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**Datasheet for the decision
of 25 October 2021**

Case Number: T 1249/19 - 3.2.03

Application Number: 14174143.9

Publication Number: 2818573

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C23C16/02, C23C16/36,
C23C16/56, B23B27/14, C23C30/00

Language of the proceedings: EN

Title of invention:
Coated cutting tool

Patent Proprietor:
Sandvik Intellectual Property AB

Opponent:
Iscar Ltd.

Headword:

Relevant legal provisions:
RPBA Art. 12(4)
RPBA 2020 Art. 13(2)
EPC Art. 100(b), 83

Keyword:

Late-filed evidence - could have been filed in first instance proceedings (no)

Amendment after summons - exceptional circumstances (no)

Sufficiency of disclosure - (no)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1249/19 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 25 October 2021

Appellant: Sandvik Intellectual Property AB
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 5 March 2019
revoking European patent No. 2818573 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman C. Herberhold
Members: G. Patton
N. Obrovski

Summary of Facts and Submissions

- I. European patent No. 2 818 573 B1 (hereinafter "the patent") relates to a coated cutting tool for chip forming machining of metals comprising a substrate having a surface coated with a chemical vapour deposition (CVD) coating.
- II. An opposition was filed against the patent as a whole, and based on Article 100(a) EPC (lack of novelty and lack of inventive step) and Article 100(b) EPC (insufficiency of disclosure).

The opposition held that the invention as defined in claim 1 of the then main request (patent as granted) was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC). The same was considered to apply to claim 1 of each of the then first to fourth auxiliary requests. The patent was revoked.

The patent proprietor lodged an appeal in the prescribed form and within the prescribed period against the Opposition Division's decision revoking the patent.

- III. The Board provided its preliminary, non-binding opinion to the parties in a communication pursuant to Article 15(1) RPBA 2020 dated 11 December 2020 that the appeal would likely be dismissed.

In reaction, the patent proprietor filed, by letter dated 17 September 2021, new submissions comprising new arguments as well as new experimental data.

- IV. Oral proceedings were held on 25 October 2021. As to the issues discussed with the parties and their requests, reference is made to the minutes.

The order of the present decision was announced at the end of the oral proceedings.

- V. The patent proprietor (hereafter "the appellant") requested

that the decision be set aside and
that the case be remitted to the Opposition
Division to decide on novelty and inventive step
- on the basis of the patent as granted (main
request), subsidiarily,
- on the basis of one of the sets of claims filed
as the first to fourth auxiliary requests with
the statement setting out the grounds.

The opponent (hereafter "the respondent") requested

that the appeal be dismissed (main request),
subsidiarily,
that the case be remitted to the Opposition
Division.

- VI. Claim 1 of the **main request** reads as follows with the feature numbering (A) to (G) used by the parties:

- (A) "A coated cutting tool comprising a substrate and a coating, wherein the coating comprises
(B) a layer of MTCVD TiCN, and

- (C) a layer of $\alpha\text{-Al}_2\text{O}_3$,
- (D) wherein the $\alpha\text{-Al}_2\text{O}_3$ layer exhibits an X-ray diffraction pattern, as measured using $\text{CuK}\alpha$ radiation and $\theta\text{-}2\theta$ scan, wherein the texture coefficient $\text{TC}(\text{hkl})$ is defined according to Harris formula

$$\text{TC}(\text{hkl}) = \frac{I(\text{hkl})}{I_0(\text{hkl})} \left[\frac{1}{n} \sum_{n=1}^n \frac{I(\text{hkl})}{I_0(\text{hkl})} \right]^{-1}$$

where $l(\text{hkl})$ =measured intensity (integrated area) of the (hkl) reflection, $l_0(\text{hkl})$ =standard intensity according to ICDD's PDF-card No. 00-010-0173, n =number of reflections used in the calculation, (hkl) reflections used are (012), (104), (110), (113), (116), (300), (214) and (0 0 12), and characterized in that

- (E) $\text{TC}(0\ 0\ 12)$ is higher than 5, preferably higher than 6, most preferably higher than 7, and wherein
- (F) a full width half maximum (FWHM) of a rocking curve peak of the (0 0 12) plane of the $\alpha\text{-Al}_2\text{O}_3$ using X-ray diffraction as measured on the clearance face of the cutting tool is FWHM lower than 30° , preferably lower than 26° , more preferably lower than 22° , and wherein
- (G) the TiCN layer exhibits an X-ray diffraction pattern, as measured using $\text{CuK}\alpha$ radiation, wherein the relation between the integrated area intensity of the 220 peak and the integrated area intensity of the 311 peak, l_{220}/l_{311} , is lower than 3, preferably lower than 2, most preferably lower than 1."

Since the outcome on sufficiency of disclosure of claim 1 of the main request applies *mutatis mutandis* to claim 1 of auxiliary requests 1 to 4 there is no need

to cite the wording of claim 1 of these auxiliary requests.

VII. The following documents considered in the opposition proceedings are relevant to the present decision:

- D1: JP 2008 093769 A;
- D1': machine translation of D1, 17 pages;
- D2: EP 2 604 720 A1;
- D5: WO 2013/037997 A1;
- D8: WO 2013/031952 A1;
- D8': EP 2 752 264 A1;
- D9: EP 1 479 791 A2;
- D10: US 2012/0015148 A1;
- D20: Experimental results of the respondent in accordance with example 1 of the contested patent, 5 pages; and
- D27: Experimental report and declaration of Mr Lee Eun Soo, 11 October 2018, 3 pages.

The following documents were filed for the first time in the appeal proceedings:

- by the appellant with the statement setting out the grounds of appeal:

D28: Bonetti, R.S. et al., "CVD of Titanium Carbonitride at Moderate Temperature: Properties and Applications", MPR, December 1990, pages 837-840; and

D29: Experimental results reproducing example 1 of the contested patent on the basis of D20, 8 pages.

- by the respondent with the reply to the statement setting out the grounds:

- D30: Experimental report repeating the sample preparation of D20/D27 and D29 and declaration by Mr Lee Eun Soo, 20 November 2019, 22 pages;
- D31: Respondent's in-house experimental report repeating the sample preparation of D20/D27 and D29, Mr Dror Bloch, 20 November 2019, 9 pages;
- D32: Factsheet of Ionbond BernexTM, March 2011, 2 pages, url:
https://www.ionbond.com/fileadmin/ionbond/global/documents_EN/Ionbond_Factsheet_Bernex_CVD_EN.pdf;
- D33: Declaration by Mr Dror Bloch, 20 November 2019, 2 pages; and
- D34: Kudapa, S. et al., "Characterization and properties of MTCVD TiCN and MTCVD ZrCN coatings", Surface and Coatings Technology, 120-121(1999), pages 259-264.

- by the appellant after notification of the summons to oral proceedings

D35: letter dated 17 September 2021 comprising new experimental data and new arguments.

VIII. The appellant essentially argued as follows (the arguments are discussed in more detail in "Reasons for the Decision" below):

Admittance of D28-D29 and D30-D31

D28 described that low pressure should be applied in depositing TiCN layers by MT-CVD (Moderate-Temperature CVD). Thus, D28 was highly relevant for the discussion on the experiments D20/D27 which were performed at high pressure. There had been no reason to perform and file experiments D29 during the opposition proceedings.

Documents D28 and D29 should therefore be admitted into the proceedings.

The admission of D30 and D31 into the proceedings was not contested.

Admittance of the contents of D35

The new experimental data and the new arguments submitted with D35 were prepared and filed in direct response to the respondent's counter-experiments D30 and D31. However, the time for performing the new experiments in D35 fell into the worst phase of the Covid pandemic. These exceptional circumstances had to be acknowledged as a reasoned justification pursuant to Article 13(2) RPBA.

The new experiments were carried out exactly according to the conditions selected by the respondent in D20/D27. They showed that the skilled person following the example of the patent was able to reproduce the claimed invention.

The appellant had realised by chance that thin film and absorption corrections had not been performed for the values of features (E), (F) and (G) presented in D20/D27.

Thus, the data in D20/D27 were incorrect, like those in D30 and D31, and had to be considered as invalid and inadmissible. It was a matter of fairness to admit the appellant's correct results.

The contents of D35 should therefore be admitted into the proceedings.

Main request

It was known in the art how (0 0 12) textured α -Al₂O₃ coating layers were produced. The required deposition conditions were given in the patent. The deposition of a TiCN layer by a MT-CVD process with a low $I_{(220)}/I_{(311)}$ ratio was also known in the art. A teaching in this respect, namely by adjusting the volume ratios of TiCl₄/CH₃CN in the MT-CVD process at higher than 2, was likewise available in the contested patent. Therefore, in view of the disclosure of the patent, in particular paragraphs 27 and 33 to 36 thereof, and the common general knowledge, the skilled person knew how to produce the claimed TiCN and α -Al₂O₃ layers with the corresponding claimed properties (features (E), (F) and (G)).

As shown by documents D1/D1', D2, D5, D8/D8', D9 and D28 the skilled person would not apply a pressure of 150 mbar as in D20/D27 for depositing the TiCN layer by MT-CVD process. The invention was reproducible just by applying in D20/D27 a usual pressure, e.g. 55 mbar.

As derivable from D29, the deviating results of D20/D27 were also explained by the CVD reactor geometry used.

Thin film and absorption corrections in accordance with the teaching of the patent, paragraphs 47, 51 and 54, were not applied to values (E), (G) and (F), respectively, as presented in D20/D27. Such corrections shifted said values significantly. D20/D27, like D30 and D31, could therefore no longer be considered as valid evidence that the skilled person was not able to reproduce the invention.

Hence, the impugned decision based on the data presented in D20/D27 was not justified and should be set aside.

First to fourth auxiliary requests

The same arguments as for the main request applied *mutatis mutandis* to the first to fourth auxiliary requests.

- IX. The respondent essentially argued as follows (the arguments are discussed in more detail in "Reasons for the Decision" below):

Admittance of D28-D29 and D30-D31

D28 and D29 were not relevant. Furthermore, they could and should have been filed during the opposition proceedings. Hence, they should not be admitted into the proceedings.

Documents D30 and D31 were filed in reaction to the appellant's allegation based on experiments D29. Hence, documents D30 and D31 should be admitted into the proceedings.

Admittance of the contents of D35

Experiments D30 and D31 were filed with the reply to the statement of grounds, such that the appellant had time even before the Covid pandemic to perform new experiments and to submit the resulting data. Moreover, the restrictions in Sweden, where the appellant was based, had not been severe during the Covid pandemic.

Realising by chance that thin film and absorption corrections had not been performed for the values of features (E), (F) and (G) presented in D20/D27 did not amount to exceptional circumstances justifying the late filing of D35.

The filing of D35 around one month before the oral proceedings before the Board was too short a time for assessing the correctness of the new data and arguments and for considering an appropriate reaction.

The contents of D35 should therefore not be admitted into the proceedings.

Main request

Many parameters in the production process for obtaining a product in accordance with the layers of claim 1 were not specified in the contested patent. This was illustrated by the experiments D20/D27 (filed by the respondent) and D29 (filed by the appellant), which both had been prepared in accordance with the teaching of paragraphs 27 and 31 to 37 of the contested patent, but still differed from each other in more than twenty parameter values.

No explanation was provided as to why these changes were made the way they were done. Considering the number of changed parameters between D20/D27 and D29, starting from the experimental data of D20/D27 in order to arrive at D29 would constitute an undue burden.

D30 and D31 showed that the reactor itself did not explain the difference of the results between D20/D27 and D29, and confirmed that the conditions applied in D20/27 did not enable a product to be obtained in

accordance with claim 1 of the main request. Further parameter(s) such as the gas flow rates or the deposition time also played a role in the MT-CVD process.

Thin film and absorption corrections disclosed in paragraphs 47, 51 and 54 of the patent were admittedly not applied to values (E), (G) and (F), respectively, as presented in D20/D27.

However, the corrections presented in the description were not mandatory in view of claim 1. Furthermore, a clear teaching on how they had to be applied was not provided in the description either.

The alleged significant shift of the values presented in D20/D27 as a result of applying thin film and absorption corrections according to the teaching of the description of the patent amounted to a mere allegation from the appellant's side. In particular with respect to feature (F), the difference between the experimental values and the upper limit claimed was so large that even after thin film and absorption correction the values would not fall within the claimed range.

D20/D27 was therefore valid evidence on which to base the finding of insufficiency of disclosure reached in the impugned decision.

First to fourth auxiliary requests

The same arguments as for the main request applied *mutatis mutandis* to the first to fourth auxiliary requests.

Reasons for the Decision

1. *Admittance of D28-D29 and D30-D34*
 - 1.1 Documents D32-D34
 - 1.1.1 Documents D32-D34 are not relevant for the present decision. Hence, there is no need to discuss these documents and their admittance into the proceedings.
 - 1.2 Documents D28 and D29
 - 1.2.1 The respondent contested the admittance of documents D28 and D29 into the appeal proceedings, arguing that they could and should have already been filed by the appellant during the opposition proceedings, in particular after having received the notice of opposition by the Opposition Division's communication dated 12 December 2016. Instead, the appellant chose not to file any substantive response to that communication.

Furthermore, the respondent considered that said documents were not relevant for the following reasons:

D28 concerned the pressure applied during a MT-CVD process. This parameter, however, did not influence the results in the claimed properties of the layers.

Furthermore, according to the respondent more than twenty changes were performed in D29 with respect to the conditions of D20 (hereafter referred as "D20/D27", see D27, points 3 and 7, and corrected page 1 of D20) without any explanations. Therefore, D29 could not be regarded as a mere repetition of the experiments of D20/D27, contrary to the appellant's allegation. For

this reason, it could not show what the appellant claimed it would, i.e. "*how the skilled person would modify the experimental data in D20 to improve the texture and FWHM according to claim 1 of the patent*" (impugned decision, page 11, second paragraph).

1.2.2 The Board does not share the respondent's view.

In view of the discussions at the oral proceedings and the Board's review of whether D20/D27 plausibly reproduced example 1 of the patent, especially taking into account the experiments D30 and D31, which use the experimental parameters of D29 and possibly show that the applied pressure could play a role in depositing layers by MT-CVD, the Board considers the admittance of D28 - disclosing the use of "low pressure" reactors in MT-CVD processes (<100 mbar) - into the proceedings to be appropriate, as it will possibly facilitate the discussion on this matter.

As far as D29 is concerned, the depositions of the TiCN layer by MT-CVD (also called "MT-TiCN" layer) and the α -Al₂O₃ layer were carried out with the same volume ratios as those used in D20/D27 and with two distinct pressures for depositing the MT-TiCN layer: 55 mbar and 150 mbar. The Board considers that, in view of the Opposition Division's preliminary opinion dated 15 January 2018, point 3.1, the appellant had no reason to perform such experiments before the Opposition Division's decision at the oral proceedings. As mentioned by the respondent, they are costly and resources are limited. Hence, the filing of D29 with the statement setting out the grounds of appeal is considered to have been performed in due time.

In view of the above, documents D28 and D29 are admitted into the proceedings (Article 12(4) RPBA 2007).

1.3 Documents D30-D31

Documents D30 and D31 were filed in reaction to the late-filed experiments D29. Since D29 is admitted into the proceedings for the reasons given above, documents D30 and D31 are also admitted into the proceedings as a matter of fairness. The appellant explicitly declared at the oral proceedings that they did not contest the admission of D30 and D31 into the proceedings.

2. *Admittance of the contents of D35*

2.1 The appellant's letter D35 dated 17 September 2021 was filed after notification of the summons to oral proceedings of 25 November 2020 and the Board's communication of 11 December 2020 pursuant to Article 15(1) RPBA 2020.

In view of the transitional provision pursuant to Article 25(3) RPBA 2020, Article 13(2) RPBA 2020 applies to the admittance of the contents of D35 into the appeal proceedings, in particular with regard to the new experimental data (see in particular point 3.5) and the new arguments (see in particular points 3.6 and 3.7) provided therein.

2.2 According to the appellant, their own experiments performed in D29 enabled it to be shown that, at both applied pressures of 55 and 150 mbar for depositing the MT-TiCN layer, the resulting products fell within the scope of claim 1 even with the essential parameters of D20/D27.

The difference between the results of D20/27, which did not fall within claim 1, and those of D29, which did fall within claim 1, could not be explained by the slight differences in the gas volume amounts, as alleged by the respondent. The difference rather came from the fact that the values presented in D20/27 were incorrect.

The respondent's counter-experiments D30 and D31 aimed at reproducing D29 showed that the applied pressure played a crucial role in order to reproduce the invention. The experiments at 150 mbar (i.e. at the pressure used in D20/D27) for the MT-TiCN layer fell outside claim 1, see pages 9 to 12 of D30, while those at 55 mbar for the MT-TiCN layer, pages 13-17 of D30, fell within claim 1 (the same applied for D31, which was similar to D30). The applied pressure could then explain why D20/D27 did not work. For the appellant, just by applying a usual pressure in D20/D27, e.g. 55 mbar as exemplified by the cited prior art documents, the skilled person would be able to reproduce the invention.

The appellant therefore considered it legitimate to repeat D20/D27 with **the exact same parameters**, i.e. including the high pressure of 150 mbar, and to file the corresponding experimental results with D35.

As shown in the table on page 9 of D35, all resulting products fell within claim 1.

For the appellant the discrepancy between the results presented in D35 and those of D20/D27 resulted from the fact that the values calculated in D20/D27 for features (E), (F) and (G) were incorrect, as they were not

obtained according to the teaching of the patent for the following reasons:

- the values in D20/D27 for TC(0 0 12) (feature (E)) were wrongly calculated since thin film and absorption corrections were not performed, contrary to the disclosure in paragraph 47 of the patent; at least for inserts 2 and 3, the TC(0 0 12) values given were not even the result of the Harris formula of claim 1; the TC(0 0 12) value for insert 1 in the case of considering the thickness shown in the figure on page 2 of D20 was around 5.4, i.e. within the claimed range;
- the values in D20/D27 for feature (G) were also incorrect since thin film and absorption corrections were not performed, contrary to the disclosure in paragraph 51 of the patent; and
- the values in D20/D27 for feature (F) were also incorrect since thin film and absorption corrections were not performed, contrary to the disclosure in paragraph 54 of the patent;
- the layer thicknesses for each sample were not indicated in D20/D27, although this was required in order to arrive at correct calculated values for features (E), (F) and (G).

The appellant considered that the new experimental data and the new arguments submitted with D35 should be admitted into the proceedings since they were prepared in direct response to the respondent's counter-experiments D30 and D31. The experiments of D35 were time-consuming and required equipment and human resources to be available for the deposition process and the measurements. However, the latter had been a serious problem, since the time for carrying out these experiments fell within the worst phase of the Covid pandemic, when most of the experts and technicians at

the appellant's research facilities were sent home on reduced working hours or were working from home without the possibility to do laboratory work. These exceptional circumstances should be acknowledged as a reasoned justification under Article 13(2) RPBA.

The new experiments, which were carried out exactly according to the conditions selected by the respondent in D20/D27, showed that the skilled person following the example of the patent would be able to reproduce the claimed invention.

The respondent's data in D20/D27, as in D30 and D31, were incorrect and should therefore be regarded as invalid and inadmissible evidence of the alleged insufficiency of disclosure.

Therefore, since the inaccuracy of the data presented by the respondent had obviously misled the Opposition Division into taking a wrong decision, it was a matter of fairness for the appellant to be allowed to present correct results based on experiments prepared in the same way as the respondent's, but with correct results.

As put forward at the oral proceedings, the appellant had realised by chance that thin film and absorption corrections for the values of D20/D27 had not been performed when the values presented therein were recalculated. In view of the good reputation of the respondent in the present technical field, the appellant had had no reason to suspect at an earlier stage that such mandatory corrections had not been performed.

2.3 The Board does not share the appellant's view for the following reasons, which were also discussed at the oral proceedings.

Experiments D30 and D31 were filed by the respondent on 21 November 2019 with the reply to the statement setting out the grounds of appeal. The appellant therefore had ample time, i.e. even before the start of any restrictions due to the Covid pandemic, to perform and file new experiments and corresponding new arguments before receiving the Board's communication dated 11 December 2020, i.e. about one year later. In this respect the Board is not convinced by the allegation of difficulties having resulted from the Covid pandemic. As also put forward by the respondent, the restrictions due to the Covid pandemic in Sweden, where the appellant's company is based, were among the least restrictive in Europe.

Furthermore, realising by chance at such a late stage of the proceedings that the calculations provided in D20/D27 were supposedly incorrect cannot be considered as amounting to exceptional circumstances. D20 was already filed with the notice of opposition in 2016, i.e. around five years ago, and D27 already in 2018. D20/D27 comprise specific experimental evidence as to the general coating thickness, the XRD diffraction spectra and the rocking curves. Possible inconsistencies due to the effect of thin film and absorption correction, in particular in view of the alleged significance of this effect as invoked by the appellant, would thus have been recognisable from the experimental data provided by the opponent. Therefore, the appellant could and should have carried out their own experiments using the same parameters as applied in

D20 in good time at an earlier stage of the proceedings.

Finally, the Board concurs with the respondent that the filing of D35 around one month before the oral proceedings before the Board was too short a time for them to assess the correctness of the new data and arguments and prepare an appropriate reaction thereto, for example in the form of further experimental evidence.

In view of all of the above, even the alleged high relevance of the newly provided experiments and arguments to counter the experimental data in D20/D27, D30, and D31 as referred to in point 2.2 above would not justify their submission at such a late stage of the proceedings.

Hence, the contents of D35, in particular the new experimental data and the new arguments provided therein, are not taken into account pursuant to Article 13(2) RPBA 2020.

3. *Main request*

- 3.1 According to the impugned decision, the invention is not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

In its approach to assessing sufficiency of disclosure, the Opposition Division relied on the experimental results given in D20/D27, which were performed and filed by the respondent, see impugned decision, point 8.5.

The conditions in accordance with example 1 of the contested patent are reproduced in D20/D27 by using the information provided in the patent and by filling the missing information with parameters that the respondent considered to belong to the skilled person's common general knowledge.

Since the experimental data in D20/D27 show results falling outside the claimed ranges in view of features (E) and (F), the Opposition Division's approach in assessing sufficiency of disclosure was based on the question:

"how the skilled person would modify the experimental data in D20 to improve the texture and FWHM according to claim 1 of the patent" (impugned decision, page 11, second paragraph).

In reviewing the impugned decision, the Board sees no reason to deviate from this approach, which was not contested by the parties.

- 3.2 According to the appellant, it was known in the art long before the priority date of the contested patent how (0 0 12) textured α -Al₂O₃ (also expressed as (0 0 1) textured α -Al₂O₃) coating layers were produced, as was shown in the available prior art.

The deposition conditions required to obtain such a α -Al₂O₃ coating were also described in the examples of the contested patent (see paragraphs 31 to 37, more particularly paragraph 36), which further taught in paragraph 27 that a TiCN layer deposited by MT-CVD process below the α -Al₂O₃ layer improved the degree of (0 0 12) texture perfection of the α -Al₂O₃ layer if its

peak intensity ratio $I_{(220)}/I_{(311)}$ was lower than 3 (feature (G)).

According to the appellant, the same passage of the contested patent also stated how such MT-TiCN layer with a low $I_{(220)}/I_{(311)}$ ratio could be obtained, namely by adjusting the volume ratios of $TiCl_4/CH_3CN$ in the MT-CVD process to higher than 2. For the skilled reader this implied that the higher the volume ratio of $TiCl_4/CH_3CN$ was above 2, the stronger the described effect on the $I_{(220)}/I_{(311)}$ ratio.

The deposition of a MT-TiCN layer as such and also with a low $I_{(220)}/I_{(311)}$ ratio was well known in the art long before the priority date of the contested patent.

The appellant considered that this was exemplified by D2, see for instance Table 1 on page 6 and the corresponding results in Table 2. In examples 1 and 2 of D2, the $I_{(220)}/I_{(311)}$ ratio was about 0.07. D2 also taught adjusting the volume ratio of $TiCl_4/CH_3CN$ in the MT-CVD process to as high as 4-10 in order to obtain MT-TiCN layers with the properties of the examples of D2. In this respect, the teaching of D2 was in line with that of the contested patent.

As a consequence, the skilled person knew, in view of the disclosure of the contested patent, in particular paragraphs 27 and 33 to 36, and their common general knowledge, how to produce the claimed MT-TiCN and $\alpha-Al_2O_3$ layers with the corresponding claimed properties (features (E), (F) and (G)).

The appellant disputed that the skilled person would apply a pressure of 150 mbar as used in D20/D27 in the deposition process of the MT-TiCN layer (see also

impugned decision, point 8.6 and minutes, point 2.2.2). This appeared from documents D1/D1', D2, D5, D8/D8', D9 and D28. Even document D10, which disclosed a very general pressure range of 50-200 mbar and was considered by the Opposition Division to justify the high pressure in D20, did not apply a pressure higher than 100 mbar in its own examples. Hence, for the appellant the skilled person would not have applied the high pressure of 150 mbar of D20, but rather a pressure below 100 mbar.

In this context, the appellant repeated the experiments of D20/D27 at two pressures (D29): at 150 mbar, as in D20/D27, and at 55 mbar, which they assumed corresponded to the usual practice. D29 showed that the lower pressure of 55 mbar apparently had no significant influence compared to the pressure of 150 mbar. At the oral proceedings, the appellant argued the opposite, namely that this was in contradiction with the results presented by the respondent in D30 and D31. In D30, pages 9 to 12, the products obtained at 150 mbar for the MT-TiCN layer fell outside claim 1, while those on pages 13-17, obtained at 55 mbar for the MT-TiCN layer, fell within claim 1. In the appellant's view, the skilled person would have been able to reproduce the invention just by performing D20/D27 with a usual pressure, e.g. 55 mbar (exemplified by the above cited prior art documents).

For the appellant, D29 also showed that, independently of the pressure (55 or 150 mbar), the intensity ratios $I_{(220)}/I_{(311)}$ of all samples were far below 1 (feature (G)) and much closer to the values obtained for the inventive samples of the contested patent than those of D20/D27.

Under the conditions of D29, the texture coefficients, TC(0 0 12) (feature (E)), and the rocking curve FWHM of the (0 0 12) peak of the α -Al₂O₃ layer (feature (F)) were well within the claimed ranges for both applied pressures (55 mbar and 150 mbar) and quite close to the values obtained for the inventive samples A1, A2 and A3 shown in Table 2 of the contested patent. This was contrary to the results of D20/D27.

In addition to the pressure applied for depositing the MT-TiCN layer, the deviating results of D20/D27 were also explained by the CVD reactor geometry used. According to the appellant, the respondent had not indicated the type of reactor which was used in D20/D27, whereas in D29 the appellant used a radial inflow reactor of the type indicated in paragraph 32 of the contested patent, i.e. a commercial Ion Bond type CVD equipment 530.

Hence, the impugned decision based on the data presented in D20/D27 was not justified and should be set aside.

3.3 The Board does not share the appellant's view.

As put forward by the respondent, there are many parameters in the production process for obtaining a product in accordance with the layers of claim 1 that are not specified in the contested patent. An illustration of this is that the experiments of both D20/D27 and D29 were prepared in accordance with the teaching of paragraphs 27 and 31 to 37 of the contested patent, but still differed from each other in more than twenty parameter values.

The experiments in D30 and those in D31 were performed in an Ion Bond CVD reactor 530, i.e. a reactor similar to that of the contested patent (D30, point 5; D31, page 1). These experiments, see pages 1 to 8 of D30 and point 3 of D31, confirm that the conditions applied in D20/27 do not enable a product to be obtained in accordance with claim 1 of the main request. Hence, contrary to what the appellant alleged, the reactor itself cannot explain the difference between the results of D20/D27 and D29.

The Board notes that the experiments in D30 and D31 also confirm that products in accordance with claim 1 can be obtained, although not consistently, under the conditions of D29 (see in particular D30, pages 9 to 17). Further parameter(s) such as the gas flow rates in the MT-CVD process could also play a role (see for instance D30, pages 18-22 and D31, point 3). Thus, contrary to the allegation put forward by the appellant, it cannot be derived in a direct and unambiguous manner from D30 and D31 that just by decreasing the applied pressure in D20/D27 to the alleged usual pressure of, for instance, 55 mbar when depositing the MT-TiCN layer, the resulting products would inevitably fall under claim 1.

The Board further emphasises that the experiments in D20/D27 fulfil the requirements of feature (G), i.e. deposition of a MT-TiCN layer with a $I_{(220)}/I_{(311)}$ ratio lower than 3. Hence, the issue in that respect, especially when D2 is discussed, seems to be irrelevant. At any rate, as put forward by the respondent, the results of D20/D27 do not suggest to the skilled person to further reduce the $I_{(220)}/I_{(311)}$ ratio by increasing the $\text{TiCl}_4/\text{CH}_3\text{CN}$ volume ratio much higher than by 2 in order to obtain products in

accordance with claim 1, since the lower the $I_{(220)}/I_{(311)}$ ratio of inserts 1, 2 and 3, the higher the FWHM of the rocking curve outside the claimed range according to feature (F). Such teaching is not clearly and unambiguously disclosed in the contested patent either.

While - as admitted by the respondent - the values for the Harris formula with respect to inserts 2 and 3 in D20/D27 were indeed calculated incorrectly, the correctly calculated values too lead to values falling outside the claimed range (features (D) and (E)). The appellant's objection in this respect is thus of no avail.

As submitted by the respondent, many changes were performed in the parameters of the experiments D29 in comparison with those of D20/D27. However, no explanation was provided by the appellant as to why these changes were made in the way that they were.

The patent does not discuss any of these parameters as being essential. Neither the patent nor the skilled person's common general knowledge provide any indication as to why those specific parameters are to be altered when starting from the failed attempts to rework the patent (D20/D27), much less why these parameters should be altered specifically in the manner shown in D29. Considering the number of changed parameters between D20/D27 and D29, it appears that starting from the experimental data of D20/D27 in order to arrive at D29 would constitute an undue burden.

3.4 At the oral proceedings before the Board, the respondent conceded, when discussing the admittance of the content of D35 into the proceedings (see point 2

above), that the thin film and absorption corrections disclosed in paragraphs 47, 51 and 54 of the patent were not applied to values (E), (G) and (F), respectively, as presented in D20/D27.

The appellant argued that the values in D20/D27 would shift significantly if the mandatory thin film and absorption corrections taught in the patent were applied. For instance, value (E) of insert 1 in D20 was 5.4 instead of 4.44 for the thicknesses of the figure on page 2 (8.7 μm for the TiCN layer). D20/D27 could therefore no longer be considered valid evidence that the skilled person would not be able to reproduce the invention on the basis of example 1 of the patent. The same applied to D30 and D31. The respondent had not even tried to provide corrected values, although they had been made aware before the oral proceedings by letter D35 that the values in D20/D27 were not in accordance with the patent. The raw data of D20/D27 were in the hands of the respondent, which prevented the appellant from calculating the corrected values. Thus, for the appellant there was no proof that the claimed invention was insufficiently disclosed.

- 3.5 The Board does not share the appellant's view for the following reasons, which were also discussed at the oral proceedings.

The corrections presented in the description, paragraphs 47, 51 and 54, are not included in claim 1. Hence, it is not clear whether said corrections are indeed mandatory and whether or not they need to be applied to the raw data. Furthermore, a clear teaching on how they should be applied is not provided in the description either, particularly for feature (F) in paragraph 54, where it is stated that "[T] *this can be*

done by taking the thickness and linear absorption coefficient into account as described **for example by** Birkholz (*Thin Film Analysis by X-ray Scattering, 2006, Wiley-VCH Verlag, ISBN 3-527-31052-5, chapter 5.5.3, pages 211-215*)" (emphasis by the Board), thereby implying *de facto* that the corrections could be performed by other methods. Hence, there is no direct and unambiguous disclosure in the patent as to whether and how the corrections should be performed, particularly for feature (F).

In addition, in particular for feature (F), the alleged significant shift of the values presented in D20/D27 as a result of applying thin film and absorption corrections according to the teaching of the description of the patent amounts to a mere statement from the appellant's side without any supporting evidence. Contrary to what was provided with respect to feature (E) (see point 3.4 above), in particular for insert 1, the appellant did not even submit an estimate of the effect of thin film correction with respect to feature (F). Given the large difference between the experimental results and the claimed range, the Board is not convinced that the FWHM values (feature (F)) on the last page of D20 would be so greatly modified as to all fall within the claimed range of less than 30°. On the contrary, the expectation would be that the corrections would not move all values into the claimed range, as an up to 40% shift would be required for instance for insert 3.

The fact that the thin film and absorption corrections disclosed in paragraphs 47, 51 and 54 of the patent were not applied to values (E), (G) and (F), respectively, as presented in D20/D27, is therefore not sufficient to cast doubt on the validity of D20/D27 as

evidence supporting the conclusion that the invention is insufficiently disclosed.

3.6 As a consequence of the above, the Board finds the reasoning and conclusion of the impugned decision, points 8 to 8.9, with respect to the main request correct (Article 100(b) EPC).

4. *First to fourth auxiliary requests*

The first to fourth auxiliary requests correspond to the first to fourth auxiliary requests underlying the impugned decision.

It is not disputed by the parties that the same arguments as given above for the main request apply *mutatis mutandis* to claim 1 of each of the first to fourth auxiliary requests.

Thus, the Board also finds the reasoning and conclusion of the impugned decision, point 9, with respect to these auxiliary requests correct (Article 83 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Spira

C. Herberhold

Decision electronically authenticated