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Case No: HC12B01709

IN THE HIGH COURT OF JUSTICE
CHANCERY DIVISION
PATENTS COURT

Royal Courts of Justice, Rolls Building
Fetter Lane, London, EC4A 1NL

Date: 5th March 2014

Before :

Henry Carr QC
(Sitting as a Deputy Judge of the High Court)

- -

Between :

KENNAMETAL INC

Claimant

-and-

PRAMET TOOLS SRO
ASSOCIATED PRODUCTION TOOLS LTD

Defendants

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- -

Alastair Wilson QC & Richard Davis, instructed by **Browne Jacobson**, for the Claimants
Iain Purvis QC & Kathryn Pickard instructed by **Charles Russell LLP** for the Defendants

Hearing dates: 28, 29, 30 January and 3 February 2014

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Judgment

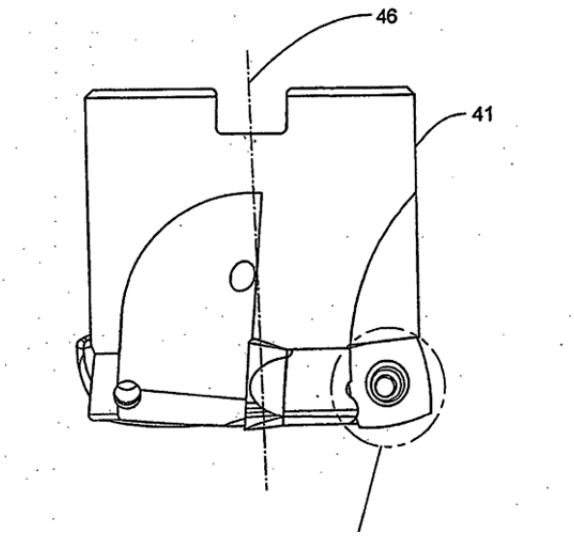
Contents

Introduction

1. By this Claim, the Claimant alleges infringement of EP (UK) No. 1,897,643 ("the 643 Patent") for a "*milling cutter tool for high feed face milling*". In particular it alleges that cutting inserts produced and sold by the Defendants ("the Pramet inserts") are infringements pursuant to Section 60(2) of the Patents Act 1977. The Defendants deny infringement and counterclaim that the 643 Patent is invalid in the light of two prior publications: Japanese Patent No. 52-103081 ("Dijet") and European Patent Application No. 1,260,298 ("Nagashimi").

2. Cutting inserts are held in revolving cutter bodies and are used to remove metal from workpieces, particularly in milling operations. Figure 8 in the 643 Patent(the first part of which is reproduced below) is an enlargement of one pocket of a cutter body (41) with a cutting insert in the bottom right hand corner.

Figure 8:



3. Mr Alastair Wilson QC, who appeared for the Claimant, explained the operation of the cutting tool as follows. In use, the cutter body will revolve about an axis running from top to bottom of the figure and will advance towards the right of the figure. The advance rate is measured in mm. per tooth. Considering Figure 8, it can be visualised that the individual insert is driven down into the page and cuts into the workpiece at a rate defined by the product of the cutting speed, "*depth of cut*" and the advance rate per tooth. The inserts will in due course traverse the page in the opposite direction on the other side of the cutter as they revolve round towards the front.

4. Before the priority date of the 643 Patent it was well known that cutting inserts were liable to carve a pattern of V-shaped grooves and ridges into the milled surface, which

would not produce a good surface finish. The cutting inserts were then liable to traverse these ridges and the back side of the cutter body would cut chunks out of them, making the surface finish still worse. When the primary milling process had finished the surface finish would need to be improved by a finishing step to smooth out the surface. Regions of cutting inserts, which performed this finishing step, were well known at the priority date and were called "*wipers*".

5. One feature of the characterising portion of claim 1 of the 643 Patent is a "*substantially straight cutting edge region of the cutting insert*" which is required to extend "*in a direction substantially perpendicular a cutting axis (46) of the cutter body*". The parties referred to this feature as "a substantially straight region". The substantially straight region is shown at 29 in the second part of Figure 8 in the 643 Patent, which is reproduced below.

Figure 8:

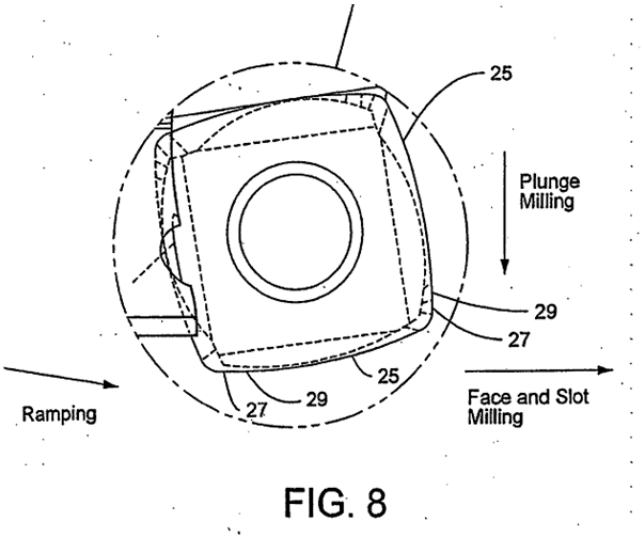


FIG. 8

6. The substantially straight region is said at paragraph [0034] of the 643 Patent "*to guarantee good surface finish on the machined surface*".

7. A primary issue between the parties is whether the Pramet inserts contain a substantially straight region. This has prompted a total of seven sets of experiments, all aimed at determining the presence or absence of a substantially straight region. This is because there is no substantially straight cutting edge region in the design drawings of the Pramet inserts. Furthermore no such region can be seen with the naked eye or under magnification. I consider this issue further below.

The Parties

8. The Claimant is the proprietor of the 643 Patent, having purchased the relevant part of the business conducted by the previous Claimant, TDY Industries LLC ("TDY"), including the 643 Patent and all rights arising in respect of infringement. Kennametal Inc. was substituted as Claimant for TDY by an Order dated 22 January 2014. The First Defendant is a Czech company that designs, manufactures and sells cutting tools, including inserts for use in such tools. The Second Defendant is the authorised distributor of the First Defendant's products in the UK. It offers certain of the First

Defendant's inserts for sale via its website and has in the past offered them in catalogues.

The alleged infringements

9. There are two types of Pramet inserts in issue: the ZDEW120408 and the ZDCW09T304 inserts. I will refer to these individually as the ZDEW and ZDCW inserts.

The skilled addressee of the 643 Patent

10. There was very little between the experts as to the identity of the skilled person. He or she is a person (or team) with responsibility for designing and manufacturing metal cutting tools and their inserts.

The expert witnesses

Mr Palmer

11. The CMC order of Morgan J. dated 5th December 2012 allowed both sides to call one expert witness. The Claimant's designated expert was John Palmer. He is an employee of Stellram, a company that was taken over by TDY and acquired by the Claimant. He is Stellram's "*Global Aerospace Segment Manager*". During cross-examination, Mr Palmer explained that he was in charge of one of the largest sectors of the Claimant's business (aerospace comprises about 40% of the business). He also explained that the inserts protected by the 643 Patent are "*of great importance to that business."*

12. Mr Iain Purvis QC on behalf of the Defendants suggested that this created an obvious conflict of interest for Mr Palmer between the requirement, as an expert, to remain impartial and uninfluenced by the pressures of litigation, and his duty as a senior employee of the Claimant to promote its interests. Mr Purvis illustrated this by reference to various passages of Mr Palmer's cross-examination. For example:

> *"Q. Obviously, therefore, you are very keen that your company should win this case.*
> *A. Yes, I would say so"* [T/2/226 lines 22-24]

13. He was also asked how he was able to maintain independence given his position within the Claimant and the importance of the 643 Patent to the business of which he was in charge:

> *"Q. So I am right, that it is hard to imagine anyone less independent than you as an expert in this case.*
> *A. In the way you put it, yes."*

14. In my judgment Mr Palmer was put in a very difficult position in his role as an independent expert. He was not an obstructive witness. However it became clear during his cross-examination that he considered that his task was to find a substantially straight region in the Pramet inserts and that it was important to maintain

this view even where it was difficult to support with objective reasons. This does not mean that I disregard his evidence. I consider that he has great practical experience of cutting inserts and was at times able to assist the Court. However, this lack of objectivity is something that I bear in mind when considering his evidence.

M. Festeau

15. M. Festeau was one of the named inventors of the 643 Patent and is employed by the Stellram division of the Claimant. He gave evidence of fact at the trial relating to the circumstances in which the invention was made. However at the start of the trial a third witness statement of M. Festeau was served which purported to comment on the Defendants' second Notice of Experiments served on the 15th January 2014. This statement was only admissible as expert evidence. The Defendants did not object to its admissibility and therefore M. Festeau was permitted to give evidence as a second expert.

16. The Defendants submitted that M. Festeau lacked independence, being one of the inventors of the 643 Patent as well as an employee of the Claimant. They further submitted that there had been significant failures to comply with the rules on instructing experts in the case of M. Festeau in at least three respects. First, he was not provided with any material or instructions about his duties as an expert until after he had prepared and signed his statement. Second, his written evidence did not contain statements to the effect that he understood his duty to the Court or was aware of the requirements of, amongst other things, Practice Direction 35. Third, although it appeared that he been provided with a bundle of material about expert duties just before his cross-examination, he did not appear to have understood them. When asked about his understanding of the duties of an expert witness, he said at [T2/2/249]:

> "*The parts that stay in my mind is – when we talk about something, you need to stay on focus on your subject, not try to talks (sic) about changing your point of view, specifically this.*"

17. The purpose of M. Festeau's third statement was to comment on the data provided by the Defendants' expert, Professor Axinte, in relation to certain surface texture scans, which are considered further below. It was necessary to correct that data to remove the effects of "waviness" inherent in the material being scanned. Unfortunately M. Festeau had used the data without correcting for the effect of waviness. He accepted in cross-examination that this was wrong and had he used the right data he would have been unable to reach the conclusion that he did in his report (see in particular [T2/2/191 – 195]).

18. Overall, I consider that M. Festeau was frank in his oral evidence and was doing his best to assist the court. I attribute the error in his third statement to the haste with which it must have been prepared. However I do consider that this mistake, which was fundamental, limits the value that can be attached to his expert evidence.

Professor Axinte

19. Professor Axinte holds the chair in Manufacturing Engineering at the University of Nottingham and is Director of the Rolls-Royce University Technology Centre in

Manufacturing at that University. He has some 25 years of experience of cutting tools which includes both academic and practical experience of the design, manufacture and use of such tools.

20. Mr Wilson acknowledged that Professor Axinte was a truthful witness but submitted that at times he seemed to have difficulty in making concessions which may have seemed unhelpful to the Defendants' case.

21. I consider that Professor Axinte was an excellent witness who was highly knowledgeable and who was able to support his conclusions with clear reasons. I consider that he held a strong view (in particular as to the absence of a substantially straight region on the Pramet cutting inserts) and was anxious to ensure that he did not say anything that might contradict this view. I do not consider that he can be criticised for this. Overall I found his evidence of considerable assistance.

Common general knowledge

22. There was very little disagreement between the experts as to what constituted common general knowledge at the priority date of the 643 Patent in October 2003. This is set out at paragraphs 28-50 of Professor Axinte's first report, by reference to a book entitled "*Modern Metal Cutting*" first published in 1994. Professor Axinte has extensively referenced this book as part of his lecture courses since 1999. He considers, and I accept, that the information relating to metal cutting and in particular to milling at Chapter X constituted part of the common general knowledge at the priority date. Relevant aspects of the common general knowledge may be briefly summarised as follows:

Milling tools

23. I have described above the general type of milling tool with which this action is concerned. It comprises a cutter body, which contains pockets into which cutting inserts can be mounted. In use the cutter body rotates round its central axis whilst either the cutting tool is moved over the workpiece surface or the workpiece surface is moved relative to the cutting tool.

Indexable cutting inserts

24. Indexable cutting inserts have multiple symmetrical cutting edges, which are rotatable. When such an insert is mounted in the cutter body, only one of its cutting edges is in contact with the workpiece at any time. When that cutting edge wears down the insert is taken out, rotated and then remounted in the cutter body so that an unused cutting edge comes into contact with the workpiece. When the insert is driven into the workpiece it creates chips as it is moved through the metal.

Positively-held cutting inserts

25. Various shapes and sizes of indexable cutting inserts were available at the priority date. The general shape comprised a top face, the edges of which are the cutting edges, and a bottom face. The 643 Patent is concerned with a positively-held shape in which the bottom face is smaller than the top face to allow for a clearance angle

between the front face and the workpiece in use. The surfaces between the top and bottom faces of positively-held shape inserts are known as "*clearance surfaces*". They are angled away from the workpiece being milled in order to provide clearance.

Face milling

26. This is a process whereby the cutting tool proceeds along the top face of a workpiece, taking off a maximum fixed depth of metal with each pass.

Surface quality

27. The geometry of the cutting edge has an effect on the surface quality left after milling. Surface quality is related to the feed rate. The higher the feed rate, the poorer the surface quality.

28. It was well known at the priority date that surface quality could be improved by the inclusion in the cutting edge of a flat section at the lowest part of the cutter extending in a direction essentially parallel to the finished face and therefore perpendicular to the axis about which the cutter body rotated. Such "*wipers"* or *"parallel lands"* are discussed in *Modern Metal Cutting* at [X-50-52]. The length of the parallel land needed to be greater than the advance rate such that the flat surfaces left by the action of the "wiper" will overlap each time. An example is shown at X-51.

29. A further common approach before the priority date was to place a special insert in one of the pockets of the cutter body with a long wiper. Following the action of the main cutting inserts this would smooth or wipe away the wavy surface left by those inserts on each rotation. Such a "*wiper insert*" is shown on [X52] of *Modern Metal Cutting*.

30. In his reply report at [9]-[12], Mr. Palmer agreed with Professor Axinte that some manufacturers' cutting inserts did have a straight cutting edge section for wiping purposes. However he explained that these were not high feed rate inserts and that with a relatively short advance rate it was possible to incorporate a wiper of appropriate length without undue increase in the size of the insert. He explained that in a circular cutter a chord would be ground away to provide a straight edge. Mr Palmer explained that it was not common general knowledge to make several fast passes for roughing purposes followed by a slow smoothing pass using the same tool. Rather, the standard method before the priority date was to make several high speed passes with a cutting tool and then to make a final pass at a lower advance rate using a wiper insert. Professor Axinte stated during his cross-examination that he could not confirm that it was conventional to make several fast passes for roughing followed by a slower smoothing pass using the same tool (T4/469/113-118).

31. The Claimant put forward a Stellram milling sales brochure from February 2002 showing cutting inserts the design principles of which were said to be common general knowledge. That catalogue shows that the same inserts were sold for roughing, semi-finishing and finishing applications (see for example [F/1/77]). So, even though it was not conventional to make several fast passes for roughing followed by a slower smoothing pass using the same insert, nonetheless it was well known to

use the same insert to achieve roughing at a fast feed rate and then, in a separate operation, to achieve smoothing at a slower feed rate.

The 643 Patent

32. Mr Wilson explained in his opening Skeleton that at the time the 643 Patent was applied for, the Applicants thought that they were the first inventors of a novel profile for the extremely fast removal of metal (by the use of convex cutting edges) and the original patent specification and claims were drafted with that invention particularly in mind. However, Hitachi had got there first. Hitachi's work is described in the Nagashimi specification, which is the main citation in the present action. The Claimant's case is that the Application for the 643 Patent contained an additional feature that was not disclosed in Nagashimi. Therefore, in the course of prosecution in the EPO, claim 1 of the 643 Patent was amended to add the requirement that at the bottom of the cutting insert there was to be a substantially straight cutting edge section, the purpose of which was to create a good surface finish.

33. This explains why there is very little in the 643 Patent concerning the substantially straight region. The background to the invention is set out at [0002]-[0008]. Square and round shaped inserts are discussed. The Description explains that round shaped inserts are stronger than square shaped inserts, and that the larger the radius the larger the portion of cutting edge engaging the workpiece, and hence the greater the feed rate that can be used without a loss of surface quality. However, the Description states that there is a limitation with a round shaped cutting insert in that the larger the radius the larger the insert. It was difficult to use increasingly large inserts in conventional machining applications.

34. The object of the invention is identified at [0009] as to produce a cutting insert that can be used for significantly increased feed rates during face milling operations whilst maintaining tool life; is similar to a round shaped insert in that it has favourable strength; is also similar to a square shaped insert in that it includes multiple cutting edges; is indexable; and allows for a high feed rate and favourable wear properties. A cutting insert that "*includes at least four convex cutting edges*" which may comprise "*at least one of a circular arc, a portion of an ellipse, a portion of a parabola, a multi-segment spline curve, a straight line or combinations of these achieves this object.*" The Description does not require the cutting edge of the cutting insert to have a substantially straight region and indeed various embodiments do not. For example, at [0024], when describing the embodiments of Figure 4, the Description states, "*such embodiments do not include one or more substantially straight (i.e. linear) cutting edge regions*".

35. The advantage of including a substantially straight region in the cutting edge is first discussed at [0031] by reference to Figure 6(b). It is explained that certain embodiments of cutting inserts may have a second region to the cutting edge "*such as in this example a linear cutting edge region that is perpendicular to the cutting insert axis…. of the cutting insert*". At [0034] it is stated that:

> "*In certain face milling applications as shown in Figure 8 the straight cutting edge 29 may be perpendicular to the cutting axis 46 to guarantee good surface finish on the machined surface*."

36. Accordingly, whilst the use of a straight cutting edge to guarantee good surface finish is disclosed in the 643 Patent, it is presented as an option and is not referred to in the objects of the invention or the advantages of the invention. I was also told that this feature was not included in any of the sub-claims of the Application as filed. There is no description of the way in which the cutting insert shown in Figures 6(b) and 8 needs to be used to achieve high speed cutting and good surface finish. In particular there is no disclosure of several fast passes for roughing purposes followed by a slower smoothing pass using the same tool.

Claim 1 of the 643 Patent

37. The Claimant did not concede that claim 1 is the only independently valid claim, though it did only assert infringement of that claim. Claim 1 may be divided in to the following integers:

(1) A milling cutter tool comprising:
(2) A cutter body including at least one cutting insert pocket; and
(3) At least one cutting insert positioned in the cutting insert pocket, the cutting insert comprising:
(4) A top surface comprising:
(5) Four identical convex cutting edges; and
(6) Four identical nose corners connecting the convex cutting edges, wherein
(7) Each convex cutting edge includes a curved cutting edge region and a first substantially straight cutting edge region adjacent the curved cutting edge region and wherein
(8) A radius of each curved cutting edge region is greater than or equal to 2x the radius of the largest circle that may be inscribed on the top surface
(9) A bottom surface comprising a bottom edge; and
(10) Four identical side surfaces each side surface extending between a convex cutting edge and the bottom edge

Characterised in that:

(11) Each side surface comprises:
(12) A primary conical clearance surface extending from a curved cutting edge region toward the bottom edge; and
(13) A first planar facet extending from a first substantially straight cutting edge region toward the bottom edge; and
(14) A secondary conical clearance surface extending from each nose corner toward the bottom edge;
(15) Wherein when the cutting insert is mounted in the cutting insert pocket of the milling cutter a first substantially straight cutting edge region of the cutting insert extends in a direction substantially perpendicular to a cutting axis of the cutter body.

38. The claim is very long but the inventive concept, as the parties agreed, is a milling cutter tool comprising a cutter body and a cutting insert with four convex cutting edges of large radius and a substantially straight cutting edge region which extends in a direction substantially perpendicular to the cutting axis of the cutter body.

Construction

39. I will apply the well known principles on the approach to construction as summarised by Jacob LJ in *Virgin Atlantic Airways v Premium Aircraft Interiors Group* [2010] RPC 8 at paragraph 5. There were only two disputes as to construction of the claim.

Substantially straight cutting edge region (integer 15)

40. A key issue between the parties is what constitutes a "*substantially straight cutting edge region*" in the context of the 643 Patent. The Claimant's case is that there are no limitations as to size within the claim and that even a tiny substantially straight region in an arc of large radius would satisfy this feature of the claim. Such a tiny region might occur by accident during milling of the radii of the cutting inserts. The Claimant contended that a tiny flat area, inadvertently created, could make a significant functional difference by improving the surface of the finished workpiece, as compared with an arc which did not have such a substantially straight region. Therefore, even where it was impossible to detect a substantially straight region in a cutting insert, whether by the naked eye or under magnification, nonetheless, if any such region existed, this satisfied this feature of the claim.

41. The Defendants submitted that the word "*straight*" is used in the 643 Patent in contradistinction to "*curved*". "*Curved*" in the context of the 643 Patent includes arcs of circles that are very large in comparison to the size of the cutting insert. For example [0018] discloses an arc whose radius is "*greater than or equal to 10 times the radius of the largest circle that may be inscribed on the top surface of the cutting insert*".

42. Professor Axinte explained that the combination of trigonometry and natural unevenness of a carved out surface means that it is impossible to distinguish between very short sections of the circumference of a circle of wide radius and very short sections of a straight tangential line. The bumpiness of the surface overwhelms any differences that there might be between a straight line and an arc over a very short distance such that the region cannot be classified either as a straight line or an arc, or alternatively could be classified as either, such classification being entirely arbitrary and subjective. This point was illustrated by the cross-examination of Mr Palmer. It was put to him that Professor Axinte's calculation showed that over a very small area a straight line was indistinguishable in practical terms from an arc. To the extent that he disagreed, his view was entirely subjective. He said [T2/280/9-23]:

> "*A. But for me if I look at those figures I see the possibility of three events. Either a circle or a flat, and the circles could be both directions here depending on how you interpret the data. So it is subjective.*
> *Q. Yes. So you cannot actually draw any conclusions from this data that support your hypothesis that it is a straight line, correct?*
> *A. My view is still the same.*
> *Q. But you have just told us that you can draw any number of hypotheses on this data.*
> *A. Yes.*
> *Q. So why is your view still the same on this data?*

A. My view is that there is a straight line.
Q. This is an article of faith, is it not, Mr Palmer?
A. No."

43. The Defendants therefore submitted that this feature of the claim requires a region of sufficient length that it can be properly distinguished as being substantially straight, as opposed to a continuation of the arc of the adjacent curved cutting edge. It follows that the wider the radius and the rougher the surface, the longer a section has to be before it can be identified as having the characteristics of a substantially straight region rather than an arc.

44. The Defendants also relied on Mr. Palmer's evidence at [19] of his reply report where he considered the natural granularity of the inserts in this case. He explained that it was appropriate to round data expressed in mm. to 3 decimal places, as any further precision would have no significance at all. This meant rounding to 1 micron. This accords with the fact that the uneven surface consists of granules of tungsten carbide of a diameter of about 1 micron.

45. The difference between a straight line drawn at the tangent of a circle and a section of an arc of a circle at that point can only be identified in terms of the variation in height between the two along its length. So the Defendants submit that if the variation along the length of that region is less than 1 micron then, on the Claimant's own evidence, there is no identifiable difference between the two and this element of the claim cannot be satisfied.

46. In my judgment the construction advanced by the Defendants is correct, for the reasons that I have summarised above. Furthermore, I would add the following points. First, claim 1 is a product claim and this feature concerns the shape of an edge of the cutting insert. Reasonable certainty for the public requires that the person skilled in the art should be able to examine the insert and identify a substantially straight cutting edge region (if it exists) without resorting to elaborate experiments of the type that were undertaken in the present case.

47. Second, a substantially straight cutting edge region is a crucial part of the claimed invention of the 643 Patent. It has been included in the characterising portion in order to distinguish the invention from the prior art, which has arcs of wide radii. If the claim is construed so as to include sections that, as a practical matter, are indistinguishable between a straight line and an arc over a very short distance, then this feature will fail to distinguish the invention from the prior art. This interpretation does not give fair protection to the patentee.

48. Third, the 643 Patent explains that the purpose of the substantially straight region is "*to guarantee a good surface finish on the machined surface*". The 643 Patent is also concerned with using the insert for high speed milling to achieve "*significantly increased feed rates*" ([0009] and [0012]). A substantially straight region cannot be used to guarantee a good surface finish unless the milling machine is advanced at a feed rate which is less per revolution than the overall length of the substantially straight region (otherwise ridges will be left on the surface). Therefore, the 643 Patent is contemplating a substantially straight region that is sufficiently long to achieve a smooth finish at high feed rates. If the claim is construed as including minute sections

then the purpose of this feature, namely to "*guarantee a good surface finish on the machined surface*" is not achieved.

49. Fourth, I have already referred to Mr Palmer's evidence that the key to the invention was that several high speed passes would be performed to remove the required amount of metal followed by a low speed pass to achieve wiping. The 643 Patent says nothing about this method and the Claimant's case is that it was unknown at the priority date. So the skilled person when reading the 643 Patent would have assumed that smoothing was to be achieved at the same advance rate as cutting. Therefore the substantially straight region would need to be of significant length, and clearly distinguishable from the arc, as shown in the drawings of the 643 Patent.

Secondary conical clearance surface (integer 14)

50. Claim 1 requires that the flank surface subtended by the nose corner should be conical. In the alleged infringements the relevant surface is cylindrical because it maintains a constant radius. However, the relevant part of the flank wall of the cutting inserts is angled back from the edge so as to provide a clearance angle.

51. The Claimant contends that this feature does not require a precise geometrical cone to be present. Professor Axinte accepted that it made no difference to the function of the inserts whether the nose corners had different or identical radii at their tops and bottoms, so long as there was a clearance angle. He also accepted that the reason it made no difference was that in the Pramet inserts, the four cylindrical sections were all angled back to form "*a sort of skeleton of a cone*" [T3/p358/116-22].

52. Therefore, the Claimant submits that the skilled person would understand that in the context of the patent a cylinder is a special case of a cone and there is no reason to interpret the word conical so strictly as to exclude the case where the four cylindrical sections are angled back. In that case the insert is generally conical because the bottom surface is smaller than the top surface and therefore the side surface can also be described as conical.

53. The Defendants submit that this construction renders the word "*conical*" in this part of the claim redundant. Any clearance surface from a nose corner will be curved and will angle back; otherwise it will not be a clearance surface. The Claimant's construction therefore seeks to strike out this integer on the basis that it does not make any difference to the inventive concept. This approach is incorrect (see for example Hoffman J, as he then was, in *Societe Technique de Pulverisation Step v Emson Europe* [1993] RPC 513 at 522).

54. In my judgment the Claimant is correct in its construction of this feature of the claim for the reasons which it advanced. It would have no effect on the operation of the Pramet inserts if there was a tiny difference between the radii at the top and bottom of the nose portions, and I do not consider that this part of the claim is concerned with such precise geometry.

Infringement

The consequences of my construction of Claim 1

55. On the construction of "*substantially straight cutting edge region*" that I have reached, the Pramet inserts do not infringe the claim. No such region is present in the design drawings for the Pramet inserts. No such region can be seen with the naked eye or under magnification. Furthermore the region that the Claimant alleges to comprise the substantially straight region has decreased in size as the case has progressed. It has now become so short that it does not appear that any distinction can be drawn at this point between an arc and a straight line.

56. In particular Mr Palmer gave a broad estimate in his first report that the substantially straight region was "*less than 1mm long*" (Palmer 1 [9.4.1]). In his second report he suggested that the length of the substantially straight region was "*0.33mm*" (Palmer 2 [21]). That was rounded down in the Claimant's skeleton argument to 0.3mm. However the case advanced during the trial and put to Professor Axinte was that the substantially straight region was about "*0.2mm. Maybe it is slightly less than 0.2mm*" (Axinte T3/402). This emphasises the difficulty of identifying and measuring any substantially straight region at all in the Pramet inserts.

57. At 0.2mm the divergence between a straight line and the arc of a circle of radius 25mm (the radius of the Pramet inserts) is 0.0002mm. This is significantly below the point at which there is any identifiable distinction between the two, and well below 1 micron. This was accepted by Mr Palmer during cross-examination [T/2/284 line 20 to 285 line 3]:

> *"Q. The fact is that over this distance, this short, at the tangent point, scientifically you just cannot say from this data whether you are looking at something that is an arc or a straight line because the unevenness of the surface is sufficient to swamp any distinction between the two. Correct?*
> *A. That is exactly what you said, yes.*
> *Q. That is true, is it not?*
> *A. Yes."*

Is there a substantially straight cutting edge region of 0.2mm in the Pramet inserts?

58. In case I am wrong in my construction of this feature of the claim, I will now consider whether, as a matter of fact and on a balance of probabilities, there is a substantially straight region of 0.2mm in the Pramet inserts. There are a number of sources of information that bear upon this question

The Defendants' design drawings

59. The Defendants' design drawings show that the Pramet inserts have four identical cutting edges. Each cutting edge is made up of five segments, each segment being a convex curve of a particular radius. The end points of each adjacent curve share a common tangent so that they blend in a continuous manner. The design drawings show that the edges of the inserts are formed from a continuous series of curves and do not have a substantially straight region.

The Wendt grinding machine

60. Mr Maixner of the First Defendant gave evidence about the use of the Wendt Grinding machine to produce the Pramet inserts. The parameters used to program the Wendt machine have also been disclosed. Mr. Maixner's evidence was that for the grinding machine to produce a substantially straight region on the cutting edge, the grinding machine program would have to be altered.

61. The Claimant countered this with evidence from Mr Lange who explained that, in his experience, a flat could be created at the programmed intersection of two circular segments if the speed of the grinder was reduced when moving from one segment to the next. Whether or not this happens, according to Mr Lange, is unpredictable and depends on many factors, but if in a particular case a speed reduction was incorporated then a flat would be reliably created. He examined the First Defendant's confidential grinding instructions and concluded that there was a speed reduction, which could cause a flat region to be ground on the cutting edge of the insert between the R_4 (5mm) and R_5 (25mm) radii. He referred to a large change in the grinding speed at this point (from 20 to 4 degrees per second).

62. Unfortunately, Mr Lange's evidence was based on a mistake, which was clearly brought out during his cross-examination. The change in grinding speed was not, as he had said in his statement, when grinding the 5mm and 25mm radii, but in the preceding roughing step. The change in speed at the step where the 5mm and 25mm radii are ground only involves a very small reduction in grinding speed (from 30 to 25 degrees per second), and so his reasons for concluding that a flat could be created were substantially weakened. In my judgment this error undermined the basis of his evidence.

Slope functionality

63. In order to counter the evidence of Mr Lange, Mr Grusell gave evidence that when grinding the Pramet inserts the "*slope function*" in the Wendt grinding machine program was used. He said that this managed the acceleration and deceleration from one region of the given radius to the next so that the movement was continuous and the risk of producing a flat region between the radii in each chain was avoided. During his cross-examination it was pointed out that there was a disparity between the Defendants' simulation video, which showed oscillation only at the rough grinding stage of the simulation, and the program instructions, which showed oscillation on the 5mm radius curve (both rough and finished) but not at all on the adjacent 25mm curve [T3/340 1.21 - 341/1.5]. He was unable to explain this disparity. Furthermore it appeared from Mr Grusell's cross-examination that the Defendants were using the slope function in its "*as supplied"* form with standard algorithms rather than having customised it in any way.

64. The Defendants submitted that Mr Lange had not mentioned the disparity between the simulation video and the programming instructions. Had the point been raised earlier, steps could have been taken to find out the reason for this. The fact that Mr Grusell was unable to explain this in the witness box was understandable. More significantly the Defendants pointed out that it had not been suggested in evidence that oscillation

at one step and not at another could be responsible for causing a flat. The case of the inadvertent flat was based upon a significant change in speed, which was itself based on an error by Mr Lange.

65. In my judgment, the evidence concerning the Wendt computer program and the slope function established that the programming instructions were unlikely to produce a substantially straight region and the use of the slope function reduced this likelihood still further. The Claimant's case, even if accepted, could establish no more than the possibility that a substantially straight region might have been inadvertently created in the Pramet inserts. However I do not accept this case, for the reason explained above.

Mr Palmer's experiments

66. Mr Palmer originally relied on four sets of experiments to establish the presence of a substantially straight region. I will deal with the first three briefly, as in the end little reliance was placed on them.

Shadowgraph

67. This is a relatively crude visualisation technique, which Mr. Palmer accepted was neutral and therefore non-probative. [T2/265 line 19 – 266 line 19].

Original CMM results

68. These fall into the same category as the shadowgraph tests. They were non probative.

The Zoller tests

69. Some reliance was placed on these. However, there was a lack of information about how the tests were performed. The Defendants were not provided with information about the machine used by the Claimant to carry out these experiments. Despite requests in correspondence (the Claimants believe that only one request of the kind mentioned was made in relation to the Zoller test), no details of any results from the Zoller machine were provided, merely screen shots that are difficult to interpret. Professor Axinte explained during his cross-examination that he had not received an explanation of how the Zoller machine worked or how the measurements had been produced. Therefore no judgment could be made about the measurements [T3/361 line 19 – 362 line 5]. I accept his evidence.

Mr Palmer's milling tests

70. Mr Palmer also relied on his visual inspection of the results of certain milling tests on workpieces which had been milled using the Pramet inserts, a Stellram insert (which the Claimant alleged was made in accordance with the 643 Patent) and a Hitachi insert which the Claimant alleged was made in accordance with the Nagashima prior art. Mr Palmer looked at the comparative finishes on the metal bars which had been milled and sought to deduce from their appearance whether or not each of the inserts used to mill them had a substantially straight region. Professor Axinte explained that whilst examining cut metal bars might give some information about the performance of the insert, it was not a reliable way of evaluating the shape of the insert. His

evidence was that if you wanted to know what the shape of the insert was, you had to look at the insert rather than the result of what it cuts [Axinte 2nd Report, paragraph 15: T/3/388 lines 4-19].

71. M. Festeau, the Claimant's second expert, agreed with Professor Axinte's analysis that very little could be reliably deduced about the shape of the inserts by looking at the surface which they had cut. He said, in relation to Mr Palmer's milling tests:

> *"Q. So your evidence is, you would not rely on the milling test to provide any useful information in this case. Is that right?*
> *A. Yes."*

72. Professor Axinte also rejected the suggestion that where there was a consistent pattern of smearing, always less than 0.3mm, you could be confident that it was caused by the presence of a wiper on the insert of less than 0.3mm width. His evidence was that such smearing was also perfectly consistent with a wide radius [T3/386 line 19 – 387 line 21].

73. My conclusion from the totality of this evidence is that the visual inspection of the results of the milling tests does not establish the presence of a flat of 0.2mm (or any substantially straight region) in the Pramet inserts.

Professor Axinte's experiments

The microscopic photographs of the workpieces

74. Professor Axinte made a closer examination of the workpieces milled by Mr Palmer and concluded that the repetitive pattern of ridges was not consistent with there being a substantially straight region on the cutting edge of 0.33mm (which was the case being advanced by the Claimant at the time). During his cross-examination it was suggested to him that the photographs showed "*smearing between ridges*" and that this smearing was only consistent with a substantially straight region perpendicular to the axis of the cutter. He did not agree. He explained that pushing the material to the surface rather than shearing it created smearing. The phenomenon also occurred with large radius inserts with no substantially straight region. The larger the radius the more the smearing [T3/376 lines 4 – 18]. I accept what Professor Axinte said about the possible causes of smearing. Since I do not consider that Mr. Palmer's milling experiments were probative, I do not consider that Professor Axinte's microscopic examination of the results of such experiments was probative either.

The CMM tests carried out by NPL

75. Professor Axinte arranged for CMM measurements to be carried out by the National Physical Laboratory on the Pramet inserts. This test measured the profile of the Pramet inserts at different heights on the clearance surface extending from the cutting edge on two sides of the inserts examined. Two analyses of the data were then undertaken. First, a "*best fit*" analysis of the radii of the various cutting regions on the inserts and second an analysis of the roundness and straightness of the regions of the cutting edges.

76. Professor Axinte summarised his conclusions from those results at [112-129] of his first report. In particular the relevant radii all deviated from roundness less than they deviated from straightness (in all cases but one by a factor of 10). The deviation from the intended radii was well within the permitted tolerances for circularity. Professor Axinte's conclusion from these experiments was that the relevant regions on the edges of the Pramet inserts were curved and not planar. This was not challenged in cross-examination. In my judgment it provides support for his strong view that there is no substantially straight region in the Pramet inserts.

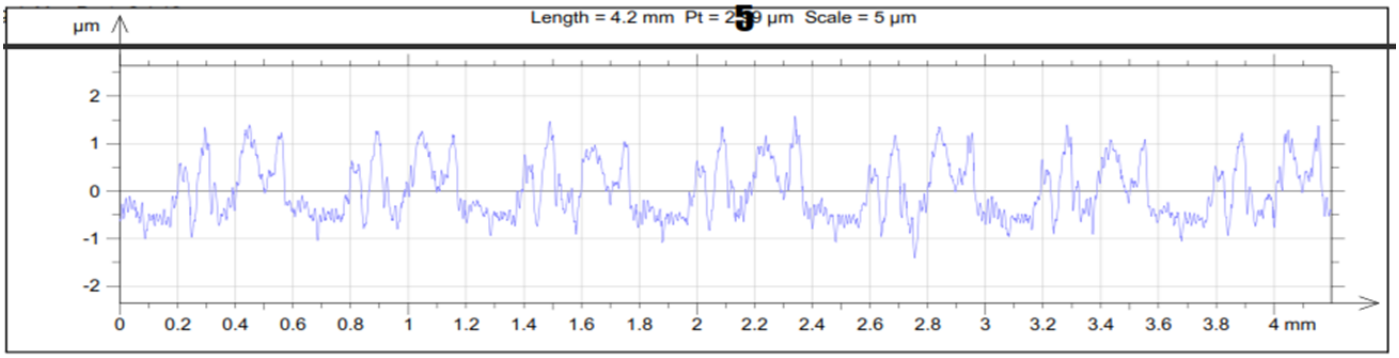
77. Mr Palmer suggested in his reply report that the NPL data showed that there was a 0.3mm substantially straight region in the Pramet inserts. However, the Claimant abandoned the claim that a substantially straight region of this length existed in the Pramet inserts. In its closing speech the Claimant accepted that as a result of the cross-examination of Mr Palmer, the NPL data could not be said to demonstrate the existence of a straight line but submitted that it was just as consistent with a straight line as with a curve of radius 25mm. I disagree and I accept the evidence of Professor Axinte in respect of the NPL data.

The surface texture scans

78. Professor Axinte used a Taylor-Hobson Talysurf machine with an inductive touch probe to scan the metal bars produced in Mr Palmer's milling experiments along a small section and the results were analysed using a metrology package. The purpose of the test was to refute the Claimant's suggestion from the milling tests that the Pramet inserts were producing a smooth surface at a feed rate of 0.3mm per tooth. Had that been the case, the regular pattern of ridges shown in the traces would not have been visible. The traces from the milled workpieces using the Pramet insert showed a repetitive pattern of peaks repeated every 0.3mm. If, as Mr. Palmer had suggested, there was a 0.33mm "wiper" on the Pramet inserts this would have obliterated the peaks or ridges.

79. The Claimant relied on professor Axinte's surface texture scans to advance a case that a flat section of 0.2mm could be observed on the surface scan and this must have been caused by a substantially straight region on the cutting edge of the Pramet inserts. The Claimant's case is that there is a region of a length of about 0.2mm at the bottom of the Pramet inserts which causes a very flat trace of about 0.2mm in length at intervals of about 0.6mm in traces 6 and 8. I reproduce below trace 6, prepared by Professor Axinte, of the workpiece milled with a ZDEW insert.

0.6mm feed – overlapped (GF-3 page 6):



80. This case was first raised in the third witness statement of M. Festeau served on the first day of the trial. M. Festeau exhibited traces from certain of the surface texture scans of the Pramet insert and observed that they showed the presence of repeating flat portions with a length of about 0.2mm. He did not suggest that these repeating flat portions were indicative of a "wiper" perpendicular to the axis of the cutter. When cross-examined about this evidence he confirmed that many of the relevant portions in the traces were not 0.2mm long, nor were they flat [T2/207 line 15 to 208 line 11]. As to what conclusions could be drawn from the surface texture scans he said at [T2/210 line 8-9]:

"*We do not know what we have exactly on the profile of the Pramet insert*."

Therefore the evidence of M. Festeau did not support the case put to Professor Axinte (a) there was a 0.2mm repeating flat portion on the traces or (b) that this showed that there was a 0.2mm "wiper" on the Pramet inserts.

81. Professor Axinte was also unable to infer the presence of a wiper on the Pramet inserts from this evidence. First, he explained that the cross-sectional profile of the surface of the workpiece does not represent the profile of the cutter. Second, he stated that the significance of any particular element of a trace could not be assessed unless elements of noise such as vibration of the machine were filtered out, which had not been done [T3/408-409 and 429]. Third, even if the flat sections on the trace represented a repeated flat section in the grooves on the workpiece (which the Professor did not accept) such flatness was perfectly consistent with a wide radius due to the phenomenon of minimum depth of thickness [T3/409 line 22 – 410 line 6]. Fourth, the cutting edges of the Pramet inserts have three dimensions and one of those dimensions is the edge preparation. In the Pramet inserts the edge that bites into the metal is chamfered. The chamfer is a planar section of 0.2mm width. This is likely to push metal back to the surface, which causes flat smearing. Therefore if one could discern a repetitive 0.2mm flat pattern in the traces that would be the likely cause.

Conclusion in relation to the alleged substantially straight region of 0.2mm

82. Evaluating all of the evidence to which I have referred above, I find as a fact that there is no substantially straight region perpendicular to the cutting axis of the cutter body on the Pramet inserts. The evidence shows that the Pramet inserts are manufactured in accordance with their design drawings and the edges are formed from a continuous series of curves.

Infringement – secondary conical clearance surface

83. On the construction that I have reached of this feature of the claim, I find that the Pramet inserts have secondary conical clearance surfaces.

Additional defences to infringement

Section 60 (2) - "when he knows or it is obvious to a reasonable person in the circumstances"

84. Claim 1 of the patent is to a milling cutter tool. The Pramet inserts are said to infringe solely on the basis of contributory infringement under section 60(2) as "*means relating to an essential element of the claimed invention*".

85. Section 60(2) provides that a person infringes who:

> "*supplies or offers to supply in the United Kingdom a person other than a licensee or other person entitled to work the invention with any of the means, relating to an essential element of an invention, for putting the invention into effect when he knows or, or it is obvious to a reasonable person in the circumstances that those means are suitable for putting, and are intended to put, the invention into effect in the United Kingdom.*"

86. The Defendants contend that even if the Pramet inserts have a substantially straight region they do not know this and it is not obvious to a reasonable person in the circumstances. They submit that there was no intention to make inserts with a straight region as can be seen from the design drawings and manufacturing instructions. Further, it cannot be said to have been obvious to a reasonable person in the circumstances that such a substantially straight region exists. The Defendants submit that even if the Claimant establishes this at trial, it will only have been able to do so after exhaustive analysis and measurements in highly contentious circumstances, where Professor Axinte does not agree with the conclusions to be drawn therefrom. Therefore it cannot have been obvious to a reasonable person.

87. Section 60(2) was considered in detail by the Court of Appeal in *Grimme Landmaschinenfabrik GmbH & Co KG v Scott* [2011] FSR 7 (see in particular the Judgment of Jacob LJ at paragraphs 82 onwards). However, that case concerned the issues of whether the supplier or the ultimate user must have the requisite intention; how specific must the intention be; and when must the intention be formed? I am here concerned with a different question; is section 60 (2) satisfied in circumstances where the Pramet inserts (when supplied for use in cutter bodies) fall within claim 1, but the Defendants were not aware that a substantially straight region was present on the cutting inserts? Having regard to the conclusion of non-infringement that I have reached, this question is hypothetical, but I will express my view in case I am wrong and because it was fully argued before me.

88. Section 60(2) is closely based on Article 30 of the Community Patent Convention (now Article 30 of the 1989 Luxembourg Agreement). In *Grimme* at paragraph 79, Jacob LJ said:

> *"Advocates should recognise that where a point of patent law of general importance, such as the construction of a provision which by Treaty (either the EPC or the Community Patent Convention) is to be implemented by states parties to those conventions, has been decided by a court, particularly a higher court, of another member state, the decision matters here. For, despite*

> *the fact that there is no common ultimate patent court for Europe, it is of obvious importance to all the countries of the European Patent Union or the parties to the Community Patent Convention ("the CPC") that as far as possible the same legal rules apply across all the countries where the provisions of the conventions have been implemented. An important decision in one member state may well be of strong persuasive value in all the others, particularly where the judgment contains clear reasoning on the point."*

89. Counsel were unable to find any decision of another contracting state which deals with this point. At my request, I was referred to an article by Professor Philip Johnson "*Contributing to the wrong: the indirect infringement of patents*" (Journal of Intellectual Property Law and Practice, 2010 Volume 5 Number 7) which states at page 516:

> *"It is not necessary, however, for a person to know he is infringing a patent, only that the means may be used for putting the invention into effect. Accordingly, even if the supplier believed the supply was lawful and non-infringing this is no defence."*

90. This essentially reflects the Claimant's case in relation to Section 60(2). So, in the present case, there is no doubt that the Defendants intended the Pramet inserts should be fitted into the cutter bodies. At that point, assuming that the Pramet inserts satisfied the relevant features of the claim, the combination of cutter body and insert would infringe. That, submitted the Claimant, is enough for the purposes of Section 60(2): if a Defendant intends a particular use to be made of his product it should not matter whether he knows that the resulting combination actually infringes. That must be a matter for the court alone to be decided objectively. Otherwise, a Defendant could escape liability under Section 60(2) by saying that he misunderstood or was ill-advised as to the meaning of the patent.

91. Further the Claimant submitted that this could not be a defence to injunctive relief in any event. Once the court has determined that particular means relate to an essential element of the invention for putting the invention into effect, the Defendant could not possibly claim that he did not know, or it was not obvious to a reasonable person in the circumstances, that this was the case.

92. I was also referred in closing to the Judgment of Floyd J (as he then was) in *Qualcomm Incorporated v Nokia Corporation* [2008] EWHC 329, in particular at paragraphs 238 and 245. In that case it was alleged by Nokia that the claim of infringement was so complicated to understand that even if the court concluded that the GSM/GPRS network, when combined with a Nokia mobile phone, fell within the claim, this was not obvious to a reasonable person in the circumstances. Floyd J said at paragraph 245:

> *"I do, however, reject Nokia's "too complicated for us to know we infringe" point. It does not seem to me that the subsection is at all concerned with how difficult it is on the facts known to the alleged infringer to determine that he infringes.* ***The sub-section is concerned and concerned only with whether he knows sufficient facts about what is to be done with the means supplied****. If facts material to the allegation that the means are to be put to infringing use*

> *are hidden from him, then he will not infringe. But if the facts are known or obvious to him in the circumstances, their complexity does not afford a defence. Otherwise complicated inventions are less well protected than simple ones, which would not be a rational policy."* (emphasis added).

93. Mr Wilson very properly drew my attention to a possible distinction between the *Qualcomm* case and the present case. In *Qualcomm*, all relevant facts about the allegedly essential means (the Nokia phone) were known to Nokia and the complexity lay in determining whether they operated in accordance with the claim. In the present case, the Defendants did not know of the presence of a substantially straight region in the Pramet inserts.

94. Nonetheless, in my judgment, the Claimant is correct in its interpretation of Section 60(2). The knowledge/obviousness requirement is concerned with the use to which the means supplied by the Defendant are to be put. Whether it is complicated or difficult to work out that the means has the features required by the claim is not the point. In this regard, I consider that the *Qualcomm* judgment sets out the policy underlying the sub-section, which is applicable to the present case. Contributory infringement is an important aspect of the exclusive rights accorded to the patentee. It may be commercially necessary to cut off one source of supply to many direct infringers, and the source may be a contributory infringer. In some cases, for example pharmaceutical and mobile phone patents, a number of tests may be required to prove infringement. If the contributory infringer could claim in such cases that there was no infringement because the requisite knowledge was lacking, then this would prevent enforcement in the case of complex inventions. As Floyd J observed, such a derogation from the patentee's rights is not supported by "*a rational policy*".

95. I also accept the Claimant's argument that in any event, this could not be a defence to injunctive relief. After the court has given judgment, the Defendant cannot continue to deny that it knows the facts found by the court or that they are not obvious to a reasonable person in the circumstances.

No supply of ZDCW inserts

96. The Defendants state that the only sales which have been made in the United Kingdom of the Pramet inserts are 10 ZDEW inserts, acquired by way of trap order. No ZDCW sales have been made. Accordingly they submit that in relation to the ZDCW inserts the claim under Section 60(2) must fail because there has been no supply in the United Kingdom. Had I concluded that the ZDCW inserts possessed the relevant features of the claim, I would have rejected this defence. In particular, the Second Defendant is the authorised distributor of the First Defendant's products in the United Kingdom, and those products include the ZDCW inserts. The Defence asserts (as might be expected) that the Defendants intend to continue the acts about which complaint is made. In my view, there is an intention to supply ZDCW inserts in the United Kingdom, which would have been sufficient to justify injunctive relief had it been appropriate in the circumstances.

Validity

Squeeze between construction and infringement

97. The Defendants' case is that if they were wrong on construction and if infringement can be established by the presence of a substantially straight region of a length of 0.2mm then it is impossible to distinguish this from the continuation of the arc of the adjacent curved region, particularly where the arc has a large radius. In that event there is anticipation by both Nagashima (Figure 7) and Dijet (Figures 11 and 12). These are reproduced below.

Fig. 7 Nagashima:

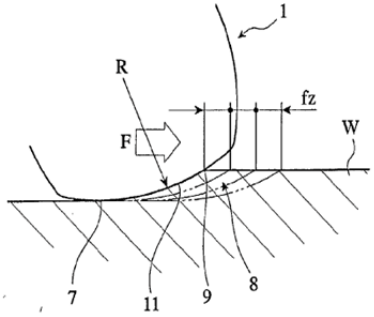


Fig. 11 Dijet:

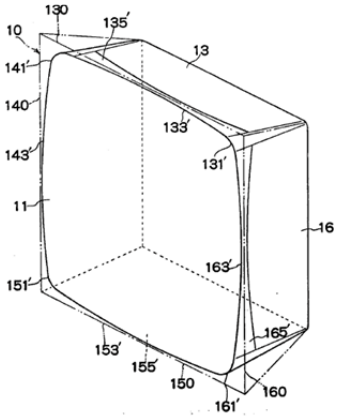
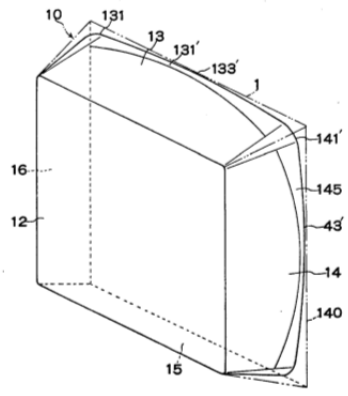


Fig.12 Dijet:



98. First, I will consider Nagashima. The Defendants point out that the Description expressly discloses the use of a radius of up to 25 mm (1.6 times the diameter of the insert, which may be, for example, 15mm). The Pramet inserts have a 25 mm radius. If one considers a region of 0.2mm length at the tangent point of the insert disclosed in Nagashima (point 7 in Figure 7) then it would be indistinguishable from a straight line, given the unevenness of the surface and the tiny size of the region. Therefore Nagashima Figure 7 would fall within the Claim 1 of the Patent.

99. In my view, this analysis is compelling and indeed was accepted by Mr Palmer during cross examination.

> *"Q. So if your evidence that the Pramet inserts fall within the claim of the Patent is correct, Nagashima's figure 7 will equally fall within the claim of the Patent, correct?*
> *A. Okay.*
> *Q. You agree with that?*
> *A. I agree with that"*

100. Turning to Dijet, the radius of the curve is even larger than in Nagashima. The Defendants contend that there is therefore a clear anticipation if the Pramet inserts infringe. Mr Palmer was cross-examined about this. He saw the force of the logic and did not offer any reason to the contrary [T2/308-9].

> *"Q. Therefore, just as on the same basis that I asked you about Nagashima, if you are right and the straightness that you observed in the Pramet insert is sufficient to bring it within the claim then Dijet is also within the claim of the patent*
> *A. I am not sure that it is used in the same context, but I understand the logic behind it yes.*
> *Q. It is right it is not the logic?*
> *A. The logic is there."*

101. The Defendants point to a further squeeze on infringement, arising from the evidence of Mr Lange. It will be recalled that the Claimant alleges that the Defendants have infringed inadvertently, because the operation of the grinding machines cannot always be relied upon to achieve continuity of curves between two radii without a flat section being created. Mr Lange's view was that the person programming the machine and setting up the slope functionality might not be able to avoid a flat in the region between the two radii, even if he was trying to do so. For example at [T/1/150]:

> *"Q So your evidence taken as a whole is that the risk of producing a flat area of this tiny amount of 0.3mm or whatever it is would exist for anyone who was making an insert where they were merging two radii together.*
> *A Yes"*

102. The Defendants contend, on the basis of this evidence, that if the Claimant is right in its construction then claim 1 of the 643 Patent must be obvious in the light of Nagashima. Nagashima shows (for example at Figure 9) an insert with two radii merging together at the lowest point 7. When trying to put Nagashima into practice, there would be a clear risk of producing a flat area which would be obvious to the

skilled addressee of the patent. It is therefore obvious in the light of Nagashima that a very small flat area might be created, and on the Claimant's construction this would satisfy the claim.

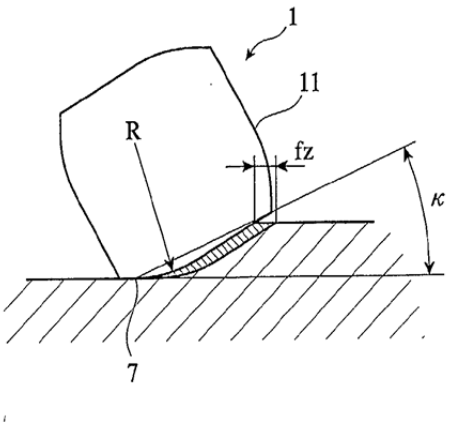
103. In my judgment the squeeze between infringement and validity is compelling in the present case. Had I accepted the Claimant's construction, I would have concluded that claim 1 was anticipated and obvious in the light of Nagashima and Dijet, for the reasons set out above.

Free standing invalidity case

Figure 21 of Nagashima

104. The Defendants' contend that the 643 Patent is invalid irrespective of the case on infringement. This submission is based solely on Nagashima. The case is that Nagashima either actually discloses the invention (and therefore anticipates claim 1), or alternatively it would have been obvious to make whatever trivial modification is needed to introduce a "wiper". The first aspect of the Defendants case is based on Figure 21 which is reproduced below.

Figure 21:



105. The Defendants contend that Figure 21 clearly and unambiguously discloses a flat section behind point 7. They claim that Mr Palmer accepted this in cross examination at [T2/304 line 22 onwards]. The most relevant part of his cross examination is as follows:

> *"Q. If one looks at figure 21, we can see exactly the same thing, can we not, except here, instead of purely straight lines, he has introduced a radius as well.*
> *A. Yes.*
> *Q. The point to the left of point 7 is again a straight line.*
> *A. It appears to be*
> *…*
> *Q. Any skilled person who was asked to implement figure 21, his natural reaction would be to implement it with a straight portion to the left of point 7 before the corner of the tool.*

A. It could be.
Q. I suggest that is exactly what he would do.
A. Figure 21, figure 22, figure 23, for me is looking at the conventional machine that we would do with perhaps a straight edge, a 90 degree tool, as against using it like this
Q. Sorry, figure 21 and 22, you were looking at a slow pass tool. Is that right?
Q. The tool is trying to explain about how the feed rate is achieving and finishing rather than anything else. He is looking at the feed rate. I look at this always to the right of figure 7, not to the left.
A. But you agree that if a skilled person was asked to actually implement figure 21, his natural first reaction would be to use a flat portion to the left of point 7.
A. Possibly, yes."

106. The Claimant submits that although one might, on a cursory glance, imagine that there is a straight line in Figure 21 extending from point 7 right to the corner of the insert, the Description does not say that this is the case. The Claimant points out that the figure cannot be read with hindsight, nor as a scale drawing, and it is important to read it in the context of the Description.

107. I accept the Claimant's case in relation to anticipation based on Figure 21. I do not consider that there is a clear and unmistakeable disclosure of a substantially straight region at the relevant point nor do I consider that it is the inevitable result of putting Figure 21 into practice.

108. The cross-examination of Mr Palmer, cited above, provides strong support for the conclusion that an obvious way of implementing Figure 21 would be to include a substantially straight region to the left of point 7. This was also Professor Axinte's clear opinion. However, the Claimant points to [28] of Mr Palmer's second report where he stated that if the cutting edge behind the point 7 was made as a straight edge perpendicular to the axis, the cutter would perform very unsatisfactorily. He suggested that the sharp corner depicted at the back of the tool in Figures 21 and 22 would create a serious weakness in the tool. The Claimant's case is that Nagashima says nothing in paragraph 42 of the specification about the region behind point 7 in Figure 21, and so the skilled person would look elsewhere in the specification for guidance e.g. to Figures 7 to 12 where the region is curved.

109. Mr Palmer was cross examined about his evidence of unsatisfactory performance at [T2/306 line 16 – 307 line 2]:

"Q. But you agree that if a skilled person was asked to actually implement 21, his natural first reaction would be to use a flat portion to the left of point 7.
A. Possibly, yes.
Q. Just looking at the corners, the actual corners shown on figure 21, which I think you have pointed out in your report are shown to be sharp, the skilled person would realise that you could simply chamfer a small radius into those corners.
A. Yes, I understand.
Q. Yes, you agree?
A. To take the corners off, yes – the sharp corners."

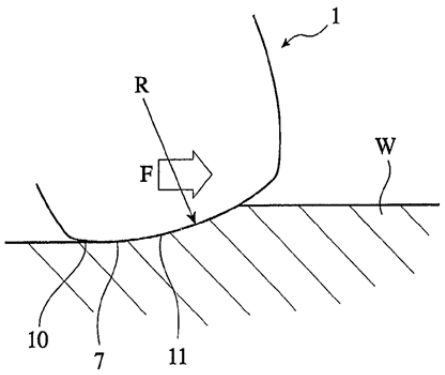
110. In my view, this evidence makes clear that an obvious way of implementing Figure 21 would be to use a flat portion to the left of point 7, and it would also be obvious to the skilled person to avoid creating a weakness in the tool by chamfering a small radius into the corner. This accords with the evidence of Professor Axinte, who held a strong view that it would be obvious to use a "wiper" behind point 7 to improve the surface finish, which would be a substantially straight region.

111. The only other feature of the claim not explicitly shown in Figure 21 is the nose corners. Mr Palmer accepted that this would be an obvious modification at [T2/306 line 20 – 307 line 2]. Accordingly, I conclude that the 643 Patent lacks inventive step in the light of Figure 21 of Nagashima.

Figures 7 and 8 of Nagashima

112. The Defendants' second argument was based on Figures 7 and 8 of Nagashima. Figure 8 shows this:

Figure 8:



113. Professor Axinte was of the clear view that it would be obvious to improve the surface conditions of the workpiece by including a straight cutting edge region in the insert at the point marked 7 in Figures 7 and 8 of Nagashima, and that this would extend in a direction perpendicular to the cutting axis (see his first report at paragraph 163 (15)). [0028] of Nagashima expressly discloses modifying the cutting edge of the insert shown in Figure 8 in order to improve the surface conditions of the worked surface. Substantially straight "wiper" sections were a known, standard way of achieving this at the priority date.

114. The Claimant's case is that this would not be obvious and indeed there would be no point in doing so because in the Nagashima cutter, the tooth advance rate was so much greater than the likely length of a "wiper" section. Only if the skilled person had thought of what Mr Palmer says was a new method of operation (consisting of milling at very high tooth advance rate and finishing with a much lower tooth advance rate) would there be any point in adding a straight wiper section. This, according to the Claimant, explains why Nagashima does not disclose a substantially straight section in the Description of Figures 7 and 8.

115. I do not accept the Claimant's case for the following reasons. First the claim is to a product and it is not concerned with advance rates at all. It is not a process claim with a limitation to operation at different tooth advance rates. Indeed, operating at different advance rates is not discussed at all in the 643 Patent. Second, Nagashima is not only concerned with operating at high speed. As Mr Palmer accepted, Figures 21 and 22 are concerned with slow speed cutters for finishing the workpiece. Third, inserts can be used both for high speed cutting and separately for finishing. Indeed it was common general knowledge to use inserts for both of these purposes. Fourth, certain of the feed rates mentioned by Nagashima are slow (as slow as 0.1mm). This allows for an insert for use at high feed rates, but also for use at a low feed rate, where a good finish could be achieved.

116. I have also considered the cross-examination of Mr Palmer at [T/2/296 – 297]. He accepted that one of the things that would interest the skilled person when implementing Nagashima would be the surface finish that could be achieved. Looking at the disclosure of Nagashima and in particular Figure 7 he accepted that the precise surface finish was going to depend to a large part on the degree of flatness around point 7 and the feed rate that was used and that that was entirely obvious. He accepted that the skilled person would know that the flatter the area around point 7, the better the finish, and that the best finish would be parallel to the surface. He pointed out that it would not necessarily be a parallel surface because the skilled person might also look at the back cutting. In my view his evidence supports the proposition that, when implementing Figures 7 and 8, a substantially straight region at point 7 would be an obvious alternative, although not the only obvious alternative. That is sufficient for a finding of obviousness. Accordingly I conclude that claim 1 is also obvious in the light of Figures 7 and 8 of Nagashima.

Other matters

117. The Defendants adduced evidence about a Hitachi brochure which pre-dated the priority date and which described a Hitachi insert which was said by the Defendants to have a substantially straight region. The purpose of this was said to be to prevent the suggestion that Nagashima (the proprietor of which is Hitachi) did not think of that which was said to be obvious. Neither this brochure nor any Hitachi insert was pleaded as prior art. Therefore I have not taken it into account when reaching my finding of lack of inventive step.

118. The Claimant sought to rely on evidence concerning the history of the invention and the view of the inventors at the time the invention was made that the combination of convex sides with a straight "wiper" was a "*beautiful concept*" and an idea which had "*great technical and commercial significance*". Even if I had accepted this evidence, in the absence of a plea of commercial success, I would not have considered it to have carried much weight for the reasons explained by Laddie J in *Hoechst Celanese Corporation v BP Chemicals Ltd* [1997] FSR 547 at 565.

119. However whilst I do accept that witnesses from the Claimant have at some point come to believe that this combination is particularly effective, I do not accept that the addition of a "wiper" was perceived to be of inventive significance at the priority date. In particular it was not referred to by the inventors in the Statement of Invention at all, nor was its significance suggested to their patent department; it was not a

feature of any claim of the Application. At least initially, the Claimant did not identify the existence or significance of the wiper to customers, who, according one of the inventors, M. Dufour, would not have known what feed rate to use to get a good finish [T1/p161/24-p162/2].

Conclusion

120. (1) The Pramet inserts do not infringe the 643 Patent.
(2) Had I accepted the Claimant's construction of claim 1 of the 643 Patent, I would have concluded that it was anticipated by and obvious in the light of Nagashima and Dijet.
(3) On the construction of claim 1 that I have arrived at, the 643 Patent is obvious and lacks any inventive step in the light of Nagashima.