

**Internal distribution code:**

- (A) [ ] Publication in OJ  
(B) [ ] To Chairmen and Members  
(C) [ ] To Chairmen  
(D) [X] No distribution

**Datasheet for the decision  
of 11 October 2011**

**Case Number:** T 1096/08 - 3.2.03

**Application Number:** 99969767.5

**Publication Number:** 1127209

**IPC:** E21B 17/042

**Language of the proceedings:** EN

**Title of invention:**

Thread coupling for a drill string for percussive rock drilling

**Patent Proprietor:**

Atlas Copco Secoroc AB

**Opponent:**

Robit Rocktools Ltd.

**Headword:**

-

**Relevant legal provisions:**

-

**Relevant legal provisions (EPC 1973):**

-

**Keyword:**

"Admissibility of evidence - partly no"  
"Novelty and inventive step - yes"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 1096/08 - 3.2.03

**DECISION**  
of the Technical Board of Appeal 3.2.03  
of 11 October 2011

**Appellant:** Atlas Copco Secoroc AB  
(Patent Proprietor) P.O. Box 521  
S-737 25 Fagersta (SE)

**Representative:** Hammond, Andrew David  
Valea AB  
Lindholmospiren 5  
S-417 56 Göteborg (SE)

**Respondent:** Robit Rocktools Ltd.  
(Opponent) Vikkiniityntie 9  
FIN-33880 Lempäälä (FI)

**Representative:** Hoffmann Eitle  
Patent- und Rechtsanwälte  
Arabellastraße 4  
D-81925 München (DE)

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 7 April 2008  
revoking European patent No. 1127209 pursuant  
to Article 101(2) EPC.

**Composition of the Board:**

**Chairman:** U. Krause  
**Members:** E. Frank  
K. Garnett

## Summary of Facts and Submissions

- I. The appeal lies from the decision of the Opposition Division dated 23 January 2008 and posted on 7 April 2008 to revoke the European patent No. 1 127 209 pursuant to Article 101(2) EPC. In particular, the Opposition Division held that the subject-matter of claim 1 as granted did not meet the requirements of inventive step in the light of an alleged prior use presented by the Respondent (Opponent). The Opposition Division found that, based on a late filed affidavit, the prior use had been proved beyond doubt.
  
- II. The Appellant filed a notice of Appeal on 29 May 2008, paying the appeal fee on the same day. The statement of grounds of appeal was submitted on 27 June 2008.
  
- III. A communication pursuant to Article 15(1) RPBA was issued together with a summons to attend oral proceedings. The Board considered that it was appropriate to hear the evidence of Mr. Sjöholm and Mr. Peltonen as to the facts and circumstances of alleged sales of tube bits, and a decision for the taking of evidence from witnesses was issued. The oral proceedings were duly held on 24 November 2010. After the taking of evidence from both witnesses, the matter was discussed with the parties, and, at the end of the first oral proceedings, the appeal proceedings were ordered to be continued in writing. A further communication pursuant to Article 15(1) RPBA was issued, following a summons to attend further oral proceedings, which were duly held on 11 October 2011. At the end of the second oral proceedings, the Respondent withdrew all its then existing auxiliary requests.

IV. The Appellant requested that the decision under appeal be set aside and the patent be maintained as granted.

The Respondent requested that the appeal be dismissed.

V. The wording of claim 1 as granted reads as follows:

"1. A conical thread coupling for a drill string for percussive rock drilling comprising a male thread (5) and a female thread (4) cooperating therewith, said male thread being arranged on a first drill string element (3) and said female thread being arranged on a second drill string element (2), that said first drill string element (3) has a first impact surface (6) and that said second drill string element (2) has a second impact surface (7), said first and second impact surfaces being arranged to abut against each other, characterized in that the crests (8) of said threads (5, 4) have a radius of curvature which is larger than 30% of the pitch of the thread."

VI. The following matters and evidence have been considered for the purposes of the present decision:

VI.1 Alleged prior use "*Robit Rocktools LTD/ Alwima Oy/Miranet Oy*".

As filed with Respondent's notice of opposition:

D1 = Drawing of ring bit RR77,  
dated 25 September 1992;

D2 = Brochure Robit Rocktools Ltd.  
(no publication date);

- D3 = Invoice 981236 Robit Rocktools Ltd.,  
dated 13 May 1998;
- D4 = Invoice 981272 Robit Rocktools Ltd.,  
dated 2 June 1998;
- D5 = Certificate Miranet Oy of 16 February 2005  
(Mr. Peltonen affidavit);
- D6 = Drawing of drill rod Terra-Team Oy 6847kk  
(not dated);

As filed after expiry of the opposition period (with Respondent's letter of 22 November 2007):

- D11 = Affidavit Mr. Sjöholm of 21 November 2007;
- D12 = The original pencil sketch of 25 September  
1992, corresponding to drawing D1;

As filed with Respondent's reply to the grounds of appeal:

- D12a = Manual from SANDVIK Rock Tools, apparently  
published in 1994 ("D12" has been renumbered  
"D12a" by the Board);

As filed with Respondent's letter of 19 October 2009:

- D17 = ISO 10208; first edition, 15 February 1991;
- D18 = Robit ROCKTOOLS (web page), "released" on  
7 July 2009 and apparently printed out on  
31 August 2009;
- D19 = Atlas Copco, Guide to product codes  
(no publication date);

As filed with Appellant's letter of 23 March 2010:

- Annex 1 = Photograph of a typical copy lath,  
apparently taken on 23 February 2010;
- Annex 2 = Photograph of a master or template  
used with such a copy lathe, apparently  
taken on 23 February 2010;

During the first oral proceedings, held on 24 November 2010:

- D21 = Three sheets of drawings/calculations, as filed  
by the Appellant (not dated);
- D24 = Evidence taken of Mr. Sjöholm; transcript of  
the verbatim recording, pages 1/45 to 45/45, as  
attached to the minutes of the first oral  
proceedings before the Board;
- D25 = Evidence taken of Mr. Peltonen; transcript of  
the verbatim recording, pages 1/17 to 17/17, as  
attached to the minutes of the first oral  
proceedings before the Board;

As filed during the second oral proceedings, held on  
11 October 2011:

- D26 = DE 1 170 887 B, filed by the Respondent;
- D28 = Extracts from Sandvik Product Catalogue  
HR-12281-ENG 1997, filed by the Respondent;

VI.2 Alleged prior use "*Robit Rocktools LTD/  
Terra-Team Oy*".

As filed with Respondent's notice of opposition:

- D1 = Drawing of ring bit RR77,  
dated 25 September 1992;
- D6 = Drawing of drill rod Terra-Team Oy 6847kk  
(not dated);
- D7 = Drawing of drill rod Terra-Team Oy 7857kk  
(not dated);
- D8 = Statement Terra-Team Oy of 17 February 2005  
(Mr. Vennola statement);
- D9 = Invoice 13931 Terra-Team Oy,  
dated 9 January 1997;
- D10 = Invoice 14017 Terra-Team Oy,  
dated 15 January 1997;

As filed with Respondent's reply to the grounds of  
appeal:

- D13 = drawing of alleged fitting between D1's drill  
bit and the drill rod of D6 (not dated);

Offer of Mr. Vennola as a witness;

VI.3 alleged prior use "*Robit Rocktools LTD/  
Helake company/Terra-Team Oy*".

As filed with Respondent's notice of opposition:

- D1, and D6 to D10 (cf. point VI.2 of this decision  
above)

As filed with Respondent's letter of 9 September 2011:

D21a = The picture of a tube, allegedly used with D1's ring bit and related to the "Helake company", not dated ("D21" has been renumbered "D21a" by the Board);

D22a = Product list, allegedly related to the "Helake company", not dated ("D22" has been renumbered "D22a" by the Board);

D23 = Translation of D22a, not dated;

Offer of Mr. Rajalin as a witness;

#### VI.4 Further Evidence:

As filed with Respondent's reply to the grounds of appeal:

D14 = GB 2 321 073 A;

D15 = EP 053 789 B;

D16 = US 4,968,968;

D20 = US 3,933,210 (cited in the patent and numbered "D20" by the Board)

As filed with Respondent's letter of 30 August 2011

D22 = Expert opinion ("*Stellungnahme*") Prof. Ulbrich, dated 18. August 2011;

As filed during the second oral proceedings, held on 11 October 2011:



D27 = Sheet 4/4 from US patent No. 6,196,598, filed  
by the Appellant;

VII. The parties submitted the following arguments:

VII.1 Alleged prior use "*Robit Rocktools LTD/  
Alwima Oy/Miranet Oy*"

(a) Respondent's case

(a.1) The Respondent said in the written appeal procedure that it did not find any errors in the Opposition Division's reasoning and conclusion that the drilling bits according to the drawing of D1 had "beyond any reasonable doubt" become available to the public through prior use by the act of selling, as was evidenced by documents D3, D4 and affidavit D11. As far as the relevance of D11 was concerned, its relevance could not be denied on the basis that the author of this document (Mr. Sjöholm) had not been heard as a witness. It was the Appellant itself who requested during the oral proceedings before the Opposition Division (cf. minutes) that Mr. Sjöholm was not to be considered as a witness and should not be permitted to add anything to his affidavit. However, Mr. Sjöholm was now offered as a witness in order to clarify any remaining issues concerning the prior use.

Moreover, the logical chain of documents D1, D3, D4 and affidavit D11 was further supported by brochure D2 and certificate D5, the latter being signed by Mr. Peltonen, whose name had been mentioned as a reference on the invoices D3 and D4. Although Mr. Peltonen's statement should be credible as such, he

was also offered to be heard as a witness to confirm the content of D5.

- (a.2) During the first oral proceedings before the Board, the Respondent further argued that the witnesses had confirmed the existence of a single, unchanged product R77/49 of Robit Rocktools Ltd, which had been produced by Robit Rocktools in the relevant period of the sales D3 and D4 to Alwima Oy by Miranet Oy's salesman Mr. Peltonen, and was also described in Robit Rocktools' sales catalogue D2 of ring bits for overburden drilling equipment.

The customer (Alwima) initially provided the key-element, that is, the already existing drilling tube, whereupon Robit Rocktools used its threaded ending as a copy-lathe master for machining threads of the corresponding bits which the customer was asking for.

The Robit Rocktools' ring bit RR77/49 shown in D1 was not a manufacturing drawing used to determine precise dimensions for machining, but rather, a product-drawing in the form of a hand-made sketch to record the dimensions of the product machined by use of a copy-lathe. However, Mr. Sjöholm stated that the dimensions of the (conical) double-start rope threads of the bit documented by the drawing D1 in 1992 were taken from produced RR77/49 bits, ie the drawing simply matched the product. This was possibly the way the draftsman of D1 had done it.

As to the dimensions indicated on the drawing, Mr Sjöholm confirmed that the slight difference between the ring bit's outer diameter of 78 mm and the nominal

diameter of 77 mm was common practice in industry. Such differences were even hinted at in the manufacturers' catalogues: cf. also D12a. Moreover, both witnesses agreed in that the ring bit rope thread usually had a pitch of half an inch, and since D1 concerned a double-start "RR" thread, the pitch was one inch, which corresponded to the 25 mm shown in the drawing. However, if the designer had made a machining drawing, the exact figure for the measurement would of course have been 25.4 mm.

To conclude, although the shape of the threads of Robit Rocktools' RR77/49 ring bit drawn in 1992 derived from an existing tube provided by customers, there was evidence from both witnesses that such ring bits, after they had been delivered by Robin Rocktools, always fitted onto the tubes of the customer's drilling equipment. The same applied in the case of Alwima in 1998. D1's ring bit thus corresponded to the prior sales of drill bits RR77/49 in D3 and D4. The calculations of the crest radius based on D6 and the Appellant's D21 had to be rejected, since they could not be understood and were therefore probably incorrect.

- (a.3) The differences between overburden and percussive rock drilling newly addressed in the second oral proceedings resulted in a significant change of the case. However, the argument that the ring bit according to D1 had only been used for overburden drilling was technically incorrect since, according to Mr. Sjöholm, the drill bit was drilled up to half a meter into the rock: cf. D24, page 20/45. In doing so, the (drilling) system was fixed into the rock: cf. D24, page 19/45.

Contrary to the Appellant's view, there was no information whatsoever on file that for rock drilling it was required to drill several metres into the rock, the ring bit had to be (easily) uncoupled, or that the maximum drilling diameter was limited.

Moreover, particularly in 1998, no distinction had been made between rock drilling and overburden drilling. In case of percussive rock drilling, the broken material was simply removed by flushing. Reference was finally made to D28 of 1997. From the drawings on page 81 of D28 it was immediately apparent that at the time ring bits were used in equipment for pneumatic hammers, ie for percussive rock drilling. Patent document D26 gave background information on the purpose of the conicity of D1's threads. Thus, based on D1 and the witnesses' testimonies, the suitability and also the use of D1's ring bit for percussive rock drilling was disclosed to the skilled person.

(b) Appellant's case:

(b.1) The Appellant submitted that, contrary to practice as well established by case law, the Opposition Division in its provisional opinion had suggested in detail the wording of an affidavit. This wording was reflected in the subsequently filed D11. Quite apart from that, the Appellant had contested ever since, with reasons, the alleged facts in the affidavit D11 and, unless its author, Mr. Sjöholm, was offered as a witness, this evidence had to be ignored. As to certificate D5, Mr. Peltonen did not explain which of D2's products he had sold, or to whom. Certainly, he did not make

reference to D3 or D4. Neither had it been explained how Mr. Peltonen was able to say that D2's products had the same conical thread as depicted in D1.

- (b.2) When assessing the evidence of the witnesses taken during the first oral proceedings before the Board, the Appellant further argued that the thread profile RR77/49 was wholly derived from the master or drill tube. However, there was nothing on file relating to the copy-lathe, ie the master or the actual tube or their threads. Remarkably, every company in this field had had such rope threads on its drilling tubes as from the 1990s, but there was no evidence on file as to what their thread profiles actually looked like.

As to D1, this was not prior art in itself, but simply a sketch, that is, a brief summary of the tube's thread, from the profile of which it was copied. In particular, the figure "R8" Radius on D1 appeared to consist of two different circles, and since the draftsman was not available, there was no evidence as to what had actually been drawn, and thus changes could have been made to D1 at any time. Mr. Sjöholm had seen the sketch D1 in around 1993 and, therefore, he was being asked as to what was on the drawing seventeen years previously. However, even if the crest's radius of curvature "R8" indicated on D1 had to be read as figure "8", it was unclear how this radius of 8 mm had been derived from the tube or master, how the radius measurement had been carried out, and how the conicity (one percent) of the shown thread had been established.

Finally, the tolerances of the depicted dimensions were unknown. Assuming that the crest radius of the thread

was really 8 mm, according to ISO standards for normal rope threads (cf. D17) the tolerance was still  $\pm 0.4$  mm. The radius of curvature therefore could have varied between 8.4 and 7.6 mm, and 7.6 mm would result in a ratio of crest radius to thread pitch close to 30%, ie outside the subject-matter of claim 1 of the patent in suit. The maximum allowed value for the radius of the crests could also be based on D6, which gave more information on the profile. However, in the light of D21, D6 disclosed a ratio well below 30%.

Thus, without knowledge of the actual profile on the master or tube which had been transferred onto the drill bit, it was impossible to say what had been delivered by Robit Rocktools to Alwima. Consequently, it had not been established to the required standard of proof "what" exactly was made available to the public.

- (b.3) During the second oral proceedings, the Appellant further argued that, according to Mr. Sjöholm, at the time Alwima made geological drillings the delivered ring bits of Robit Rocktools were used for the purpose of overburden drilling through soil. In order to obtain a (geological) rock sample, a diamond bit was then introduced to drill (through the ring bit) a drilling core of solid rock: cf. D24, page 18/45 and 19/45. Although the overburden ring bit would enter the rock to secure the casing in the rock face, this bit was neither suitable nor used for (percussive) rock drilling. Mr. Sjöholm even stated that, technically speaking, "overburden" meant loose ground, and "rock" meant solid rock, which of course was harder and hence required a different type of bit: cf. D24, page 3/45 and 4/45.

Overburden ring bits have a substantial diameter for drilling through loose material until the rock face is reached. To prevent loose material from falling into the hole, a lining is introduced in the borehole. By comparison, percussive rock drilling is used to create holes in rock, for which purpose as much percussive energy as possible is transmitted to the bit. Moreover, to withstand the greater forces, percussive drill elements have a far smaller diameter, the maximum diameter being about 38 mm. Furthermore, the larger the diameter of a thread, the smaller the pitch angle for each revolution (constant pitch), and the tighter the drill elements are coupled together. As to D1's ring bit, the skirts of D1's hollow element were clearly too thin and its 78 mm diameter too large to withstand the forces applied during percussive rock drilling. The pitch angle shown in D1 is very small, which would make it impossible to uncouple such a bit from a drill string used in percussive rock drilling. Finally, neither the drawing D1 nor the witnesses gave any information on the conicity of D1's thread profile, and due to the absence of a male member it is very unclear what might constitute an impact surface on D1's ring bit to transfer the percussive forces. The selection of pages from catalogue D28 were not relevant, since the pilot bit shown there performs the percussive rock drilling and it is impossible to apply or transmit percussive forces to the surrounding ring bit and its tube. Therefore D28, which was late filed, should not be considered. Finally, D26 had been filed far too late.

Therefore, based on the evidence on file, D1 did not disclose a ring bit suitable for percussive rock drilling, let alone a ring bit which had been used for percussive rock drilling by Alwima before the priority date of the patent.

VII.2 Alleged prior use "*Robit Rocktools LTD/  
Terra-Team Oy*"

- (a) In its reply to the grounds of appeal, the Respondent argued that a yet further proof of public prior use of the drill bit according to drawing D1 was disclosed in D6, and D8 to D10, wherein the delivery dates of D6's drill rod together with D1's (ring) bit were indicated (via an invoice) in D9 and D10. As illustrated by (the drawing of) the enclosed D13, the drill bit D1 indeed fitted onto the drill rod D6. The threads of D1's drill bit were manufactured by use of a copy-lathe from the drill rods, and thus always resulted in an appropriate fitting. In practice, a template was first manufactured from the rod threads. The purpose of the statement of Mr. Vennola (D8) was to clarify how drawing D6 and invoices D9/D10 related to each other and how the drill bit D1 and the drill rod of D6 had been dimensioned to fit together. Further, the author of D8, Mr. Vennola, was offered as a witness.

During the oral proceedings before the Board, the Respondent emphasised that the further prior use (based on D6, and D8 to D10) was relevant and also had to be examined, since the evidence for it was filed within the opposition period. Although the Opposition Division did not need to use it for its finding, it did not consider it irrelevant.



- (b) The Appellant submitted that although the Respondent argued that the threads of the male part on the drill rod D6 were used as the guiding template for the drill bit depicted in D1, this was certainly not what was stated in D8. The fact was that D6 was silent as to the profile of the threads on the male part. The thread on the male part had a pitch of 25.4 mm/turn, which actually did not correspond to that of D1, in which the thread had a pitch of 25.0 mm. Curiously, the drill bit illustrated in D13 was indicated as having a thread pitch of 25.4 mm, but that drill bit was not in accordance with D1.

Since the only information concerning the thread profiles of D6 related to the pitch, it was impossible to determine whether the crests of the thread had a radius of curvature which was larger than 30% of the thread, and thus a prior use of the claimed conical thread coupling had not been established. It was therefore irrelevant that Terra-Team Oy might have sold a number of these drill rods to the Research Center of Geology in Finland. In its reply to the Notice of Opposition of 9 June 2005, the Appellant however argued that it could not be proven by the invoices D9 and D10 that the products according to D6 and D7 (not to mention D1) actually were available to the public.

VII.3 Alleged prior use "*Robit Rocktools LTD/  
Helake company/ Terra-Team Oy*"

- (a) The Respondent submitted that D21a showed a picture of the tube used with D1's Robit bit RR77, in connection with the prior use relating to Terra-team Oy (D6 to

D10). The bit and the tube were listed in the enclosed list D22a, and its verified translation D23. The newly filed product list of D22a and the picture of D21a were highly relevant and related to a company called "Helake", which had been purchased by Terra-Team Oy in 1994. This could be confirmed by Mr. Jari Rajalin who worked for Helake and then for Terra-Team and was named as a witness concerning the above mentioned facts. Although the new material was filed late, it was argued that according to the established case law the main issue relating to the admittance of documents into proceedings was their relevance. Thus, any relevant documents filed as a reaction to new submissions should be admitted.

- (b) The Appellant argued that it was immediately apparent that D21a to D23 had nothing to do with the alleged prior uses to which D6 to D10 related. For example, the product numbers listed in D22a all related to components having the dimensions "72/49". D6, D9 and D10, on the other hand, all related exclusively to components having the dimensions "68/47", whilst D7 related to a component having the dimensions "78/57". In other words, any purported activities relating to product numbers 07144, etc., of D22a/D23 constituted a new allegation of prior use. Moreover, the Board was reminded that it was fully entitled to refrain from even examining the potential relevance of such a late-filed submission. Even if the Respondent's submissions were considered by the Board, there was no information as to when the prior use occurred, where, how or by whom. As such, the allegation of prior use had not been adequately substantiated and, accordingly, was inadmissible. Finally, given that the role of a witness

was simply to corroborate previously submitted facts, and no such facts had been put forward, it was only proper that the Board should refuse to hear Mr. Rajalin.

#### VII.4 Admissibility of further Evidence

- (a) The Respondent reiterated that a relevant document, when filed as a reaction to new submissions, had to be admitted to the proceedings. As to document D14, a conical rope thread coupling for a drill string was suggested. The coupling depicted in figure 2 was drawn very systematically and clearly showed an intended conicity of the thread. Since the crests were flattened, the crest radius could be interpreted as being infinite and the ratio between crest radius and thread pitch thus was well beyond 30%. The circular root portions provided a ratio of more than 30% as well. Moreover, the threaded coupling of document D15 was highly relevant, because it clearly taught the skilled person to enlarge the crest radius beyond 30% of the pitch of the thread if good fatigue resistance and wearability of the coupling were to be retained during percussive drilling: cf. pages 2 and 3 of D15. Document D17 concerned the standard dimensions to be used on rope threaded drill equipment for percussive rock drilling in 1991, and not only gave information as to the approximate millimetre values for product codes, but moreover gave a hint for the skilled person as to the ratio between the crest radius and the thread pitch according to claim 1 of the patent. Furthermore, the closest prior art D20 cited in the patent dealt with a drill bit for percussive drilling and contained all the pertinent information on percussive loads through hard formations. Tapered threads were described as being a

"critical facet": cf. D20, column 2 and 3. With respect to the impact surfaces' positioning, claim 1 of the patent was "incomplete": cf. D22, expert opinion of Prof. Ulbrich.

- (b) The Appellant argued that, according to the case law of the Boards of Appeal, late filed documents had to be prima facie relevant. The invention of the patent in suit pertained to percussive rock drilling, which required certain drill string elements, such as a particular thread profile and bit. However, D14 firstly did not relate to a conical thread, since the document remained completely silent as to why the profile of the draft in figure 2 might have had that form. Figures 5 and 6 of D14 were missing, but were shown, without thread conicity, on sheet 4/4 of the US-equivalent document D27. Thus, it was mere speculation that the draftsman intentionally drew conical threads in figure 2. Moreover, the crests in D14 were flattened. Thus, it was absurd to say that this was a "radius", taking into account the principle of a mind willing to understand claim 1 of the patent. Furthermore, D15, although pertaining to percussive rock drilling, was odd in that an asymmetric thread profile was suggested therein. During rock drilling, therefore, the coupling was kept together due to the forces transferred to the threads, which would lead to pitting and failure. However, D15 neither disclosed nor hinted at conical threads or impact surfaces. Document D17 related to a standard, and therefore would not be modified, since everyone in this particular filed would apply it. Thus, D17 would not have led to a conical thread. During rock drilling, the impact force and torque applied would cause the tightening of the thread coupling of D17. As

already pointed out, the larger the diameter, the narrower the pitch angle, which made uncoupling more difficult. This is why the standard D17 is limited to a nominal thread diameter of 38 mm for a fixed pitch. Otherwise it could not be uncoupled. Therefore the Robit bit drawn in D1 could not be applied to D17. D20 was introduced by the examiner himself during the examination procedure, but this was not, however, agreed by the Appellant, since D20 was irrelevant. Contrary to the expert opinion D22, essential features were not missing in claim 1. However, if the Respondent's argument related to a clarity matter, it was no ground of opposition, and to the extent that it was a disguised Article 100(b) objection, no consent was given to the introduction of such new ground of opposition. Thus, the late filed documents D14, D15, D17, D20 and D22 should not be admitted into the proceedings.

#### VII.5 Inventive step

- (a) The Respondent argued that a suitable starting point was document D17, which described the general standard of rope threads for percussive rock drilling. The subject-matter of claim 1 of the patent differed therefrom only in that a conical shape of a thread coupling was provided. Contrary to the Appellant's view, overburden drilling with pneumatic hammers was known in the art, and therefore the suitability of a thread coupling for percussive rock drilling as opposed to overburden drilling was overemphasized, because the tube-type drill strings were used for both drilling methods. However, D20 did not mention overburden drilling, but drilling "through hard formations": cf.

D20, column 3, lines 28 to 29. Thus, the drill head assembly of D20 was both intended and suitable for rock percussive drilling. As was hinted at in column 2, lines 26 to 30 of D20, the tapered threads constituted an advantageous feature. Thus, taking D20 into consideration, it would have been obvious for the skilled person to modify D17 such that a conical thread was provided, and to arrive at the subject-matter of claim 1 of the patent. Moreover, the conical shape would also have been obvious from the Robit bit D1. Another starting point was either D20 or D1, both being suitable for percussive rock drilling. The thread coupling of claim 1 differed from their disclosure by having a different thread profile. The objective was to find an alternative thread. Hence, the characterising portion of claim 1 would have been obvious in the light of D17's or D15's advantageously taught ratio of thread crest to thread pitch. It was to be noted that the skilled person would not have any difficulties in choosing certain radius values from the ISO-standard D17, or in adapting the wall thickness of D20 (or D1) to the tubes described by D17 or D15. It was reiterated that claim 1 of the patent in suit did not define any wall thickness either. Therefore, claim 1 lacked an inventive step.

- (b) Regarding the actual starting point of the invention according to the patent, the Appellant argued that, based on previously known rock percussive drill bits sensitive to breakage, uncoupled threads were required during percussive rock drilling in order to withstand the strains. As was immediately apparent from figure 2 of the patent, this had been achieved, in combination, by provision of both a conical and well rounded shape

of the threads. The closest prior art was considered to be document D17, which related to percussive rock drilling. Document D20, however, dealt with earth drilling and not percussive rock drilling. The described "hard formations" could relate to clay, rubble or pebbles, but no rock drilling was disclosed; this was pure speculation. Only boulders might possibly be pushed aside by the rotary drill of D20. The drill head assembly of D20 was completely unsuitable for rock drilling, since its object was to provide a rigid unit: the conical tapering was to ensure that the all threads matched up along their surface. These contacts would cause failure in percussive rock drilling. Again reference was made to the technical meaning of overburden drilling as in D20, where very hard material at the bottom of the bore hole did not exist and, therefore, transmission of substantial forces between the drill string elements did not take place. During overburden drilling, only some percussive forces were transmitted by means of the impact surfaces but, in contrast to rock drilling, the drill string elements would be threaded together as tight as possible. This was entirely consistent with D20's teaching. Thus, starting from D17, there was firstly no motivation to turn to earth drilling, ie to overburden drilling of D20 (or D1). The conicity of D20 was combined with compressibility of particular tapered threads (cf. D20, column 2, lines 19 to 40 and column 7, lines 38 to 41), which could not give any advantage in a rope thread of D17. As to D1, there was no information about conicity, and hence no technical teaching which would have led in that direction. Finally, starting from the ISO-Standard D17 for a single rope thread, the maximum diameter was 38 mm, which was incompatible with the material

dimensions of D20 (or the double rope thread bit of D1). It was true that claim 1 of the patent did not mention a particular diameter of the threads. However, claim 1 was clearly directed to percussive rock drilling and therefore had to be construed as being restricted thereto. Apart from that, no conicity was mentioned in D17, and since the skilled person would not deviate from compulsory standards, there was no teaching why the conicity of D20 (or D1) should be maintained. For the above reasons, D20, and the even further remote D1, could also not form the nearest prior art. Therefore, based on the prior art on file, claim 1 was not obvious and involved an inventive step.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Alleged prior uses*  
(Article 54 (2) EPC)
  - 2.1 No evidence other than that relating to alleged prior use was submitted within the opposition period. The first question is whether the matters relating to "what" has been used, and "when" and "how" it has been used, have been proved to the necessary standard of proof.

*Prior use: "Robit Rocktools/Alwima/Miranet"*

- 2.2 The Board follows the Opposition Division's and the Respondent's view that the alleged prior use consisting of the sales according to D3 and D4 of articles said to be manufactured in accordance with D1 is potentially



relevant as regards what was relevant prior art: cf. the dimensions of the (button) ring bit indicated on drawing D1. However, the Board also shares the Appellant's view that the Opposition Division was in error when it found that such prior use was proved to the requisite standard of proof. Given that the Opposition Division had previously stated in its communication of 29 October 2007 that D1 could be accepted as prior art provided there was an affidavit that D3 and D4 related to a bit manufactured exactly as in D1, and that the Appellant contested the alleged facts in the subsequently filed affidavit D11, the Board considered it appropriate to hear the evidence of Mr Harri Sjöholm and Mr Kari Peltonen as to the facts and circumstances of the alleged sales, notwithstanding that both witnesses were offered at a very late stage of the proceedings. According to point 4 of the minutes of the oral proceedings before the Opposition Division the Appellant requested that Mr. Sjöholm was not considered as a witness. However, the statements of the Appellant in this respect might have had a bearing on the first instance procedure (eg because offer of the witness was too late) but do not need to be considered in the present appeal proceedings, since it is the Board who decides to hear a witness if potentially relevant.

The Board thus exercised its discretion under Articles 12(4) and 13(1) RPBA to hear the evidence of Mr. Peltonen and Mr. Sjöholm. See the Board's decision of 11 June 2010.

- 2.3 The ISO-standard D17, late filed by the Respondent to briefly explain product codes generally used for drill

elements such as D1's ring bit, is considered itself relevant prior art, and as to its admittance into the proceedings, reference is made to point 3 of this decision below.

Moreover, the extracts from the Sandvik Product Catalogue (D28) are considered to be prima facie relevant as to whether a ring bit of equipment for pneumatic hammers is suitable for percussive rock drilling or not. Although D28 was not filed by the Respondent until the second oral proceedings held on 11 October 2011, the functioning of the depicted ring bit can be readily gleaned from the figure at the beginning of page 81 of D28. Therefore, the Appellant, and indeed also the Board, were able to deal with D28. As regards D26, however, which was also filed during the second oral proceedings, and which consists of several printed pages, the Appellant and the Board could not be reasonably be expected to deal with this, given its complexity. This is irrespective of its potential relevance. The Board thus exercised its discretion to admit D28 to the proceedings but not D26, in accordance with Article 13(3) RPBA.

The document D18 is stated to have been "released" on 7 July 2009 (cf. left column, headed "News"), and the documents D19, Annex 1, Annex 2, and D21 are not dated. Therefore, these documents have not been established to constitute prior art in the sense of Article 54(2) and cannot be taken into consideration.

- 2.4 After the parties and the Board had assessed the witnesses' testimony, the public sales before the priority date of Robin Rocktools Ltd's ring bit "RR-

77/49" for overburden drilling (cf. also sales catalogue D2) to Alwima Oy by Miranet Oy's salesman Mr. Peltonen were no longer in dispute.

Moreover, the parties accepted that Alwima Oy had provided an existing tube as a pattern, whereby Robit Rocktools Ltd subsequently used the threads of this tube as a copy-lathe master for machining the threads of the ring bits sold to Alwima Oy. Thus, the thread profile of these ring bits depended on that of the master.

- 2.5 The Respondent concedes that the Robit Rocktools' ring bit shown in D1 is not a manufacturing drawing, but only a product drawing in the form of a hand-made sketch produced in order to internally record dimensions of the tube's thread, from which tube thread profile the ring bit "RR77/49" was parallel-machined by means of a copy-lathe in 1992: cf. the original pencil sketch D12; the witness testimony of Mr. Sjöholm (D24: pages 8/45, 12/45, 29/45 and 36/45); and Mr. Peltonen (D25: pages 10/17 and 14/17).

However, assuming that a slight difference between the ring bit's outer diameter of 78 mm and the nominal diameter of 77 mm was common practice in the trade, and the rope thread product "RR77/49" shown could have had a pitch of one inch, there would still be no evidence as to how the indicated pitch of 25 mm, and more particularly the crest radius of 8 mm and thread conicity of 1°, were taken, ie measured, from either any produced Robit ring bit or the tubes provided by any customer. Furthermore, no tolerances are specified on the drawing D1, cf. also Mr. Sjöholm's testimony on

page 42/45 of D24, second to last paragraph. Apart from that, the exact dimensions of the threads of the produced drill bits also depend on the accuracy with which the copy lathe duplicated the threads of the drill tube provided by the customer. As argued by the Appellant, it moreover must be borne in mind that the drawing D1 is dated 1992, and since the draftsman is not available, changes could have been made on D1 in the meantime: cf. also hearings of Mr. Sjöholm, pages 5/45 and 10/45 of D24; and Mr. Peltonen, page 10/17 of D25.

Hence, based on the 1992 sketch D1, it is in the Board's view, impossible to conclude firstly what were the machined dimensions of the threaded male part of the drill tube(s) of Alwima Oy and, as a consequence, what exactly were the dimensions of the threads of the drill bit(s) machined by use of a copy-lathe which were sold in 1998 to Alwima Oy. The degree of accuracy of such a reverse engineering process is thus unknown, and solely based on the witnesses' testimony that ring bits "RR77/49" sold to Alwima Oy had been manufactured "*according to that drawing (D1)*" and "*fitted (on any of the customer's drilling equipment)*", the Board is not persuaded that the values shown in D1 for the radius of curvature of the crests and for the pitch represent anything other than an approximation for the corresponding values of the ring bits actually sold (cf. D24: pages 36/45, 37/45, 43/45; and D25: page 16/17).

2.6 Contrary to the Respondent's view, the discussion pertaining to suitability for percussive rock drilling during the second oral proceedings before the Board

took place within the same legal and factual framework as the first instance proceedings, ie whether claim 1 (which is explicitly directed to percussive rock drilling) involves an inventive step in the light of alleged prior use D1 and common technical knowledge. However, even the question of whether the ring bits drawn in D1 and allegedly sold to Alwima Oy were suitable (or had been used) for rock percussive drilling has been addressed many times in the proceedings, ie according to the minutes of the oral proceedings before the Opposition Division (see points 15, 16 and 19), the witnesses' testimonies as regards overburden drilling of Alwima Oy, and in any event by the last communication of the Board prior to the second oral proceedings (cf. point 2 of the communication).

- 2.7 Both witnesses consistently stated that the "RR77/49" ring bit of Robit Rocktools Ltd sold to Alwima Oy was invariably used by Alwima Oy for geological (exploration) drilling through the overburden (cf. D24: pages 3/45, 12/45, 13/45, 14/45, 16/45, 17/45, 32/45, and D25: page 8/17). Moreover, the Board shares the Appellant's view that Mr. Sjöholm convincingly explained that the delivered "RR77/49" ring bits of Robin Rocktools Ltd were made for overburden drilling through soil up to and into the rock but, as to the latter, only to a *"certain amount, a few tens of centimeters, half a metre..."*, ie in order to fix the ring bit and its liner into the rock face. Any further rock drilling would have entailed breakage of the bit: *"...if that is stuck or broken..."*, cf. D24, page 19/45 and 20/45.

2.8 The Board also accepts the Appellant's argument that there are considerable differences between overburden drilling and percussive rock drilling. This was also confirmed by Mr. Sjöholm, cf. D24, page 4/45:  
*"Overburden is a loose ground, rock is solid rock which is of course harder and there you need ... different type of bits."*

After having drilled through the overburden, according to Mr. Sjöholm a drill string provided with diamond bits was introduced by Alwima Oy through the 49 mm inner diameter of the ring bit, and *"diamond coring"*, ie drilling of core samples from solid rock for exploration, was subsequently carried out: cf. D24, pages 18/45 and 19/45.

2.9 Furthermore, the Board acknowledges the Appellant's argument that, in order to withstand the relevant forces, percussive rock drill string elements usually require a smaller diameter, cf. ISO-standard D17. Due to its relatively large diameter, the (constant) pitch angle for each revolution for the "RR77/49" drill bit product according to D1 is small, which may also complicate uncoupling. As regards the conicity of 1° indicated on D1's thread profile, neither the drawing itself, nor the witnesses provide any information thereto. Moreover, the figure on page 81 of D28 cannot support the Respondent's argument that ring bits, such as the "RR77/49" shown in D1, are generally known as being suitable for percussive rock drilling. To the contrary, D28 depicts a central pilot bit for percussive rock drilling, whereas the surrounding ring bit and its inserts are arranged to be used without the transfer of high percussive forces.

2.10 Thus, based on the hearing of both witnesses, the Robit ring bit "R77/49" sold to Alwima Oy in 1998 and shown in D1 was not used as a drill bit for percussive rock drilling, as the skilled person would directly and unambiguously recognize that drilling into the bedrock to secure the casing onto the rock face is substantially different from percussive rock drilling. Due to this fact alone, in the view of the Board the ring bit "RR77/49" cannot form an element being suitable for percussive rock drilling as claimed in claim 1 of the patent. Moreover, taking into consideration the implicit knowledge of the skilled person as to the requirements of a drill bit and its specification to sustain high percussive forces (cf., eg, D17 and D28), the Board agrees with the Appellant's view that also based on the information derivable from the approximate figures indicated on the drawing D1, be it through the drawing D1 itself or the witnesses' testimonies as to these dimensions, the product "RR77/49" lacked suitability for rock percussive drilling.

2.11 Summing up, the ratio of the radius of curvature of the crests of the thread profile to the pitch of the thread of the ring bit "RR77/49" which was sold to Alwima Oy in 1998 is not unambiguously disclosed by the sales of ring bits according to drawing D1. Moreover, irrespective of whether the abutting surfaces described by Mr. Sjöholm (cf. D24, pages 15/45 and 16/45) in D1 actually form "impact surfaces" within the meaning of claim 1 of the patent, the ring bit "RR77/49" sold to Alwima Oy was not suitable for percussive rock drilling.

*Prior use: "Robit Rocktools/Terra-Team Oy"*

- 2.12 As argued by the Appellant, D6 is silent as to the profile of the threads of the male part, except for their pitch of 25.4 mm. Despite the fact that a template had allegedly been manufactured by use of a copy-lathe from the drill rods shown in D6, the pitch of the ring bit drawn in D1 (25 mm) does not exactly correspond to that of D6. According to the statement of Mr. Vennola (D8), drill bits of the type RR77 (D1) were bought from Robit Rocktools Ltd as from 1996, and their conical rope threads were "*the same*" as the ones of the drill rod D6. However, it is not derivable from D8 that these drill rods were sold and in any event there is no information about any such sales, eg quantities, purchasers or more precise dates. The invoices D9 and D10 refer to different types of drill rods, allegedly also "*according to*" the drawing D6, which were sold by Mr. Vennola of Terra-Team Oy to the Geological Research Center in Rovaniemi (Finland) in 1997. It follows from Mr. Vennola's statement that drill rods of drawing D7 apparently had not been sold per invoice D9 or D10.
- 2.13 Given the discrepancies between the pitch of the rope threads of D6 and D1, and the uncertainty as to what design actually was sold by Terra-Team Oy in 1997 based on the invoices D9 and D10, the Board agrees with the Opposition Division's view (cf. minutes to the oral proceedings before the Opposition Division, point 13) that the alleged prior use D6 is less relevant, or at least not more relevant than the asserted prior use D1. See points 2.2 to 2.11 of this decision above. Moreover, since the prior use of D6 has been disputed by the Appellant ever since its reply to the grounds of opposition in its letter of 9 June 2005, the Respondent



has the burden of proof. However, Mr. Vennola was not offered as a witness in due time. In its reply to the grounds of appeal, the Respondent did not submit any further substantiated facts or arguments as to which Mr. Vennola could have been heard during the first oral proceedings before the Board.

Therefore, the Board exercised its discretion under Article 12(4) RPBA not to order the taking of evidence of Mr. Vennola at the first oral proceedings at such a late stage, and even more so after taking of evidence of Mr. Sjöholm and Mr. Peltonen as regards the accuracy of the handmade sketch D1 of 1992: Article 13(3) RPBA. D13 is not dated, and thus it is not established to constitute prior art.

*Prior use: "Robit Rocktools LTD/Helake company/  
Terra-Team Oy"*

2.14 Strict standards apply in the case of the admissibility of the late-filed evidence of public prior use by the Opponent (Respondent), due to its complexity and required high standard of proof beyond doubt. In the present case, the Respondent moreover did not give any clear explanation and sound reasons as to why the allegation of public prior use could not have been made any earlier, in particular the offer of witness testimony of Mr. Rajalin. In the Board's view, the piecemeal approach of the Respondent to assert yet another alleged prior use shortly before the second oral proceedings clearly could not have been dealt with by the Appellant or the Board without yet another adjournment of the oral proceedings. Therefore, regardless of its relevance, the Board exercised its discretion not to admit this allegation of prior use

into the proceedings and not to hear the evidence of Mr. Rajalin as to such use: Article 13(3) RPBA.

For the sake of completeness, the Board also shares the Appellant's view that the purported activities relating to D22a to D23 *prima facie* constitute a new allegation of prior use, rather than relating to the prior use by Terra-Team Oy.

3. *Admissibility of further Evidence*

As to the *prima facie* relevance of late-filed document D14 (cf. abstract), regardless of whether the conicity shown in figure 2 was intentionally drawn, or not, the linear flanks "44" are truncated by flat crests "46" as opposed to rounded crests having a certain radius of curvature as required by claim 1 of the patent. Moreover, although the threaded coupling of D15 does not appear to comprise conical threads (cf. D15: page 2, first paragraph and figures), percussive rock drilling is addressed therein, and the ratio between crest radius and thread pitch seems to be larger than 30% (cf. D15, page 3, lines 40 to 45). D16 pertains to rock percussive drilling, but no ratio as defined in claim 1 of the patent appears to be described. Furthermore, D17 relates to an ISO-standard of drilling elements for percussive rock drilling, and the dimensions of their rope threads can be easily derived from Table 1 of D17. Document D20, although referred to for the first time in the Respondent's reply to the grounds of appeal, was however introduced into the procedure by the examiner, and its citation in the patent had been accepted by the Proprietor (Appellant): Rule 51(4) EPC 1973. The expert opinion D22, apparently

raising an objection of either lack of clarity or insufficiency of disclosure of claim 1 of the patent, was not admitted to the proceedings, since lack of clarity is no ground of opposition and no consent for the introduction of a new ground of opposition was given by the Proprietor (Appellant).

Therefore the Board exercised its discretion under Articles 12(4) and 13(1),(3) RPBA to admit the late-filed documents D15, D17, and the somewhat late-filed submissions as regards D20 to the proceedings, but not documents D14, D16 and D22.

4. *Novelty and Inventive step*

*(Article 100(a) EPC, see Articles 54 and 56 EPC)*

4.1 The Respondent did not dispute the novelty of claim 1, and also the Board has no reason to doubt that its subject-matter is novel.

4.2 As to inventive step, the Board agrees with the Appellant that ISO-Standard D17 forms the closest prior art with respect to the subject-matter of claim 1, since D17 pertains to percussive rock drilling and describes the claimed ratio between crest radius and thread pitch. See D17, pages 1 and 2. Although D17 is silent about impact surfaces as defined in claim 1 of the patent, in the view of the Board, such impact surfaces are a mandatory part of any drill string for percussive rock drilling and will therefore be included in a corresponding thread coupling, or in any other manner. However, the parties agreed that the subject-matter of claim 1 differs from the disclosure of D17 in

that in any event a conical shape of a thread coupling is provided.

According to the patent, the problem underlying this distinguishing feature is to obtain a thread coupling which will withstand the strains at those parts on a drill string element which are most sensitive to breakage. This is achieved by means of a combination of conical threads and a well rounded crest of threads: cf. patent, paragraphs [0002] and [0003].

- 4.3 The document D20 concerns a drill head assembly generally relating to earth boring bits for both rotary and percussion action. However, D20 only describes drilling through relatively "*hard formations*", but does not disclose or hint at rock percussive drilling: cf. D20, column 1, lines 19 to 20; column 2, lines 50 and 51; and column 3, lines 28 and 29. Moreover, the tapered threads constitute a critical feature of D20's construction, since it is intended that all of the threads should "make up", along the pitch line, simultaneously as the shank 12 and removable head 24 are rotatably engaged, so that the threads are uniformly engaged along the full length thereof: cf. D20, column 2, lines 26 to 39. To this end, after hand tightening of the head assembly, sufficient torque is applied to the head to ultimately deform the threads of the shank and/or removable head: cf. D20, column 3, lines 6 to 29; column 6, lines 7 to 11, and column 37 to 41.

The Board therefore shares the Appellant's view that D20 teaches the provision of a rigid unitary bit (cf. D20; column 1, lines 43 to 47), which requires the

conicity of D20 to be combined with compressibility of particular tapered threads, which combination would in fact most likely cause failure in percussive rock drilling. During overburden drilling as in D20, only some percussive forces are transmitted by means of impact surfaces (cf. D20, column 6, lines 2 to 12). Hence, in contrast to rock drilling, the drill string elements of D20 can be threaded together as tightly as possible.

4.4 Thus, starting from a thread coupling for a drill string for percussive rock drilling of D17, the skilled person would not consider D20 in order to solve the problem stated above, since there would be firstly no motivation to turn to the technical field of earth drilling, and secondly the conicity and the specific threads of D20's drill elements, intended to provide a rigid unitary bit, cannot give any advantage in D17's rope thread such as to avoid breakages during transmission of high percussive forces. Whether or not the skilled person would deviate from standards such as D17, or whether the maximum diameter of D17 was incompatible with the material dimensions of D20, does not have to be decided.

4.5 For the sake of completeness, the Board refers to the prior use of the overburden drill bit "RR77/49" and its approximate dimensions illustrated in D1. This bit would firstly not be taken into consideration for percussive rock drilling and, secondly, would not prompt the skilled person to provide a conical thread, since there is no disclosure of the purpose of the conicity indicated in D1: cf. point 2.9 of this decision above.

4.6 For these reasons, and contrary to the Respondent's view, neither D20 nor prior use D1 constitute a suitable starting point for the assessment of inventive step.

4.7 The subject-matter of claim 1 therefore fulfills the requirements of novelty and inventive step.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent as granted.

The Registrar

The Chairman

D. Hampe

U. Krause