INTELLECTUAL PROPERTY OFFICE

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16 November 2009

PATENTS ACT 1977

APPLICANT Advanced Micro Devices, inc.

ISSUE Whether patent application number GB0706153.4 complies with sections 1(1) and 1(2).

HEARING OFFICER Dr P Purcell

DECISION

Introduction

1. Patent application number GB 0706153.4 was filed on 12 October 2005 claiming an earliest priority date of 2 November 2004 from an earlier US application and was published under serial number GB2433134 on 13 June 2007.

2. Despite amendment of the claims during substantive examination, the applicant has been unable to persuade the examiner Paul Marshall that the invention is patentable within the meaning of section 1(2) of the Act or that the invention was novel or inventive within the meaning of section 1 of the Act. The matter came to a hearing before me on 7 September 2009 which was attended by the patent attorneys Rosemary Eve and Iain Russell of Brookes Batchellor LLP and Examiner Mr Paul Marshall.

3. In advance of the hearing on 17 August 2009 the applicant's attorneys filed an alternative set of claims for consideration. I asked Examiner Paul Marshall to consider these claims and whether they overcame the objections he had previously raised but in a further communication to the applicant dated 2 September 2009 he indicated that the objections previously raised were still to be addressed. In response on 3 September 2009 the applicant's attorneys filed a further set of claims for consideration at the hearing and it is these that were considered. However, the agent's letter accompanying these claims made clear that whilst the claims were

intended to form the basis of the discussion at the hearing the applicant would wish to reintroduce dependent and independent claims that were omitted.

The invention

4. The invention claimed in the application concerns a fault detection system and method based upon weighted principal component analysis to improve fault detection reliability through feedback when workpieces, such as semiconductor devices are manufactured.

5. The original filed claims include three independent claims 1, 7 and 9 that address the method comprising processing a workpiece and performing a fault detection analysis of claim 1, a process for performing fault detection of claim 7 and claim 9 to a computer readable program storage device with instructions to perform the method.

6. The alternative version of claim 1 filed on 3 September 2009 reads:

> *1. A method of detecting a fault in a semiconductor manufacturing using a dynamic weighting technique comprising:*
> *processing a workpiece (105);*
> *acquiring metrology data relating to the processing of the workpiece using a metrology tool; acquiring tool state data, the data comprising tool state parameters for the workpiece being processed;*
> *performing a fault detection analysis relating to the processing of the workpiece (105) by using a fault detection unit to detect a fault based on a fault detection model in which a fault is deemed to have occurred if the value of a particular parameter in the metrology or tool state data of the workpiece being processed abnormally lies outside a predetermined range for that particular parameter;*
> *determining whether the abnormal value of that particular parameter relating to the fault contributed to the detected fault;*
> *adjusting a weighting associated with the particular parameter having the abnormal value based upon the contribution of the abnormal value of the particular parameter to the detected fault, wherein the weighting is increased if the parameter contributed to the fault and decreased if the parameter did not contribute to the fault; and processing a subsequent workpiece dependent on the adjusted weighting of the particular parameter, whereby fault detection in the subsequent processing depends on the adjusted weightings.*

7. If I find that this claim passes (or fails) the requirements section 1(2) of the Act then it follows that the other objections need not be considered.

Patentability

8. The examiner raised objections under section 1(2) of the Patents Act 1977 that the invention is not patentable as it is a mental act.

The law

9. Section 1 (2) reads:

"it is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of-
(a) a discovery, scientific theory or mathematical method;
(b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;
(c) a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;
(d) the presentation of information;
But the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.";

10. The approach to interpreting section 1(2) is governed by the judgment of the Court of Appeal in *Aerotel Ltd v Telco Holdings Ltd (and others) and Macrossan's Application* [2006] EWCA Civ 1371 ("*Aerotel*"). In that judgment, a four step test was set out which can be summarised as:

(1) properly construe the invention
(2) identify the actual contribution
(3) ask whether it falls solely within the excluded subject matter
(4) check whether the actual or alleged contribution is actually technical in nature.

11. Thus, an invention which makes a technical contribution lies outside the exclusions in Section 1(2) – and conversely, inventions which make a contribution lying solely within the exclusions (as considered in *Aerotel* step 3) do not make a technical contribution. Step 4 of *Aerotel* ensures that an invention making no technical contribution is still excluded even if it does not fall within the (non-exhaustive) list of exclusions explicitly listed in section 1(2).

Arguments

12. At the hearing Mr Russell argued that the amended claim under consideration now related to an invention which makes a technical contribution in the field of semiconductor manufacturing and so the invention as now claimed lies outside the exclusions of section 1(2). The Examiner Mr Marshall agreed with this analysis and he stated that this claim would not raise an objection to patentability as the technical contribution was now clear.

Findings

13. What I need to determine on this matter is whether the contribution falls solely within the exclusions, or whether it is by contrast a technical contribution. However, in the light of the submissions and analysis by both Mr Russell and the Examiner I agree that the contribution is technical and so the application meets the requirements of Section 1(2). For this reason I will not go through the four step test set out above.

Novelty and inventive step

The law

14. Section 1 of the Act requires that an invention is novel or has an inventive step in order be patented. The law states in Section 1(1):

A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –
(a) the invention is new;
(b) it involves an inventive step;

15. The Examiner Mr Marshall in his communication of 2 September 2009 maintained his objection that the invention claimed would be anticipated by the conventional process of adjusting a machine/process based on a measured error. In support of his objection the examiner cited WO 2004/003822 A1 (Tokyo Electron Limited) as this document discloses:

a. A performance prediction model which performs a fault analysis, which is disclosed in paragraphs 52 and 58.
b. Correlating tool data and making a model estimating the significance of the tool in the process performance, which is disclosed in paragraphs 72 and 73.
c. Adjusting the 'weighting' of a parameter in the model as disclosed in lines 12-16 of paragraph 77.

16. Mr Russell and Ms Eve submitted that the amended claim now under consideration was distinguished from this prior art as it discloses applying the same weighting to all of the parameters measured during the fault detection process but then using adjusted parameters which included all the parameters measured in subsequent processing, whereas the disclosure in WO 2004/003822 A1 was to find the most significant tool data parameters for a particular part of the process and then to produce a reduced matrix that only related to those parameters. They submitted that the invention as defined by claim 1 under consideration does not exclude parameters, rather it adjusts the weightings of all of them. It is, they submitted, a much broader approach and a much more comprehensive approach and is therefore an advance over the disclosures of WO 2004/003822 A1.

17. However, on further questioning about the disclosures in WO 2004/003822 A1 both Mr Russell and Ms Eve agreed with the assertion made by the Examiner Mr Marshall during the hearing that WO 2004/003822 A1 has all the component steps, or very similar ones, of the application under consideration except the application under consideration rather leaves one step out, which is the narrowing down step. Whilst it was agreed the amended claim overcame the objection to novelty it consequently, Mr Marshall maintained, raised the issue of whether the invention satisfied the condition of Section 1(1)(b) of the Act, that it involves an inventive step because then a skilled person would have all the integers, or at least very similar integers, present in the disclosure of WO 2004/003822 A1 that are also defined in the current application. Mr Russell and Ms Eve agreed that this was a fair assessment of claim

1. I must therefore conclude that claim 1 as currently worded of the claimset under consideration lacks an inventive step.

18. However, in response Mr Russell and Ms Eve submitted that the subject matter of claim 2 further distinguished the invention from the prior art cited. Claim 2 states that

> *2. A method according to claim 1, wherein different weightings are assigned to that particular parameter based on the particular type of process being performed by the process tool.*

They argued that in the WO 2004/003822 A1 document a reduced set of parameters is selected and used in deleting a fault in subsequent steps. Thus this means that in a different part of the process a parameter that has been removed might be important in fault prevention, but is not available. However, claim 2 of the current application requires that it is necessary to increase the relative importance of a different parameter in each different stage of the manufacturing process. Consequentially , no parameters are removed from the set and this non exclusion is an advantage over the prior art and confers an inventive step. The examiner agreed that this feature was not disclosed in WO 2004/003822 A1 and that this would appear to distinguish the current application from the prior art and therefore form an inventive step. Having considered the disclosures in WO 2004/003822 A1 I find that I accept the submissions of Mr Russell and Ms Eve that the subject matter of claim 2 is inventive over this prior art.

19. In light of these submissions by Mr Russell and Ms Eve it may therefore be possible for the applicant to further amend the claims by incorporating the matter of claim 2 into claim 1 which would result in acceptable claims. Thus it may be possible to amend the claims such that they comply with the Act. As set out in paragraph 3 of this decision the applicant has also indicated that they may wish to file further claims in addition to those submitted for discussion. In any event these claims will need to be considered by the examiner to decide whether further searching is needed and generally to continue the examination. I will therefore remit the application to the examiner if a new set of claims is filed.

Conclusion

20. I conclude that although the claimed invention is patentable under Section 1(2) I have found that claim 1 lacks an inventive step contrary to Section 1(1)(b) of the Patents Act. For the reasons given above, I hereby give the applicants 2 months from the date of this decision to file an amended set of claims. If they do so the application will be remitted to the examiner for further processing. If not the application will be refused under section 18(3).

Appeal

21. Under the Practice Direction to Part 52 of the Civil Procedure Rules, any appeal must be lodged within 28 days.

P Purcell
Deputy Director acting for the Comptroller