. I would consider the use of a wash plant to not only be best practice but a necessity in order to achieve consistent feed and consistent performance from dry sand screening machines. I would expect a modern industrial sand producer or their consultant to understand that and not attempt to avoid this industrywide practice by not having a wash plant.

2.1.5.2 A washing plant helps to reduce fines, cleans clay, silt and colloid size particles from the sand, mitigates excess trace minerals (such as iron oxide), shapes sand grains by knocking off rough edges, ensures the product entering the screening machines is consistent, and, because it is used with a dryer, controls moisture. Over-all, a washing and drying plant are an essential part of the process for preparing and controlling quality and consistency of the sand to be screened.

2.1.5.3 In 50 years of working in the sand processing industry I have never heard of anyone going directly from the mine to the dry screens without utilising a wash plant and dryer to ensure a consistent screenable feed.”

322. I do not doubt that what Mr Olmen says here accords with his own experience, but nearly all of his work has been done in the USA and his only involvement with the establishment of sand screening plants outside the USA has been in England and Poland. In both cases the plants involved were for the screening of “frac” sand meeting the strict requirements of the American Petroleum Institute for use in hydraulic fracturing operations. However, he said that he has “*consulted in and/or sold sand in over 30 countries*” (without naming any of them<sup>23</sup>).
323. There is no evidence before the court about the practice in the Middle East of washing sand before it is fed to the screening machines. Rotex was put on clear notice of the fact that there were differences in the particle size distribution of the sand fed to the machines, and I consider that it must be taken to have known that Aldrees did not generally wash the sand before it was fed to the machines for this type of application. If washing was necessary in order to enable the Rotex machines to perform as represented, I would have expected Rotex to have said so.
324. Professor Lieberwirth was not asked to address this point, although, as I have already mentioned, he did say in the Experts Joint Statement that he did not consider that any differences between the PSD of the sand that he was testing and the original sample were material to the operation of the machines.

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Further information about these countries was provided after the trial – but this was too late.

325. I therefore reject any suggestion (if it is being made) that it was an implied term of the contract that there would be negligible variation in particle size distribution in different batches of feed material. However, I do accept that Rotex was entitled to assume that the machines would be fed with feed material the PSD of which would not vary significantly from that of the sample sent in April 2010. By “significantly” I mean a degree of variability which is of the order suggested by Mr Olmen in paragraph 4.4.8 of his report, but not necessarily limited to the precise figures he mentions. For example, depending on the precise figures in any particular sample, and in the circumstances of this particular contract, I would regard a difference of 5-10% in the coarse or mid-size material in the feed as being about the limit of the degree of variability that Rotex should have expected.

### *Reliance*

326. For the reasons that I have already given, I reject the case that Aldrees relied on a representation that each machine could be fed with silica sand at a rate of 66.6 tph at 94.4% efficiency, or that there was a term of the contract to that effect.

327. However, I find that Rotex did represent that four MM 3180-3 machines could process 200 tph of silica sand at 94.4% efficiency and, by implication, that each machine could process 50 tph of silica sand at 94.4% efficiency. I find also that these representations were terms of the contract. However, in each case I find that the representations or terms were qualified to the extent that (a) they were subject to there not being a significant variation in the composition of the feed to the machines (in the sense that I have summarised in the previous section of this judgment) and (b) they were given in the context of an application where 98% of the product was required to be in size (ie. between 500  $\mu\text{m}$  and 106  $\mu\text{m}$ ). This latter was made clear in each of the quotations.

328. The latter qualification was particularly important in the context of blinding, because, depending on the PSD of the feed, a specification that permitted 2% of the product to contain oversize or fines would be more tolerant of blinding than a specification that permitted only 1% of oversize or fines. Putting it another way, if the specification was reduced from 2% to 1% oversize or fines in the product, the throughput would probably have to be reduced in order to achieve the tighter specification: this is because the extent of the blinding tended to increase as the feed rate increased (see, for example, Mr Turk’s first witness statement, paragraph 59).

329. Further, I am in no doubt that Aldrees relied on these representations subject to the qualifications that I have mentioned.

330. For the avoidance of any doubt, I should make it clear (and I did not understand Rotex to suggest otherwise) that the subject of the representations was the MM 3180-3 machines that were actually supplied by Rotex. It would in my view be very odd if Rotex could erect a valid defence by saying that the representation referred only to the machines as described in the quotation so that if, by mistake, Rotex supplied a machine which was not all respects in conformity with the description in the quotation, it could escape liability.

## **Conclusions in relation to the capacity of the machines**

### *The machines as delivered*

331. Rotex now concedes that by delivering the machines with the wrong bottom meshes, it was in breach of contract (see paragraph 25 of its closing Submissions). However, it goes on to assert that no loss for the period August 2013 to February 2014 has been isolated or presented and that, in any case, commissioning of the machines was not completed until February 2014. Leaving aside this limited concession by Rotex, in my judgment there is no doubt whatever that the machines as originally delivered by Rotex could not achieve a throughput of 50 tph, or anything close to it, as Professor Lieberwirth's tests show. This was caused primarily by the provision of incorrect bottom meshes, but it was contributed to also by the manner in which the feed material was fed to the screens and the agitation of the balls (both as described by Professor Lieberwirth) - which led to the discharge of in specification product with the oversize fraction.
332. The real issue in the case is, therefore, whether or not the machines, following the modifications to the screens suggested by Rotex and the introduction of the 170 µm bottom meshes in February 2014, could achieve the required throughput of 50 tph yielding product within the original specification at the required efficiency. In other words, did these steps mitigate the loss caused by the original breach of contract so that the machines could perform in accordance with Rotex's quotation?
333. It is Aldrees' case that the machines were never capable of handling a throughput of 50 tph or otherwise performing in accordance with the contract so that, as a result, it suffered a continuing loss of profit over the working life of the machines. In order to examine that case, it is necessary to consider the various periods of operation separately.

### *February 2014 to November 2014*

334. First, it is necessary to analyse the figures in Mr Turk's e-mails of 3 and 14 November 2014 in a little more detail in order to see what they really show in terms of the throughput being achieved by the machines.
335. Whilst Mr Turk's starting figure of 30 tph was at the bottom of the range that he quoted, he made no express allowance for downtime caused by necessary maintenance, routine replacement of screens or problems upstream in the production process (such as changes in the feed). The figures put forward by Mr Olmen (at paragraph 6.5.1 of his report) indicate probable downtime at about 4-5 hours per week, per machine: in other words, about 8-10% of the time spent in production. Aldrees submitted that this was unrealistically high. Having regard to the production records, and considering the matter overall, I consider that Mr Olmen's estimate is on the high side. Ignoring the periods of extended breakdown for any particular machine, my estimate of average downtime is 5% of the time spent in production.
336. However, Mr Turk, as the Production Manager, would have been only too well aware of machine downtime and so he must have taken it into account when using 30 tph as his base figure. If, as I find, downtime was about 5% (ie. half an hour per shift per machine), the achievable output of the machines would have to be 31-32 tph in order

for a machine to produce 300 tons in a 10 hour shift (as Mr Turk's calculation assumed).

337. During his testing of the machines in August 2017 Professor Lieberwirth was able to make an assessment of the machines' screening efficiency, which he found to be within the range of 86.5% to 89.7%, with a standard deviation of 1.7%. I consider that it is reasonable to take a figure of 87.5%. This is significantly less than the 94.4% efficiency obtained in Mr Smith's tests and recorded in Lab Report 2269A. I do not find this surprising because the difference is explicable by the loss of product caused by the factors discussed elsewhere in this judgment.
338. Professor Lieberwirth also noted that the feed material investigated during his tests contained between 13.8% and 29.3% of material which was out of specification. Taking a mean of 21%, the proportion of available product in the feed that he was testing was, therefore, 79% (much lower than the 87% found in Lab Report 2269A and somewhat higher than the average proportion of about 70-75% between February and November 2015). However, Professor Lieberwirth noted that the feed was generally coarser than that tested by Rotex in April 2010.
339. Taking these figures into account, together with the fact that samples taken in May and June 2016 showed a level of available product in the feed of between 90-95% and that the limited data for 2014 showed a mean of about 82% (both figures estimated from the graph referred to above), I consider that a reasonable mean of all these figures is 80%, which is the figure I propose to take to represent the average proportion of product in the feed material between 2014 and mid 2017.
340. In order to calculate the throughput using this typical feedstock, with an efficiency of 87.5%, an output of, say, 31.5 tph has to be divided by these two figures (ie. 0.8 and 0.875). This produces 45 tph, which is the level of throughput necessary in order to achieve an average daily production of 300 tonnes per machine, per 10 hour shift.
341. Carrying out the same exercise using Mr Turk's upper limit of output, of 40 tph, produces a figure for achievable throughput per machine of 60 tph. So, in order to achieve a daily production of 300-400 tons per machine, the throughput per machine would have to be 45-60 tph.
342. If the machines were operating with the efficiency contracted for of 94.4%, these figures would become 42-55 tph.
343. However, these ranges take only limited account of other factors external to the machines that could adversely affect overall output, such as wet weather (albeit fairly rare in Saudi Arabia), staff shortages (of which there are some reports in the minutes of the weekly meetings of the directors), protracted breakdown of a particular Rotex machine resulting from, say, mechanical failure for which Rotex is not obviously responsible and breakdown or downtime of upstream machinery. Mr Turk would know the effect these on average daily production, and I would have expected him to factor them in to any estimate of future production.
344. In addition to the matters discussed in the previous paragraphs, the other principal points to be taken into account when assessing the capability of the machines to perform in accordance with the quotation are:

- (1) The lack of any production records prior to February 2015: this means that the court must do its best to assess the capability of the machines by drawing inferences from the contemporaneous documents and other available information.
- (2) The absence of any record of internal dissatisfaction with the performance of the Rotex machines from the end of February 2014 until early 2015. The only adverse comments related to the non-arrival of meshes and other spares (with the result that only two of the machines were operational for the first few months of 2014). However, Aldrees makes no claim in these proceedings based directly on any failure by Rotex to supply spare parts.
- (3) The repeated references in the minutes of the weekly meetings of the directors to the machines “*functioning properly*” or “*functioning great*” (or “*excellent*”) are inconsistent with any perception by Aldrees at the time that the machines were not achieving the expected throughput.
- (4) The references in the minutes of the weekly meetings in March and April 2014 to the machines “*functioning properly by the ratio of 40 tons per hour*” is unclear. One might expect it to be a reference to the amount of product that could be produced per hour, rather than to the feed rate, because the directors would probably be concerned with the former, rather than the latter. Further, if it was a reference to the feed rate, then why is it that the machines were recorded as functioning properly if they could only handle a feed rate of 40 tph when the expected or required feed rate was 50 tph? Or, if Mr Aldrees really believed it to be the case, 66 tph? Aldrees has no good answer to this question.
- (5) However, it is possible that Aldrees was very relieved that it could produce a product with a level of fines below 0.8% using a feed rate that was only 20-25% below that which it had expected to achieve in order to produce a product with the looser limit of 98% in specification material. This would tell one little about what throughput the machines could have achieved if producing to the original specification, save that it would almost certainly be higher. However, if this was the explanation of the notes in the minutes one might have expected someone to say so, but neither Mr Aldrees nor Mr Turk proffered this explanation. However, such an explanation (if correct) would not assist Aldrees’ case because it would be a recognition of the adverse effect on production of reducing the limit on fines to 0.8%.
- (6) Using the figures that I have derived above, a feed rate of 40 tph would yield about 28 tonnes of product, which is just below the bottom of the range taken by Mr Turk in his e-mails of 3 and 14 November 2014. I find it hard to accept that at this level of output the machines would have been described as “*functioning properly*” (unless the reason was the explanation suggested in the previous paragraph).
- (7) Leaving aside any detailed analysis of the figures, the references in Mr Turk’s e-mails of November 2014 to the machines being capable of producing 30 to 40 tph suggests that they must, at least on occasions, have produced 40 tph. Since Mr Turk considered that the accuracy of the assessment of the feed rate

based on productivity figures was no better than plus or minus 15% (Day 3/111), any estimate of the actual feed rate is only an approximation and may be an underestimate given the likely loss of product to oversize and also to fines (as a result of the use of a bottom mesh of 170  $\mu\text{m}$ ).

- (8) If, as Mr Turk's e-mails suggest, on occasions the machines were only producing 30 tph, there may have been many reasons for this unconnected with the capability of the Rotex machines (I have given various examples of this already, such as unusual changes in PSD, staff shortages, breakdown of machinery or other problems with the material taken from the mine).
  - (9) There is no suggestion in Mr Turk's e-mails, or any other contemporaneous documents, that some of the Rotex machines were capable of accepting a feed rate of 50 tph, and others were not. If this is correct, then this would suggest that each of the machines might have been able to handle of a throughput of about 50 tph in appropriate conditions.
  - (10) The telling absence from the lawyer's letter of December 2014 of any complaint about the inability of the machines to achieve the expected throughput.
345. In an attempt to rebut the inferences to be drawn from these factors, Aldrees makes the following points. First, it submits that the dominant concern in 2014 was the failure by Rotex to provide replacement meshes and so, submits Aldrees, it was not unreasonable for it to wait and see how the machines would perform when the new meshes were eventually supplied rather than make possibly premature complaints. The short answer to this is that two of the machines were in production with the new meshes right from the outset, and the second two a couple of months later: Aldrees had many months in which to assess their performance and, indeed, did so. If Aldrees thought that the machines that were in operation between February and November 2014 were not functioning satisfactorily or to specification, there would be no reason not to say so or to seek assistance from Rotex.
346. The second point, to which I have already referred, is the entry in the "war room document" about the blinding problem which had arisen in 2013 and which, on the face of the document, was still an open item in 2015. On this point I accept the evidence of Mr Anderton that this was simply an oversight by Rotex (probably Mr Anderton himself, because he was the "owner" of this particular entry) in failing to update or remove this reference (Day 7/182-183). It was Mr Anderton's evidence that no complaint about the productivity of the machines or blinding was made between February 2014 and February 2015 (Day 7/202) and, during the period that Mr Smith was away (June to October 2014), he was entirely responsible for the Aldrees account and so he would have received any complaints: he heard nothing from Aldrees during that time.
347. I accept this evidence, which is entirely consistent with the contemporaneous documents. The absence of any complaint by Aldrees between February and November 2014 and the cumulative effect of the entries in the minutes of the weekly meetings of the directors are telling: the war room document is far too slender a thread on which to hang a finding that there was a persistent blinding problem in 2014 or 2015.

348. The final point that Aldrees advances in order to rebut these conclusions is that the production records for 2015 onwards show that the machines were not achieving a throughput of 50 tph or anything like it, and so there is no reason to think that the position would have been any different in 2014. In my view, there are two answers to this point.
349. The first is that there is a very good explanation for the reduced production from November 2014 onwards, which is the change in product specification and the fitting of top meshes of 438  $\mu\text{m}$  in order to meet it. The second is that, because the machines were gradually brought into production during the course of 2014, figures for production in 2014 and 2015 cannot be compared on a like for like basis.
350. In relation to the second point, in terms of “machine months”, the machines were not in production for more than 38-40 machine months during 2014 (out of an available 60 machine months). So, if all five machines were in production during 2015, one would expect the output of the Rotex machines during 2015 - all other things being equal - to be a little over 50% more than their output in 2014. In fact, other things were not equal in that for about the last 6 weeks or so of 2014 the machines were fitted with the 438  $\mu\text{m}$  top meshes, thus reducing their output, and so a figure of 50% is conservative. The figures set out in Appendices 3.3a and 3.3b of Mr Gilbey’s report (which appear to relate to the Rotex machines), when adjusted for the average sales price per tonne for each year, show that the overall increase in production during 2015 was only about 29%. Thus production per machine in 2014 (prior to the fitting of 438  $\mu\text{m}$  top meshes) was significantly higher than in 2015, and so the point loses its force.
351. Another relevant factor is that, according to Mr Turk (at paragraph 70 of his witness statement), production during June and July 2014 was “heavily” affected by the lack of replacement meshes: e-mails sent by Mr Turk on 27 May 2014 said that Aldrees had no spare meshes, that the bottom deck meshes needed to be changed as soon as possible and that Aldrees needed 30 replacements. A quotation was sent on 31 May 2014, and on 23 June 2014 Mr Turk was still chasing the order saying that Aldrees had no spares to replace the damaged meshes in use. By 3 July 2014 the order had still not arrived.
352. So, taking all these factors into account, I consider that any comparison of production between 2014 and 2015 provides no basis for supporting the claim.
353. In the context of levels of production in absolute terms, there are two further points. The first is that output was adversely affected by two factors peculiar to the configuration of the machines. The first was the combination of the effect of the agitation of the balls and the way in which the feed to the top screen was preferentially directed to one side of the mesh so that part of the mesh was effectively unused with the result that the overall effective aperture area was reduced; and the second was the use of the 170  $\mu\text{m}$  meshes on the bottom deck. The conclusion that I have reached already is that about 10% of in specification product was discharged as oversize; I find that a further 5% of product was probably lost because it was discharged as fines when it was in fact within the product specification, making a loss of about 15% overall.



354. The second point in relation to absolute levels of production is the change of specification for the fines (to a maximum of 0.8%). It was, I think, common ground - and, if it is not, I find it to be the case - that one way to reduce any problem with blinding is to reduce the feed rate. Therefore, the lower the permissible level of fines in the product, the less the degree of blinding that can be tolerated. So, unless the feed is particularly coarse, a reduction in the permissible level of fines in the product may well only be achieved if the feed rate is reduced. This is likely to have had an adverse effect on productivity of the machines right from the outset.
355. Taking the evidence for this period as a whole, there is in my judgment no basis on which the court can safely conclude that the machines (once fitted with the new 170  $\mu\text{m}$  meshes to the bottom decks) were not able to produce about 40 tph of product during the 9 months of production between February and November 2014, so long as the feed corresponded broadly with the sample sent by Aldrees to Rotex in 2010. This is equivalent to a throughput of about 50 tph. But for the reasons I have given above, the actual throughput of which the machines were capable may have been rather more than this, although it is not possible to be precise about the true average throughput during that period.

*November 2014 to September 2015*

356. For the period November 2014 to September 2015 production was seriously affected by the decision to change the specification of the product by the introduction a limit of 0% oversize (ie. nothing above 500  $\mu\text{m}$ ). This involved replacing the 500  $\mu\text{m}$  top meshes by 438  $\mu\text{m}$  meshes. The precise extent of the reduction in the output caused by this change is difficult to quantify exactly, but it seems to have been at least 30%. In addition, there was a continuing loss of product through the bottom deck as a result of the use of the 170  $\mu\text{m}$  screen. This was not so significant as the change to the top deck meshes, but it continued to make a contribution to the reduction in production.
357. In the light of all the factors that I have discussed in this judgment, I consider that there are too many uncertainties for the court to reach any conclusion from the available material about the true capability of the Rotex machines or their ability during this period to perform in accordance with the contract. All that can be said with confidence is that Aldrees has not proved that during the period November 2014 to September 2015 the machines were not capable of accepting a throughput of 50 tph, particularly given that the machines were being required to meet, first, a reduced specification for the acceptable level of fines in the product (0.8% instead of 2% fines and oversize) and, second, from November 2014, a limit of 0% oversize.
358. Since I have not been able to reach any firm conclusion about the capacity of the Rotex machines (when fitted with the 170  $\mu\text{m}$  mesh) to perform in accordance with the contract on the basis of the evidence relating to the period between November 2014 and September 2015, the result is that Aldrees cannot prove on the evidence relating to that period that Rotex's breach of contract caused it to sustain the losses contended for. However, I must, in fairness to Aldrees, consider whether there is anything in the evidence relating to the period between September 2015 and July 2017 (just before the experts inspected the plant on site) which leads to a different conclusion.

*September 2015 to July 2017*

359. As I have already mentioned, the average daily production during 2016-17 was slightly lower than that for 2015, perhaps by about 4-5%, with an overall average between January 2015 and July 2017 of 15.5 tph. If the machines were capable of producing 30 to 40 tph in November 2014, as Mr Turk recorded, the reason for such a dramatic reduction in output a few months later and continuing until July 2017 must have been factors external to the machines. I have already concluded that between November 2014 and September 2015 this was principally the result of the change to a 438  $\mu\text{m}$  top mesh, although there may have been other factors in play as well (such as changes in the feed).
360. The natural inference from the production data shown in the graph of production for 2015-2017 would be that the top meshes were not changed back to 500  $\mu\text{m}$  in late 2015 and that this, perhaps coupled with increasing coarseness or in coarse near size of the feed, was what accounted for the continuing, and gradually declining output during 2016 and to July 2017.
361. Even if I had concluded that in early 2014 the figure of 40 tph mentioned in the minutes of the weekly meetings of directors represented the feed rate and not the output, so that the true output was of the order of 30 tph, this would still come nowhere near to explaining why the average output was half the latter figure between January 2015 and July 2017.
362. It seems to me far more likely that the decline in output between January 2015 and July 2017 was the result of a decision by Aldrees to sell a different product (with a different specification) and changes in the composition of the feed. If the machines could produce 30-40 tph in 2014, there is no reason why they should not have been capable of the same output in 2016-17 if the conditions under which they were being operated and the nature of the feed had not changed. It is therefore far more likely that the poor output in 2016-17 was caused by factors similar to those which caused the dramatic reduction of output from November 2014 onwards. So the claim as advanced by Aldrees is also unsupported by the evidence relating to the period September 2015 to July 2017.
363. In short, whilst I cannot exclude the possibility that the machines could not handle a throughput of more than 40 tph even if all other conditions were satisfactory, it is also possible - and, I think more likely<sup>24</sup> - that they were capable of achieving an output of 40 tph, and therefore capable of handling a throughput of about 50 tph. At any rate, I find that there is no satisfactory evidence which shows that, if operated as envisaged by Rotex's quotation, the machines could not handle a throughput of 50 tph once fitted with the 170  $\mu\text{m}$  bottom meshes. Accordingly, the claim for a continuing loss of profit from the outset, as advanced by Aldrees, cannot succeed.
364. Aldrees advanced a claim in the alternative for wasted expenditure. This was predicated on the assertion "*had Aldrees been aware of the true performance capacity*" of the machines, it would not have entered into the transaction (Re-

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<sup>24</sup> By saying in this passage that I "*think*" it "*more likely*", I mean the more likely of two unestablished situations: this is not to be read as a finding of fact that, on the balance of probability, the machines were capable of achieving an output of 40 tph,

Amended Particulars of Claim, paragraph 28.3). Since the finding that leads to the rejection of the loss of profit claim is, in effect, that on the basis of the evidence it has not been possible to reach a conclusion about the true capacity of the machines, that finding disposes also of the alternative claim based on wasted expenditure.

**Did the steps taken or advised by Rotex between July 2013 and February 2014 mitigate any loss that might have been suffered by Aldrees?**

365. My conclusions in the previous section are, in my view, not necessarily the end of the matter. I must consider whether or not there were any other losses suffered by Aldrees as a result of the breach of contract by Rotex that were not successfully avoided by the steps taken in mitigation.
366. Aldrees has not pleaded or advanced any alternative case on quantum, although matters have been pleaded or referred to in evidence and submissions that suggest that Aldrees did suffer some losses, albeit very much smaller than those claimed.
367. I will first consider what potential heads of claim are disclosed by the evidence and then whether or not it would be fair to Rotex to award damages on the basis of the case so disclosed.
368. In my view, there are three matters which have been disclosed by the evidence which might give rise to a claim by Aldrees based on the supply by Rotex of machines which were incapable of achieving the required performance. These are:
- (1) the delay in bringing the machines into commercial production; and
  - (2) the loss of product during operation both to oversize and to fines; and
  - (3) the additional cost of using synthetic 170 µm meshes in place of the wire meshes described in the quotation.
369. In relation to (1), the events between June 2013 and May 2014 (when I have found that the third and fourth machines were brought into production), were explored extensively in the evidence and submissions. In relation to the first machine, Rotex dealt in detail with the allegation by Aldrees that the machine was commissioned in June 2013 (in paragraph 159 to 175 of its Closing Submissions). So far as the second, third and fourth machines are concerned, there is little room for any dispute as to when they were brought into commercial production, or that the reason for the delay was the lack of the appropriate bottom meshes.
370. As to (2), the product lost to oversize was addressed in paragraphs 180 to 183 of Rotex's Closing Submissions. The loss of product that resulted from the fitting of the 170 µm bottom meshes was pleaded at paragraphs 50 and 59 of the Reply and Defence to Counterclaim. Further, Professor Lieberwirth was cross-examined in great detail about this (as I have already mentioned) and Rotex addressed the issue at paragraphs 274 to 276 of its Closing Submissions (albeit reserving its position).
371. As to (3), no evidence addressed the cost of using synthetic 170 µm meshes, save that it was mentioned in Professor Lieberwirth's report and not challenged.
372. At paragraph 372 of the draft judgment I said this:

“These are relatively narrow issues and I can see little prejudice to Rotex if they were to be taken into account. I will, of course, give Rotex an opportunity to make further submissions on these points following the circulation of this judgment in draft should it wish to do so.”

373. The parties duly made submissions in response to this invitation, and I received post judgment submissions from each party on both 30 November and 21 December 2018 (in reply). In addition, Rotex lodged a brief skeleton argument before the hearing, which had been fixed for 11 January 2019. As before, I heard argument from both Mr Chapman, with Mr Chelmick, and Mr Stansfield at that hearing.

*The delay in bringing the machines into commercial production*

374. In relation to this, Mr Turk said (at paragraph 18 of his witness statement):

“Aldrees wanted the plant to run at full production as quickly as possible after wet commissioning and after the plant had been optimised for production (which would have been two or three months maximum, with 70-80% optimisation happening in the first month).”

375. I have already found that one machine was effectively “wet commissioned” by Mr Smith in June 2013 when it carried out its first production run. However, at that stage the Haver pre-screeners were not working and so the silo for the Rotex machines had to be filled by hand. However, they were fixed and running by August 2013 (as Rotex accepts at paragraph 169 of its Closing Submissions).
376. The principal reason for the delay in bringing the machines into production was the blinding of the bottom deck meshes as a result of the supply by Rotex of the wrong meshes. I consider that if the machines had been delivered with the correct bottom meshes, the first machine could have been brought into commercial production by the end of September 2013. But since it would have been the first machine in operation, given likely teething problems I think it is unlikely that it would have achieved an output of more than 300 tph in the first few months.
377. In relation to the second, third and fourth machines, if again there had been no problems as a result of their having been fitted with the wrong bottom meshes, I consider that they could have been brought into production by the end of January 2014. This is only seven weeks after Mr Smith’s visit in December 2013, but I consider that Aldrees’ experience with the first machine would have speeded up the process a little.
378. Although, as I have already concluded, fitting the 170 µm meshes to the bottom decks mitigated the greater part of Aldrees’ loss, as Rotex hoped it would, Aldrees not having shown the contrary, I consider that Aldrees nevertheless suffered delays in putting the machines into production. These were as a result of the need to make modifications to the machines before they could be brought into satisfactory commercial production. In addition to the need to change the bottom meshes, Rotex also recommended alterations to the pockets of the screens below the meshes and the addition of extra balls. These alterations were implemented between about August 2013 and February 2014.

379. Although the position taken by Rotex in its written post judgment submissions was that it would be unfair to permit Aldrees to recover damages in respect of the loss of production between July 2013 and the dates in 2014 on which each machine went into commercial production, because such a claim had never been advanced at trial, at the hearing on 11 January 2019 Mr Stansfield realistically accepted that this was not a position that could be advanced with much force. He accepted, I think, that such a loss over this period was already covered by the way in which the claim had been pleaded, which was the difference between the quantity of product that should have been produced if the machines had complied with the contract (said to be 2,145,000 tonnes) and the actual production (465,445 tonnes) between July 2013 and December 2015. To my mind it is obvious that the former figure includes the quantity of product that should have been produced during the period whilst the machines were being modified before they could be put into commercial production.
380. However, Mr Stansfield did suggest that the first two machines went into commercial production in January 2014, and not the end of February 2014 as I had indicated in the draft judgment. Whilst it is correct to say that the 170  $\mu$ m synthetic meshes were fitted by mid January 2014, it was not until 13 February 2014 that machines Nos 4 and 5 had each achieved a throughput of 37 TPH, the feed rate having been increased every two or three days prior to that date (see paragraph 216 above). On this basis, I consider it unlikely that the machines achieved their full potential output until the last week in February 2014 and so I see no reason to alter the conclusion that I had already reached as to the date when they probably went into commercial production.
381. I consider, therefore, that Aldrees suffered the following delays in putting the machines into production that it could not reasonably have avoided:
- (1) 5 months delay in putting the machine commissioned in June 2013 into commercial production (the end of September 2013 to the end of February 2014).
  - (2) 4 weeks delay in putting the second machine into commercial production (February 2014).
  - (3) 3 months delay in putting the third and fourth machines into commercial production (February to May 2014).

*The loss consequent on the use of the 170  $\mu$ m bottom mesh and the loss of product to oversize*

382. On 5 January 2014 Mr Smith recommended changing the fitted bottom mesh with a different mesh with a 0.145 mm opening (this had an open area of 47%, very close to the specified mesh which had an open area of 46%). This was then changed to a polyester mesh with a 165  $\mu$ m opening (machine 5), and a polyester mesh with a 170  $\mu$ m opening (machine No 4). On 14 February 2014 the polyester mesh with the 170  $\mu$ m opening was fitted to machine No 5, and subsequently to the others. The effect of this was that, initially, particles above 106  $\mu$ m and below 145  $\mu$ m were being discharged as fines when, if the machines had been fitted with the mesh originally specified, they would have been discharged into the product stream (as Mr Aldrees pointed out in paragraph 87 of his witness statement). The subsequent fitting of a 170  $\mu$ m mesh would have resulted in an even greater loss of product as fines.

383. An analysis carried out by Rotex of Professor Lieberwirth's Test Report 5-53-nc-1 showed that this loss, although described by Professor Lieberwirth as "*substantial*", was found to be about 2%. However, as Professor Lieberwirth observed in his report the feed material being used in his tests was rather coarser than the sample provided by Aldrees in 2010 and, in particular, the level of fines in the feedstock that he tested was generally below 2% (as against 5% in the sample tested by Mr Smith on 20 April 2010 – see the test report at F/36/1). Extrapolating from these figures and allowing for variations in the coarseness of the feed, albeit a rather crude exercise, I consider that the loss of product by way of fines when the bottom mesh was 170  $\mu\text{m}$  would typically have been of the order of 5% (the fact that the figures of 2% and 5% appear twice is pure coincidence). 5% may in fact be a conservative estimate because I have taken no account of the additional downtime, and hence loss of production, resulting from the need to replace the synthetic meshes more frequently.
384. The second is the manner in which the material was fed to the machines. As I have already mentioned, in his visit to the Aldrees site in August 2017 Professor Lieberwirth noted that the feed entering the machines was preferentially channelled towards the inner side so that it was not deposited evenly over the mesh at the feed end. As a result, a corner of the mesh on each deck received no or few particles. The practical effect of this was that the effective size of each screen was reduced, with the consequence that the tests carried out by Rotex in the laboratory (because the test machine did not suffer from the same problem) effectively underestimated the screen area required. This problem was, I find, aggravated by the combination of the vibration of the screens and the effect of the balls bouncing below them, which tended to cause some particles to bounce off the screen and, in the case of the top deck, to be discharged as oversize.<sup>25</sup> As I have already mentioned, this latter problem was something that Mr Smith had noticed during some of the tests which he carried out in April 2010.
385. In the light of these and other matters, Professor Lieberwirth's tentative conclusion was that the machines (when Aldrees was using them with a 500  $\mu\text{m}$  top mesh) functioned most efficiently when the throughput was of the order of 25 tph. It is difficult to say what proportion of product-sized particles were typically lost to oversize, but on the basis of the original testing carried out by Mr Smith and the results of the tests carried out by Professor Lieberwirth (in which he found that in five samples of the oversize fraction there was 35% of in specification product), and again allowing for variations in the PSD of the feed, as a conservative estimate I have already concluded that it was probably of the order of 10% (in other words, there would have been about 10% more product in the absence of these factors).
386. I consider that, in principle, this is a potential head of loss suffered by Aldrees which ought to be recoverable unless be unfair to Rotex to permit such recovery in circumstances where no claim had been put forward on this particular basis.

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<sup>25</sup> It is possible that the position was the other way round, in that the dominant problem was the effect of the movement of the balls and that this was aggravated by the uneven feeding. However, it is not necessary to resolve this: in my view nothing turns on which cause was dominant.

*The additional cost of using 170 µm synthetic meshes for the bottom decks*

387. In the draft judgment, I suggested that the costs of 170 µm synthetic meshes must be a matter of record, and that I did not anticipate any serious issue about their working life. I therefore invited the parties to make submissions on these points, which they did. For the reasons which I give below, my assessment of these issues proved to be wide of the mark.

**The assessment of damages**

388. Although, as I have already concluded, Aldrees has not proved that as a result of Rotex's breach of contract it suffered a loss in terms of the claim as formulated, I consider that the need to fit the 170 µm meshes to the bottom decks caused Aldrees to suffer losses consequent upon the delays (which it could not avoid) in bringing the machines into production as set out above.

389. I am not satisfied that the delay in putting the fifth machine into production was caused by problems with the bottom mesh: it seemed that there were other reasons, such as its conversion back from a machine to process limestone and the vibration problem, for which Rotex is not alleged to be responsible.

390. In addition, between the date of coming into commercial production and 6 November 2014 there was a continuing loss of product caused by the loss of material to the oversize fraction when operated at an appropriate level of throughput and the use of the 170 µm bottom mesh. For reasons that I have already given I assess this at 15% and, given the state of the market in 2014, I see no reason why Aldrees could not have sold the additional product if it had not lost it.

391. In the draft judgment I assessed the loss per month on the basis that each machine could have produced 33.25 tph, after allowing for 5% downtime (this is based on the mean of Mr Turk's estimate of 30-40 tph). That is an output of 332.5 tonnes per day. In the case of the first machine I assumed an output of 30 tph (after downtime). I have not been invited to revisit this assessment and, even if I had been, I would not have done so.

392. Accordingly, in the draft judgment I assessed the loss of sales suffered as a result of the delay in bringing the machines into commercial production (adopting the prices used in Mr Gilbey's report, but taking a mean of SAR 124 for the first machine) provisionally as follows:<sup>26</sup>

<b>Machine</b>	<b>Days and rate</b>	<b>Price</b>	<b>Total</b>
1st machine	114 days at 300 tonnes	At SAR 124	4,240,800
2 <sup>nd</sup> machine	24 days at 332.5	At SAR 115	917,700

<sup>26</sup> Based on the entries in the minutes of the weekly directors reports for 2014 it appears that the machines, once brought into production, were probably in production 6 days a week, although I note from production reports for later years that this was not always the case. The summary of Daily Production Reports (Exhibit 7) is incomplete (for example, the figures for May 2016 are missing in their entirety).

	tonnes		
3 <sup>rd</sup> machine	78 days at 332.5 tonnes	At SAR 115	2,982,525
4 <sup>th</sup> machine	78 days at 332.5 tonnes	At SAR 115	2,982,525
			<b>11,123,550</b>

393. In arriving at these figures I did not take any account of holidays or religious festivals or any savings during the period between June 2013 and May 2014, when the third and fourth machines were not in production. Having received clarification from the parties as to the incidence during the relevant period of national holidays that would have affected Aldrees, I have revised these figures and the results are set out below. So far as the period between June 2013 and January 2014 is concerned, it appears that Aldrees initially attempted to run all the machines and then decided to concentrate on just two of them. However, at paragraph 15 of his witness statement Mr Michel said that the number of employees required to operate the Rotex machines was fixed, irrespective of the amount of silica processed (which was not the case with the old plant).
394. At paragraph 97 of his witness statement Mr Turk said that Aldrees used some of the old machines to make up for the loss of production from the Rotex machines. It seems likely, therefore, that some operators may have been redeployed on the old lines whilst some of the new machines were lying idle because Aldrees did not have sufficient 170 µm bottom meshes. However, such additional production as may have been achieved by this would not have affected the fact that Aldrees was losing of 15% of the product for the two reasons mentioned in paragraph 397 below.
395. Following a request from the court, Aldrees provided the following information about religious festivals or holidays on which there would have been no production (which, in the absence of any contrary information, I have adopted):

	2013			2014		
	From	To	Days	From	To	Days
Eid Al Fitr	7 August	10 August	3	27 July	29 July	3
Eid Al Adha	14 October	18 October	4	4 October	7 October	4
National Day	23 September		1	23 September		1
Total days:			8	Total days:		8



396. Taking these into account, and correcting errors in the number of days and the price in 2014<sup>27</sup>, I have adjusted the table at paragraph 392 above as follows:

<b>Machine</b>	<b>Days and rate</b>	<b>Price</b>	<b>Total</b>
1st machine	126 days at 300 tonnes	At SAR 124	4,687,200
2 <sup>nd</sup> machine	24 days at 332.5 tonnes	At SAR 129	1,029,420
3 <sup>rd</sup> machine	76 days at 332.5 tonnes	At SAR 129	3,259,830
4 <sup>th</sup> machine	76 days at 332.5 tonnes	At SAR 129	3,259,830
		<b>SAR</b>	<b>12,236,280</b>

397. The 5% loss of product caused by the excess irrecoverable product under 170 µm, and the discharge of in specification product as oversize, which I have assessed at 10%, if recoverable, would run from the date when each machine was brought into commercial production until, at least, 6 November 2014. This was when Aldrees changed the top meshes to 438 µm in order to produce a product of a tighter specification and which could be sold at a higher price per tonne. There is no evidence to show that Aldrees suffered any further continuing loss as a result of this change: as I have found, the hope was that the new product would be sold for a higher price (which, presumably, would offset the value of the product lost - otherwise, there would have been little point in doing it). However, there is no material upon which I can form any view as to whether or not this happened: there were many factors in play and the position is just too uncertain. Accordingly, there is no satisfactory evidence of any continuing loss beyond this date.
398. However, during the hearing on 11 January 2019 Mr Stansfield advanced an elegant argument in support of a submission that this did not in truth represent an actual loss to Aldrees. His argument, put very simply, was that when assessing the likelihood throughput of the machines, this loss was already taken into account. To permit recovery, he submitted, would in effect result in an award of the same loss twice over.
399. Mr Stansfield referred me to the exercise that I carried out at paragraphs 334 to 343 above. He submitted, correctly, that this exercise started by assessing the likely output per machine per hour during 2014 and then, by factoring in an assumed efficiency and the likely level of available product in the feed, arrived at a figure for the likelihood throughput. Accordingly, he submitted, any loss of product as a result

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<sup>27</sup> The price taken in the draft judgment of SAR 115 applied during 2015, not 2014. This was an error. The average price in 2014, according to Mr Gilbey, was SAR 128.92, which I have rounded up to SAR 129 (since the price must have started to fall at the end of the year).

of the loss of oversize and additional fines could be ignored because it was already taken into account because the calculation started with actual figures for throughput.

400. This argument, deftly presented as it was, initially struck me as very plausible. However, on reflection I realise that it contains a flaw. The purpose of the exercise that I carried out at paragraphs 334 to 343 above was to arrive at a figure, or a range, for the likely actual throughput on each machine. For that exercise, the starting point was the actual throughput as assessed by Mr Turk adjusted by a small allowance for downtime. However, the amount of product that was actually produced by each machine during this period would have been higher (at the same throughput) if there had not been the 15% loss to oversize and fines of product that was within specification. Accordingly, I conclude that this head of loss is recoverable in principle and that there has been no double counting.
401. The next question is whether or not it would be unfair to Rotex to allow Aldrees to recover damages in respect of this head of loss in circumstances where it is submitted that no claim was articulated in this way. It is correct that no such specific claim has been pleaded, but again I consider that it is covered by the general deficiency that has been pleaded (as already described). Aldrees rested its claim on the allegation that the machines did not comply with the contract because they were not capable of delivering the specified throughput at the stated efficiency. Assuming that Aldrees could establish that there was such a deficiency in the amount of product produced caused by the failure of the machines to achieve the output contracted for, it did not need to plead or prove any specific defect in the design or construction of the machines or its particular consequences. As a matter of pleading, therefore, I do not consider that Rotex has a ground of complaint. In addition, the loss of product to fines as a result of the fitting of the 170 µm bottom mesh was specifically referred to at paragraph 59 of the Re-Amended Reply and Defence to Counterclaim.
402. However, in my judgment it is not sufficient that a particular head of claim has been pleaded if the way in which the case has been conducted might have led the opposing party to think that the claim was been put in one particular way and no other because that can lead to unfairness. In my judgment, Rotex has not been taken by surprise. Not only was the loss of product to fines expressly pleaded, as I have already mentioned, it was also the subject of extensive cross examination. As to the off-centre method of feeding the feedstock to the machines, this was addressed by Professor Lieberwirth at some length in his report. It was an aspect of his evidence that was not challenged. Whilst I was slightly surprised by this at the time, on reflection I consider that it was probably a prudent exercise of judgement by Mr Hargreaves because there appeared to be no answer to it.
403. For these reasons, I consider that it would not be unfair to Rotex to permit Aldrees to recover damages on this basis.
404. In the draft judgment I assessed, for each machine, the loss between the date of its introduction into commercial production and 6 November 2014 as follows:

<b>Machine</b>	<b>Days and rate</b>	<b>Price</b>	<b>Total</b>
1st machine	240 days at 332.5 tonnes x 0.15	At SAR 115	1,376,550

2 <sup>nd</sup> machine	240 days at 332.5 tonnes x 0.15	At SAR 115	1,376,550
3 <sup>rd</sup> machine	163 days at 332.5 tonnes x 0.15	At SAR 115	934,906
4 <sup>th</sup> machine	163 days at 332.5 tonnes x 0.15	At SAR 115	934,906
			<b>4,622,912</b>

405. Again, this calculation did not take account of holidays or religious festivals.
406. In the light of the information about religious festivals or holidays on which there would have been no production, I have adjusted the figures in the table at paragraph 404, again correcting errors in the calculation of days and the price in 2014, as follows:

<b>Machine</b>	<b>Days and rate</b>	<b>Price</b>	<b>Total</b>
1st machine	207 days at 332.5 tonnes x 0.15	At SAR 129	1,331,812
2 <sup>nd</sup> machine	207 days at 332.5 tonnes x 0.15	At SAR 129	1,331,812
3 <sup>rd</sup> machine	155 days at 332.5 tonnes x 0.15	At SAR 129	997,250
4 <sup>th</sup> machine	155 days at 332.5 tonnes x 0.15	At SAR 129	997,250
			<b>4,658,124</b>

407. This produces a total loss of revenue of SAR 16,894,404. A profit margin of 22% is the figure used in the claim, although Mr Gilbey derived a higher figure, 36%, with the result that the claim was amended accordingly. Mr Houghton arrived at a profit margin of about 26%, but this was based on a reworking of the assumptions made by Mr Gilbey. Mr Houghton did not proffer it as the figure that was necessarily appropriate, but neither did he proffer an alternative lower figure. Mr Chapman submitted that I should adopt Mr Gilbey's figure of 36% because it had been put forward by an independent expert who had arrived at his own conclusion. I am not prepared to accede to this submission because I consider that there was force in some of the points made by Mr Houghton and because adopting a lower figure would allow some credit to be given for the possibility that Aldrees might have been able to sell some of the product that was "lost" (in the sense of being screened out). I therefore propose to use the figure of 22% that was originally pleaded. This produces a loss of profit on lost product of SAR 3,716,769<sup>28</sup>.

<sup>28</sup> This is a little under £700,000.

*The recovery of the additional cost of using 170 µm synthetic meshes*

408. In addition, since it has been established that using synthetic meshes is more expensive than wire meshes, I indicated in the draft judgment that Aldrees might in principle be entitled to recover the excess cost of using synthetic meshes in place of wire meshes for the periods set out in the above table. However, at the time when I issued the draft judgment I had no information upon which I could assess this head of loss, and so it was addressed in the further post judgment submissions by the parties that I have already mentioned.
409. Mr Stansfield submitted that this was an aspect of the claim which received almost no attention at the trial because it had not been raised as a discrete head of loss and that it would be quite unfair for it to be raised now for the first time. That is why, submitted Mr Stansfield, Professor Lieberwirth's evidence about this was not challenged. Even now, there is no pleaded claim for the additional cost of using the 170 µm meshes.
410. When I raised it in the draft judgment as a possible head of claim I had assumed, probably rather naïvely, that there would be little room for argument about the prices of the different meshes and a reasonable measure of agreement as to their relative service lives. However, it became apparent from the parties' submissions that the situation is in fact much more complicated. The position is not made any easier by the fact that Rotex gave Aldrees a free issue allowance of a particular quantity of meshes, without making any distinction between the type of mesh. Thus, Aldrees could have taken its entire allotment in synthetic 170 µm meshes or, say, 118 µm steel meshes without paying anything. Thereafter, it would have to pay the appropriate price.
411. In my view, this is not a head of claim that can be fairly disposed of on the basis of written submissions. There are too many factors in play (such as the life of the meshes, which may differ from one plant to another), and variables to which the court would have to assign a value without any satisfactory material upon which to do so (such as the price that Aldrees would have to pay for different types of mesh at any particular time, about which there is no agreement<sup>29</sup>). In my judgment, it is too late to permit the only alternative way of disposing of it, which would be some form of mini trial. I am therefore not prepared to allow a claim in respect of the need to use additional meshes to be advanced.

*The continuing loss resulting from the use of 170 µm synthetic meshes for the bottom decks and the off-centre feed*

412. In his post judgment submissions Mr Chapman argued that this head of loss was a continuing one and that it should not stop at November 2014.
413. He accepted that it would be difficult for Aldrees to maintain a claim on this basis for the period November 2014 to September 2015 (when 438 µm top meshes were in use), but he submitted that, once Aldrees reverted to 500 µm top meshes in September

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<sup>29</sup> Aldrees' submissions dated 30 November 2018 included ten paragraphs on issues relating to the price of the meshes and the rate of consumption. Rotex's submissions in reply dated 21 December 2018 devoted nine paragraphs addressing various points relating to the price of the meshes, and in addition raised several points about their operational lifespan.

2015, this head of loss would resume and that Aldrees was entitled to compensation for it.

414. I have some reservations about whether it is open to Mr Chapman to raise this point at such a late stage but, since I do not regard it as a recoverable head of claim, I need not discuss that aspect.
415. At paragraph 260 above I discussed the rather unsatisfactory evidence given by Mr Turk in relation to the change to the top deck meshes in September 2015 and, in particular, whether or not Aldrees still intended at that point to continue producing some product to a specification that required 0% oversize. The possibility that Aldrees did intend to go on producing of product to such a specification (and did so) is supported by the inquiry that was sent to Haver on 17 August 2015, which specifically referred to a desired product of 0-500  $\mu\text{m}$ , with 0% above 500  $\mu\text{m}$ . This issue was also discussed at paragraphs 276 to 279.
416. As I observed in paragraph 279 above, the evidence is sparse as to the specification of the product that Aldrees was producing or intended to produce during 2015 or 2016. It may well be that the low throughput rates that were recorded for 2016 and 2017 (see paragraph 271 above) were the result of the need to produce a product to a much tighter specification.
417. At all events, in my judgment the evidence about production from late 2015 onwards does not enable the court to conclude as a matter of probability that Aldrees suffered a continuing loss of 15% of product (or even some other amount) during that period. I suspect that there may have been some loss of product as a result of the off-centre feed and the use of a 170  $\mu\text{m}$  bottom meshes from September 2015 onwards, but it is impossible to put any figure (or figures) on it. So, even if it is appropriate to permit a claim for a continuing loss, there is no satisfactory material upon which the court could begin to make any assessment of the probable amount of such a loss.

### **The counterclaim**

418. On 13 July 2010 Mr Aldrees sent an e-mail to Mr Paulsen in which he confirmed the contents of a telephone conversation in which they had discussed and agreed the payment terms. Mr Aldrees wrote:
- “Last 10% upon satisfactory testing and commissioning.”
419. On the following day Aldrees sent its Purchase Order to Rotex which provided that the final 10% was to be payable:
- “At sight [sic] after testing and commissioning.”
420. Although the word “satisfactory” has been omitted, I consider that it is to be implied that the commissioning would be satisfactory: commissioning that was not satisfactory would not be the expectation of a reasonable businessman on either side of the bargain.
421. I now turn to what happened when the machines were commissioned by Mr Smith at the end of 2013 and early 2014. In early January 2014 two bags of product were checked. A sample was taken from each and the PSD analysed. In each case, the

combined oversize and fines was below the original 2% limit, but the fines were well over the 0.8% limit that Aldrees marketing manager was asking Mr Turk to achieve. However, as Mr Turk pointed out (at Day 3/135), this material was produced at about half the intended feed rate.

422. These production runs were carried out with a 145 µm bottom mesh. At this point, there were two targets that remained to be met. First, Aldrees now wanted the level of fines below 0.8% to meet the new specification. Secondly, this was to be achieved at a substantially higher feed rate, preferably approaching 50 tph. It was, as I have already found, the need to keep blinding of the bottom meshes under control that was the principal reason why Mr Smith recommended the 170 µm synthetic mesh for the bottom deck. However, as I have already pointed out, the use of the mesh with a much larger aperture would reduce the amount of product because the fraction between 100 µm and 170 µm would be lost. As already explained, I have assessed this as being about 5% on average.
423. Thereafter, the first two machines went into production fitted with 170 µm bottom meshes, but with the continuing loss of product.
424. The outcome appeared to be satisfactory according to the reports in the minutes of the weekly directors meetings and Mr Turk's e-mails of 3 and 11 November 2014, but of course this was not achieved with machines that were configured in accordance with the Rotex quotation or as delivered.
425. It is clear that the machines as delivered were not capable of being satisfactorily commissioned without alteration. It has not been established whether or not machines configured in accordance with Rotex's quotation could have met the original specification because they were never tested with that configuration.
426. The difficulty facing Rotex is that, since the machines were not capable of meeting the contractual requirements in the condition delivered, they were only made capable of doing so, or possibly doing so, by the substitution of a lower deck mesh that came at the cost of a continuing loss of about 5% of the product and an increased maintenance cost.
427. It could be inferred that the expressions of satisfaction with the performance of the machines recorded in the minutes of the weekly directors meetings during 2014 show that the commissioning was satisfactory. However, the difficulty with this suggestion is that, even if the machines were not achieving the contractual throughput of 50 tph, but only 40 tph, and Aldrees knew it, this may have been acceptable if, at the same time, they were meeting a new and tighter specification of <0.8% fines in the product.
428. Taking a narrow view, it has not been shown that the machines that Rotex contracted to supply, or the machines that they did supply, were capable of performing in accordance with the quotation (but, as I have now found, the contrary has not been shown either). The reality is that the machines as delivered had to be reconfigured during commissioning in order to achieve this or, at least, to have any prospects of doing so. I have therefore been unable to find, one way or the other, whether or not the machines really were satisfactorily commissioned - in the sense that thereafter they could meet the contractually required performance under appropriate conditions.

Accordingly, Rotex has failed to prove that it achieved satisfactory commissioning of the machines.

429. A broader view is that the machines, as eventually reconfigured and commissioned, could only produce about 85% of the yield that should have been achievable and only did so by using synthetic meshes that were more expensive to maintain than the wire meshes described in the quotation or delivered. Why, Aldrees might legitimately ask, should Rotex be entitled to payment of 100% of the price when it had supplied (finally) machines capable (at best) of 85% of the performance otherwise achievable? My answer is that Rotex is not so entitled.
430. In these circumstances, I consider that Rotex has not made out its case for payment of the remaining 10% of the purchase price. The counterclaim therefore fails.
431. In Rotex's post judgment submissions it was submitted that if Aldrees was to recover damages in respect of the 15% loss of product up to November 2014, the balance of the price should be set off against that claim. I reject this submission. If the counterclaim fails, as I have concluded that it does, then Rotex is not entitled to the remaining 10% balance of the price. That is a final determination: it is not open to review in the light of subsequent events. I can see no basis on which Rotex should be entitled to recover it simply because Aldrees is found to be entitled to recover damages for breach of contract.

### **Conclusion**

432. Although Aldrees has proved that Rotex was in breach of contract, its claim for loss of profits as formulated fails for want of proof.
433. Similarly, Rotex's counterclaim fails also: it must be dismissed.
434. The facts, as established by the evidence, show that Aldrees did suffer some losses (that were reasonably unavoidable) caused by Rotex's breach of contract in failing to supply machines that could perform in accordance with the quotation and as represented. A claim for such losses has not been formulated, although some of them are effectively within the existing claim. However, I consider that to the extent that the matters giving rise to them were fully explored in the course of the trial and that, Rotex now having a proper opportunity to be heard on any matters on which it considered it had not been able to make submissions at the trial, there is no injustice in principle in allowing Aldrees to recover damages in respect of lost production on the basis that I have set out above. I assess these damages in the sum of SAR 3,716,769 (excluding interest).
435. It appears to be common ground that damages should be ordered to be paid in SAR. I will hear counsel on any other consequential matters, including interest (if not agreed), and costs.