

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA**

SANDVIK INTELLECTUAL)	
PROPERTY AB,)	
)	
Plaintiff,)	
)	2: 10-cv-00654
v.)	
)	
KENNAMETAL, INC.,)	
)	
Defendant.)	

**MEMORANDUM OPINION AND ORDER OF COURT
ADOPTING SPECIAL MASTER’S REPORT AND RECOMMENDATION
ON CLAIM CONSTRUCTION**

Before the Court is PLAINTIFF’S OBJECTIONS TO REPORT AND RECOMMENDATION OF SPECIAL MASTER filed by Sandvik Intellectual Property AB (“SIPAB”) (Document Nos. 247 and 249) and the RESPONSE filed by Kennametal, Inc. (“Kennametal”) (Document No. 252). Also pending is the MOTION TO ADOPT REPORT AND RECOMMENDATION OF SPECIAL MASTER AS TO CLAIM CONSTRUCTION filed by Kennametal (Document No. 241) and the BRIEF IN OPPOSITION filed by SIPAB (Document No. 253).

Having reviewed the record *de novo*, and the objections of SIPAB to the Report and Recommendation of the Special Master, the Court adopts in its entirety the claim construction recommended by the Special Master in his Report and Recommendation dated February 26, 2012 (Document No. 240).

BACKGROUND

A. The '625 Patent

There being no objection to the Special Master's summary of the patent, the Court adopts it in whole, and will partially quote it hereafter.

SIPAB (through a related company, Sandvik, Inc.) and Kennametal are both in the business of manufacturing and selling metal cutting tools. SIPAB owns U.S. Patent No. 5,487,625 ("the '625 Patent), entitled "Oxide Coating Cutting Tool." The '625 Patent discloses cutting tool inserts¹ coated with alumina that have a particular microstructure and crystallographic texture to overcome shortcomings of the prior art.² Alumina (Al_2O_3) is a commonly employed coating material in the coating tool industry. Alumina is deposited onto the surface of the cutting tool through the process of chemical vapor deposition ("CVD"). Alumina may crystallize onto the surface in a variety of phases (i.e., polymorphs), each having its own physical properties (e.g., hardness, density, thermal properties). One of those phases (α -alumina) deposits in the form of coarse grains having a size of 1-6 μm depending on the deposition conditions. The α -alumina will deposit in a thermodynamically stable hexagonal crystalline structure. It is this phase that is utilized as a coating material for cutting tools in the preferred embodiments of the '625 Patent.

¹ Disposable coated cutting tools, commonly known as "inserts" are used in the metal working field, and are essential to the automotive, aerospace, die and mold, and general engineering industries.

² Metal alloy tools often wear quickly and become unusable due to degradation of their integrity that occurs during the cutting process. The coating of carbide cutting tools to increase wear resistance is a well-known strategy that has been employed routinely in the prior art. '625 Patent, col. 1, line 52 - col. 2, line 1. However, when coated cutting tools are used to machine nodular cast iron, the adherent properties of the iron result in rapid removal of the coating from the cutting edge and little improvement in tool life. '625 Patent, col. 1, lines 22-28.

One manner of assessing the specific orientation and structure of α -alumina crystals produced on a tool surface by CVD is the measurement of the texture coefficient (“TC”) along a particular orientation of the crystal. The ‘625 Patent states that the TC for α -alumina may be calculated using the Harris equation, which is commonly used to calculate TC and is stated mathematically as:

$$TC(hkl) = \frac{I(hkl)}{I_o(hkl)} \left\{ \frac{1}{n} \sum \frac{I(hkl)}{I_o(hkl)} \right\}^{-1}$$

“n” is the number of X-ray diffraction (“XRD”) peaks found in the X-ray spectrum, “I(hkl)” the intensity of the individual peaks in the XRD pattern from the test sample, and “I_o(hkl)” is the intensity from standard XRD data for the particular crystalline structure being assessed.

The claims of the ‘625 Patent are directed to coated cutting tool bodies having one or more refractory layers of which at least one layer is α -alumina. Claim 1, the only independent claim of the ‘625 Patent, reads:

1. A coated cutting tool body with one or more refractory layers of which at least one layer is alumina, said alumina layer having a thickness (d) of 0.5-25 μm and a single phase α -structure with a grain size (s):

0.5 μm < s < 1 μm for 0.5 μm < d < 2.5 μm ; and

0.5 μm < s < 3 μm for 2.5 μm < d < 25 μm ,

said alumina layer exhibiting a texture coefficient greater than 1.3 for the (012) growth direction of the equivalent crystallographic planes defined as:

$$TC(hkl) = \frac{I(hkl)}{I_o(hkl)} \left\{ \frac{1}{n} \sum \frac{I(hkl)}{I_o(hkl)} \right\}^{-1}$$

wherein: I(hkl)=measured intensity of the (hkl) reflection;
I_o(hkl)=standard intensity of the ASTM standard powder pattern diffraction data; and
n=number of reflections used in the calculation, wherein (hkl) reflections used are: (012), (104), (110), (113), (024), (116).

Thus, the claimed invention of the '625 Patent specifies the thickness depth, grain size, and TC (as calculated by the modified Harris equation) of the α -alumina coating layer of the cutting tool.

B. The Dispute Between the Parties

The dispute between the parties with regard to the scope of claim terms is narrow, pertaining only to the “texture coefficient” phrase. Kennametal asserts that the TC equation phrase contains terms that render it indefinite. In response, SIPAB argues that the overwhelming intrinsic and extrinsic evidence, which includes Kennametal’s own pre- and post-litigation conduct, establishes that the disputed claim phrase and terms are not indefinite and should be given their ordinary meaning to one skilled in the art. Further, SIPAB contends that the TC formula is definite because it is a known formula in the art as of the time of the patent.

Kennametal does not dispute that the various TC formulas were known in the art before the patent’s December 1992 claimed priority date. Rather, Kennametal’s position is that the claims are indefinite not because the TC formula is unknown, but because the '625 Patent fails to specify how to select and calculate the two variables that the TC formula requires to calculate a TC value:

- $I_0(hkl)$ = standard intensity of the ASTM standard powder pattern diffraction data; and
- $I(hkl)$ = measured intensity of the (hkl) reflection.

Kennametal contends that the '625 Patent provides no guidance on the following two (2) questions:

- (1) which “standard intensity” should be selected among the more than a dozen “ASTM standard powder pattern diffraction data” of α -alumina available in December 1992?; and

(2) how should the intensity of an α -alumina coating be measured using XRD (for instance, which parameters for the testing and analysis of intensity data should be chosen)?

In response, SIPAB submits that “ $I(hkl)$ is the measured intensity of the hkl reflection using X-Ray Diffraction, where hkl are the Miller indices of the measured crystallographic plane” and that “ $I_0(hkl)$ is the standard intensity of the hkl reflection as indicated on Powder Diffraction File 10-173 for alpha-Aluminum Oxide (corundum).”

C. Claim Construction Proceedings

On October 10, 2010, the parties submitted a Joint Disputed Claims Terms Chart (Document No. 94). Thereafter, on November 1, 2010, SIPAB filed its Opening Claim Construction Brief (Document No. 103) and on November 22, 2010, Kennametal filed its Response to SIPAB’s Opening Claim Construction Brief (Document No. 107). Because of the complexity of the issues raised in the parties’ briefs, by Order of November 30, 2010, the Court appointed Frederick H. Colen, Esquire as Special Master to serve throughout the claim construction process including, but not limited to, the Claim Construction Hearing and the Report and Recommendation (Document No. 125)

A Claim Construction Hearing (“Markman Hearing”) was conducted on June 13-14, 2011, before the Special Master, with the undersigned in attendance, at which all parties were represented by counsel who presented and argued the issues skillfully and effectively. Todd B. Hufnagel, Ph.D., testified as an expert witness for SIPAB and William E. Mayo, Ph.D., testified as an expert witness for Kennametal. Both provided extensive testimony as to their respective

positions with respect to the definiteness / indefiniteness of the claims of the '625 Patent and the bases for their opinions.

Prior to the Markman Hearing, SIPAB requested that the Court determine whether the invalidity defense of indefiniteness should be decided by the Court as part of the claims construction determination or by the jury at the trial of the case. Both parties briefed the issue and agreed that oral argument was unnecessary as the issue could be decided on the briefs. *See* Document Nos. 150, 151, 155, and 156. The Court requested the Special Master to provide the Court with his recommendation as to the disposition of this issue as part of the Report and Recommendation.

After the Markman hearing, SIPAB filed a Motion to Strike Opinions (and other testimony) of William E. Mayo, Ph.D., Kennametal's expert, under Federal Rule of Evidence 702 (Document No. 199). That matter was also fully briefed by the parties. *See* Document Nos. 200, 209, and 212. The Court requested the Special Master to provide the Court with his recommendation as to the disposition of this Motion as part of the Report and Recommendation.

On February 16, 2012, Special Master Colen issued his Report and Recommendation on Claim Construction (the "Report and Recommendation") (Document No. 240), in which he made the following recommendations:

1. It is prudent and appropriate for the Court to consider the issue of indefiniteness at the claim construction stage of the proceeding.
2. The Motion to Strike the Affidavits of Dr. Mayo and his associated testimony under Federal Rule of Evidence 702 should be denied.
3. The claim term in dispute - "*a texture coefficient greater than 1.3 for the (012) growth direction of the equivalent crystallographic planes*" - is insolubly ambiguous in that the

formula for texture coefficient (TC) incorporates the terms “ $I(hkl) = \text{measured intensity of the } (hkl) \text{ reflection}$ ” and “ $I_o(HKL) = \text{standard intensity of the ASTM standard powder pattern diffraction data}$,” both of which are insolubly ambiguous.

4. Independent Claim 1 and dependent Claims 2-7 are, therefore, invalid for indefiniteness under 35 U.S.C. § 112, ¶ 2.

See Report and Recommendation, at 51-52.

On March 15, 2012, SIPAB filed its Preliminary Objections to the Report and Recommendation (Document No. 247) and on May 14, 2012, SIPAB filed its Supplemental Submission in Support of its Objections to the Report and Recommendation (Document No. 249), in which it objects to the Special Master’s recommendation that the Court find that the claims of the patent are indefinite and further objects to the recommendations with respect to the motion to strike and the motion regarding SIPAB’s asserted right to a jury trial on the issue of indefiniteness. On May 30, 2012, Kennametal filed its response to SIPAB’s Preliminary Objections and Supplemental Submission (Document No. 252).

The parties do not object to the Special Master’s summary of the “Description of the Prior Art and the Invention,” “The Claim Terms at Issue,” and “The Legal Framework” for Claim Construction and Indefiniteness, and the Court has adopted and quoted from these summaries. The Court also finds that the Special Master’s section on the governing legal principles for claim construction, including the statutory principles, is correctly, thoroughly and succinctly set forth in the Report and Recommendation and adopts those sections in full.

Additionally, because the parties have no objection to the Special Master’s explanation of the law to be applied to the present claim construction, the Court adopts it in full as well.

Similarly, no party objects to the Special Master’s definition of a person of ordinary skill in the art. The Court agrees with and adopts the finding of the Special Master that the definitions proposed by the experts for SIPAB and Kennametal are substantially the same and their differences, if any, do not affect the construction of the disputed claim terms.

The Court now reviews the Report and Recommendation of the Special Master, along with the objections filed by SIPAB and the response of Kennametal. Having conducted, pursuant to Federal Rule of Civil Procedure 53(f)(3), a *de novo* review of the parties’ respective positions, the Court will DENY the objections of SIPAB and ADOPTS in its entirety the claim construction recommended by the Special Master in his Report and Recommendation.

STANDARD OF REVIEW

The Court is required, under Federal Rule of Procedure 53(f)(3) to conduct a *de novo* review of all objections to findings of fact made or recommended by the Special Master, unless the parties, with the court’s approval, stipulate that the findings shall will be reviewed for clear error or that the findings of the Special Master will be final. The parties have not agreed to clear error review nor have they stipulated to the finality of the Special Master’s Report. “In acting on a master’s order . . . the Court may adopt or affirm, modify, wholly or partly reject or reverse, or resubmit to the master with instructions.” Fed. R. Civ. P. 53(f)(1).

ANALYSIS

A. General Principles of Claim Construction

The purpose of claim construction is to “determin[e] the meaning and scope of the patent claims asserted to be infringed.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976-78 (Fed. Cir. 1995), *aff’d*, 517 U.S. 370 (1996). It is well-established that claim construction is

conducted by courts in accordance with certain canons of construction. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-24 (Fed. Cir. 2005) (en banc). Claim construction analysis begins with the language in the claims themselves, which are generally given their ordinary and customary meaning to a person of ordinary skill in the art in question at the time the invention was patented. *Id.* at 1312-13.

This “person of ordinary skill in the art” is also deemed to have read the claim “in the context of the entire patent, including the specification.” *Id.*

If the plain meaning of the claims is not entirely clear, courts next refer to the patent’s intrinsic evidence. For example, “the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term” *Id.* at 1315 (*quoting Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)) (quotation marks omitted). The construction which is most faithful to the claim’s language and most aligns with the invention’s description will ultimately be the correct construction. *Id.* at 1316. The prosecution history is also considered intrinsic evidence and is an important source for understanding the true meaning of terms.

Extrinsic evidence, such as dictionaries or technical treatises, are also often useful to assist a court’s understanding of how complex or technical terms of art are commonly understood by experts in the field. Such extrinsic evidence may be relied on so long as it does not contradict clear language from the claims, specification, or other intrinsic evidence. *Id.* at 1322-23.

B. SIPAB's Objections to the Report and Recommendation of the Special Master

SIPAB objects to the Special Master's recommendation that the Court find that the claims of the patent are indefinite and to the Special Master's recommendations with respect to the motion to strike and the motion regarding SIPAB's asserted right to a jury trial on indefiniteness. Kennametal, not surprisingly, requests that the Court overrule SIPAB's objections, and adopt in full the recommendations set forth in the Report and Recommendation of the Special Master. The Court will address the Objections seriatim, turning first to the objection relating to whether it is appropriate for the Court to consider the issue of indefiniteness at claim construction, then to the issue of whether Dr. Mayo's affidavit and associated testimony should be stricken, and finally to the issue of whether the claim term in dispute is insolubly ambiguous.

1. Indefiniteness is Properly Decided by the Court

SIPAB argues that the guarantee of the Seventh Amendment to the United States Constitution of a jury trial requires that the issue of indefiniteness be submitted to a jury. However, as the Special Master discussed in his Report and Recommendation, the United States Supreme Court and the Federal Circuit Court of Appeals have repeatedly held that claim construction is an issue for the court, not a jury. *See Markman*, 517 U.S. at 372; *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc).

Further, as the Special Master recognized, the Federal Circuit extended this holding to indefiniteness issues in *Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371 (Fed. Cir. 2001), wherein the appellate court "reject[ed] Exxon's argument that the issue of indefiniteness turns on an underlying factual dispute that should not have been resolved as a matter of law on

summary judgment.” *Id.* at 1376. The court emphasized that:

although a court may consider or reject certain extrinsic evidence in resolving disputes en route to pronouncing the meaning of claim language, “the court is not crediting certain evidence over other evidence or making factual evidentiary findings. Rather, the court is looking to the extrinsic evidence to assist in its construction of the written document”

Id. (quoting *Cybor Corp.*, 138 F.3d at 1454). See also *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010) (“If a claim is indefinite, the claim, by definition, cannot be construed”); *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1379 (Fed Cir. 1999) (recognizing that indefiniteness is “inextricably intertwined” with claim construction).

Accordingly, the Court will adopt the Special Master’s recommendation and finds that “the determination of claim indefiniteness is a legal conclusion that is properly part of the Court’s performance of its duty as the construer of patent claims and that such determination is properly part of claim construction at a Markman Hearing.”

2. The Declarations and Testimony of Dr. Mayo are Admissible under Federal Rule of Evidence 702

Because the parties have no objection to the Special Master’s explanation of the *Daubert*³ legal framework, the Court adopts it in full without restating it herein.

SIPAB seeks to exclude the affidavits and testimony of Kennametal’s proffered expert witness William E. Mayo, Ph.D. According to SIPAB, Dr. Mayo’s opinions are unreliable because (1) they are unsupported by sufficient facts and data, (2) his analytic approach was not guided by reliable scientific principles or methods, and (3) he failed to disclose critically important facts about the testing methods and protocols.

³ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

In particular, SIPAB argues that Dr. Mayo's reliance on (a) the scoping study and (b) tests on three Sandvik samples is not appropriate as there are serious flaws and deficiencies in his data and methodology. The Special Master found this argument to be unpersuasive. The Court concurs with the Special Master's finding for the following reasons.

First, Dr. Mayo testified that the scoping study summarized major influences on variability of calculated TC(012) for α -alumina. The scoping study was comprised of both approximations based on Dr. Mayo's experience in the field as well as actual experiments that he had performed in the past. The scoping study was designed to identify which variables were important in finding TC(012) measurement. The scoping study did not set forth any TC(012) measurements obtained in the testing of actual α -alumina coated cutting tool samples on which Dr. Mayo relied in developing his expert opinions. Dr. Mayo explained the purpose of the scoping study during his testimony at the Markman Hearing:

Well, a scoping study is a typical scientific process whereby one attempts to identify the key parameters that are going to be used for the big experiments. It's not intended to be official in any way, it's simply intended to indicate the direction that you're going to go and why you were thinking about these particular variables.

June 13, 2011 Markman Hearing Tr. (Document No. 194 at 199: 6-11).

According to Dr. Mayo, based on his scoping study, he undertook a comprehensive variability study "to confirm the effects of [different] choices" on variability in TC(012). Aff. at ¶ 134. The variability study analyzed "merely a subset of the choices of a person of ordinary skill in the art may have made in December of 1992." *Id.* The scoping study informed Dr. Mayo's decision as to which parameters to further investigate in the variability study. This variability data was extensively detailed in Tables 15 - 17 of Dr. Mayo's Affidavit.

The Special Master determined that SIPAB's criticism of the scoping study was misplaced. The Court agrees and finds that the scoping study is not relevant to the evaluation of Dr. Mayo's variability data obtained in actual experiments which he reported in Tables 15 - 17. The scoping study was only germane to Dr. Mayo's later testing. As the Special Master noted, it is only those later tests that are relevant to evaluation of the influence of the data and analytical considerations on TC(012) for α -alumina coated cutting tools.

Next, SIPAB argues that Dr. Mayo's analytic approach was not guided by reliable scientific principles or methods and, as a result, yielded wildly inconsistent results. Specifically, SIPAB argues that Dr. Mayo's conclusions based on the scoping study are inconsistent with his conclusions on the three Sandvik samples,⁴ which data is reflected in Tables 15 - 17. Dr. Mayo provided extensive detail in his testimony as to how he collected the XRD data on the three Sandvik samples - including details on the equipment that he used and the settings employed on the diffractometer. Moreover, SIPAB and its expert, Dr. Hufnagel, neither conducted their own testing to rebut Dr. Mayo's assertion that the parameter choices at issue affected TC(012) nor ever analyzed Dr. Mayo's raw test data. Dr. Mayo testified that the variability study in Tables 15-17 used only a subset of the overall choices of parameters available in 1992. Significantly, Dr. Hufnagel, SIPAB's expert, agreed with Dr. Mayo that most of the different parameters at issue offered choices to a person of ordinary skill in the art.

⁴ SIPAB also argues that Dr. Mayo's results are unreliable solely on the basis that Kennametal's counsel selected the samples for evaluation. The Special Master found that there was no evidence of record "that even suggests that those sample selections generated any difference in the reported results of the XRD (or the calculated TC values) or were not representative of α -alumina coated cutting tool sample manufactured by Sandvik." Upon de novo review, the Court agrees with the Special Master that the record is completely devoid of any evidence or testimony that establishes or even suggests that the tool cutting samples selected by Kennametal's counsel for Dr. Mayo to test were chosen to bias or influence Dr. Mayo's test results.

SIPAB raises two additional arguments with respect to the variability study, both of which can be dismissed rather summarily. Although SIPAB expresses concern about the potential impact of possible defects in the cutting tool inserts tested by Dr. Mayo, it cites to no record evidence to establish that any defects were present in the three samples evaluated by Dr. Mayo. Without any record support for such a contention, SIPAB's argument must fail.

SIPAB also objects that Dr. Mayo did not properly account for sample inhomogeneity or analytical and experimental variation in his methods. However, as the Special Master noted, far from avoiding the issue, Dr. Mayo recognized that the choice of slit size and sample face can introduce variation in the TC(012) calculation (Aff. ¶¶ 111-112). As did the Special Master, the Court finds that surface-to-surface variability of the coatings on the cutting tool inserts does not raise an issue of reliability of Dr. Mayo's testimony.

Finally, SIPAB objects to Dr. Mayo's conclusions as unreliable and incomplete based on the failure of Dr. Mayo to disclose that one of the Sandvik samples had been "diamond polished." While Dr. Mayo should have disclosed that he had diamond polished the sample, the Court finds, as did the Special Master, that the end material analyzed by Dr. Mayo remained an α -alumina layer on a cutting tool. Dr. Mayo did not compare the polished section of the sample to an unpolished section; rather he isolated the section to be analyzed and varied only the experimental, analytical, and reference standard parameters.

After a *de novo* review, the Court finds, as did the Special Master, that SIPAB has not established that the opinions of Dr. Mayo are unreliable under Federal Rule of Evidence 702. According, the Motion to Strike filed by SIPAB will be denied.

3. Claims Construction

Special Master Colen, in an extremely detailed analysis and discussion of the '625 Patent recommended that "the claim term in dispute ' *a texture coefficient greater than 1.3 for the (012) growth direction of the equivalent crystallographic planes* ' - is insolubly ambiguous in that the formula for texture coefficient (TC) incorporates the terms ' $I(hkl) = \text{measured intensity of the } (hkl) \text{ reflection}$ ' and ' $I_o(hkl) = \text{standard intensity of the ASTM standard powder pattern diffraction data,}$ ' both of which are insolubly ambiguous. Accordingly, the Special Master recommended that the Court find that Independent Claim 1 and dependent Claims 2-7 of the '625 Patent are invalid for indefiniteness under 35 U.S.C. § 112, ¶ 2.

a. *The Claim Term "Measured Intensity of the (hkl) Reflection"*

The Special Master concluded that "the cumulative evidence here demonstrates that the phrase " $I(hkl) = \text{measured intensity of the } (hkl) \text{ reflection}$ " is not sufficiently precise to permit a potential infringer to determine the bounds of the claims of the '625 Patent.

SIPAB objects that the Special Master's finding should not be adopted because it is contrary to the weight of the evidence, especially in light of the fact that the Special Master relied upon the testimony of Dr. Mayo. However, as discussed *supra*, the Court has found that Dr. Mayo's opinions are reliable, complete, and satisfy the requirements of Federal Rule of Evidence 702. Therefore, the Court finds and rules that the Special Master did not err in relying upon the testimony of Dr. Mayo.

Furthermore, the Court finds that the objections raised by SIPAB are based primarily on attorney commentary on Dr. Mayo's test results, which commentary is not supported by its own expert, Dr. Hufnagel. SIPAB offered no evidence which discredited Dr. Mayo's tests results.

Remarkably, Dr. Hufnagel did not perform a single experiment on any α -alumina coated cutting tools nor did SIPAB provide him access to Dr. Mayo's raw testing data on the three Sandvik samples.

Accordingly, the Court adopts the recommendations of the Special Master and finds that:

1. Dr. Mayo's test data collected from the three Sandvik cutting tools essentially stands unrebutted;
2. Test data demonstrates that the variation in the calculated value of TC(012) as a result of applying numerous collection and analytical factors that confronted one of skill in the art as of December 1992 made a meaningful difference in that the resulting TC(012) values of the same Sandvik GC415, GC3015, and GC4215 samples fell both within and without the greater than 1.3 (and/or 1.5) texture coefficient value required by the claims of the '625 Patent to infringe; and,
3. Such variability, which could have been avoided through a more extensive disclosure by the patentee in the '625 Patent, renders the boundaries of the claims of the '625 Patent unclear to one of skill in the art.

For these reasons, as well as the comprehensive reasons set forth in the Special Master's Report and Recommendation, the Court finds the phrase "*I(hkl) = measured intensity of the (hkl) reflection*" to be insolubly ambiguous and, therefore, finds that independent Claim 1 and dependent Claims 2 - 7 of the '625 Patent are invalid. The cumulative evidence demonstrates that the phrase "*I(hkl) = measured intensity of the (hkl) reflection*" is not sufficiently precise to permit a potential infringer to determine the bounds of the claims of the '625 Patent.

b. *The Claim Term “Standard Intensity of the ASTM Standard Powder Pattern Diffraction Data”*

Claim 1 of the ‘625 Patent defines standard intensity with reference to the “ASTM standard powder pattern diffraction data.” The construction dispute focuses on whether one of ordinary skill in the art as of December 1992 would understand the phrase “*Standard Intensity of the ASTM Standard Powder Pattern Diffraction Data*” to refer to a single PDF card for α -alumina as argued by SIPAB or up to sixteen powder pattern diffraction cards as argued by Kennametal. Neither the specifications, the claims, nor the prosecution history of the ‘625 Patent identifies in greater detail what the inventors were referring to as “the ASTM standard powder pattern diffraction data” for α -alumina. Hence, it is only through extrinsic evidence that the Court can determine what one of ordinary skill in the art as of December 1992 would have understood this reference to mean.

Dr. Hufnagel opined that one of ordinary skill in the art as of December 1992 would have ultimately taken the phrase “ASTM standard powder diffraction data” to refer to two possible cards for α -alumina - the PDF 10-173 card and the PDF 42-1468 card. On the other hand, Dr. Mayo opined that there were at least sixteen standard powder diffraction data sets available for α -alumina as of December 1992 and that “there was no single ‘standard powder pattern diffraction data’ for α -alumina as of December 1992.” Mayo November 2010 Aff. (Doc. 109 at ¶ 89.)

After a *de novo* review of the evidence presented by SIPAB, which includes the Declaration of Dr. Hufnagel, the testimony of Dr. Hufnagel at the Markham hearing and at his deposition, published Sandvik and third party documents, deposition testimony of Sandvik personnel and third party personnel at Seto, as well as the evidence presented by Kennametal

which includes the November 2010 Affidavit of Dr. Mayo and third party publications on which Dr. Mayo relied, the Special Master's Report and Recommendation, and the objections thereto, the Court finds, as did the Special Master, that the phrase "the ASTM standard powder pattern diffraction data" would be understood by one of ordinary skill in the art as of December 1992 to refer to two standard powder pattern diffraction cards -- Powder Diffraction File 10-173 and Powder Diffraction File 42-1468. Interestingly, SIPAB acknowledged during the Markman hearing that these two different cards will result in different TC(012) being determined with the Harris equation required by the claims of the '625 patent. *See* Transcript of Markman Hearing 205: 2-19, 248:8-10.

Accordingly, the Court finds, as did the Special Master, that the cumulative evidence of record demonstrates to a clear and convincing standard that the phrase " $I_o(hkl) = \textit{standard intensity of the ASTM standard powder pattern diffraction data}$," is not sufficiently precise to permit a potential infringer to determine the bounds of the claims of the '625 Patent. Therefore, the phrase " $I_o(hkl) = \textit{standard intensity of the ASTM standard powder pattern diffraction data}$," cannot be construed in that it is insolubly ambiguous and is, therefore, invalid.

D. Internal Testing Conducted by Kennametal

After the conclusion of the Markham hearing, SIPAB filed its Third Supplemental Identification of Extrinsic Evidence for Claim Construction for consideration by the Court and the Special Master (Document No. 192). Attached as Exhibit 52 is a single piece of additional extrinsic evidence which specifically relates to the standard intensity data for alpha-alumina Kennametal allegedly used in the 1992-1993 timeframe. According to SIPAB, this Exhibit provides further insight into what a person of ordinary skill in the art would have selected for

standard data in 1992 and provides additional evidence of Kennametal's "longstanding use of PDF 10-173 for XRD analysis of α -alumina." Specifically, SIPAB contends that Exhibit 52 supports its position that those skilled in the art would have understood the standard intensity term to refer to the PDF 10-173 card.

The Court has reviewed Exhibit 52 and Kennametal's Response to the Third Supplemental Identification of Extrinsic Evidence for Claim Construction (Document No. 196) and finds that the activities of Kennametal and Hertel AG ("Hertel"), as reflected in Exhibit 52, are not controlling and do not provide sufficient evidence to support SIPAB's position that Kennametal understood the standard intensity term to refer to only PDF 10-173.

In December 1992 and January 1993, engineers for Hertel performed XRD analysis on its alumina coatings and in doing so used the PDF 10-173 card to determine whether the alumina coating was the α -phase. At the time this work was being performed, Kennametal did not own Hertel; rather Kennametal acquired a majority interest in Hertel later in 1993. It does not appear that the card was used as part of any TC calculation under the Harris formula nor was its use related to any analysis of the '625 Patent (which notably did not exist at that time) or any other TC patent.

Kennametal's own TC testing began in 2000, after it became aware of SIPAB's TC patents. The evidence adduced during the Markman hearing showed that Kennametal's TC analysis followed extensive internal confusion and discussion about what the "standard intensity" term in those patents meant. The decision to use the PDF 10-173 card at that time was based upon its review of publications by Sandvik and related authors and was not based upon any TC calculation performed by Hertel in 1992-1993. *See* Kennametal Ex. Nos. 77 - 79 and 83

(which repeatedly make reference to Kennametal not having the Standard Intensity Data (hkl) necessary for examination of the Sandvik patents) and the excerpts of Greenfield's deposition.

The Court finds and rules that the evidence in the record clearly demonstrates that before being sued, Kennametal did not know what SIPAB meant by the term "ASTM standard powder pattern diffraction data," that it researched what the term could possibly mean including the recognition that several different standards existed, and ultimately asked SIPAB in March 2001 what standard data it used.

Conclusion

Having reviewed the record *de novo*, and having reviewed SIPAB's objections to the Special Master's Report and Recommendation, the Court finds that SIPAB's objections do not demonstrate that the Special Master erred in either his factual or legal analysis of the indefiniteness issues. Accordingly, the Court hereby adopts the Report and Recommendation issued by Special Master Colen in its entirety.

An appropriate Order follows.

McVerry, J.

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA**

SANDVIK INTELLECTUAL)	
PROPERTY AB,)	
)	
Plaintiff,)	
)	2: 10-cv-00654
v.)	
)	
KENNAMETAL, INC.,)	
)	
Defendant.)	

ORDER OF COURT

AND NOW, this 24th day of July, 2010, in accordance with the foregoing Memorandum Opinion, the Court hereby adopts the Report and Recommendation issued by Special Master Colen in its entirety. Specifically, the Court rules that:

1. It is prudent and appropriate for the Court to consider the issue of indefiniteness at the claim construction stage of the proceeding.
2. The Motion to Strike the Affidavits of Dr. Mayo and his associated testimony under Federal Rule of Evidence 702 is **DENIED**.
3. The claim term in dispute - "*a texture coefficient greater than 1.3 for the (0132) growth direction of the equivalent crystallographic planes*" is insolubly ambiguous in that the formula for texture coefficient (TC) incorporates the terms "*i(hkl) = measured intensity of the (hkl) reflection*" and "*I_o(hkl) = standard intensity of the ASTM standard powder pattern diffraction data,*" both of which are insolubly ambiguous; and
4. Independent Claim 1 and dependent Claims 2 - 7 are, therefore, invalid for indefiniteness under 35 U.S.C. § 112, ¶ 2.

It is further **ORDERED** that the Motion to Adopt Report and Recommendation of Special Master as to Claim Construction (Document No. 241) filed by Kennametal is

GRANTED.

So **ORDERED** this 24th day of July, 2012.

BY THE COURT:

s/ Terrence F. McVerry
United States District Court Judge

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