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**D E C I S I O N**  
of 24 November 1998

**Case Number:** T 0635/93 - 3.2.5

**Application Number:** 85301582.4

**Publication Number:** 0161748

**IPC:** B24B 35/00

**Language of the proceedings:** EN

**Title of invention:**  
Improved microfinishing apparatus and method

**Patentee:**  
Industrial Metal Products Corporation

**Opponent:**  
Supfina Grieshaber GmbH & Co.

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 123(2)

**Keyword:**  
"Inventive step (main request and auxiliary request 1: no)"  
"Original disclosure (auxiliary request 2: no)"

**Decisions cited:**  
-

**Catchword:**  
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Case Number: T 0635/93 - 3.2.5

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.5  
of 24 November 1998

**Appellant:** (Opponent) Supfina Grieshaber GmbH & Co.  
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**Respondent:** (Proprietor of the patent) Industrial Metal Products Corporation  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 13 May 1993  
concerning maintenance of European patent  
No. 0 161 748 in amended form.

**Composition of the Board:**  
**Chairman:** A. Burkhart  
**Members:** P. E. Michel  
J. C. M. De Preter

## Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal against the interlocutory decision of the Opposition Division maintaining the patent No. 0 161 748.

Opposition was filed against the patent as a whole and based on Article 100(a) EPC (lack of novelty and inventive step).

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC did not prejudice the maintenance of the patent as amended, having regard to the following documents:

- D1: DE-C-881 915
- D2: US-A-1 905821
- D3: US-A-1 993 543
- D4: Fachberichte für Oberflächentechnik, 8(1970),  
pages 203 to 208
- D5: VDI-Zeitschrift, 125(1983), pages 9 to 14
- D6: US-A-3 813 231
- D7: US-A-1 908 048
- D8: 3M-brochure "Imperial Brand Micro Finishing Film  
Rolls"
- D9: US-A-2 376 531
- D10: 3M-brochure "A report from 3M on Microfinishing  
Lubricants"

D12: Thielenhaus Microfinish Corp. "Stone Microfinish"

II. Oral proceedings before the Board of Appeal were held on 24 November 1998.

- (i) The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.
- (ii) The respondent (patentee) requested that the appeal be dismissed and that the patent be maintained in amended form according to the interlocutory decision of the Opposition Division (main request) or on the basis of the auxiliary request 1 as presented at the oral proceedings or on the basis of auxiliary request 3, filed on 26 October 1998 (auxiliary request 2). The respondent requested also apportionment of costs to be borne by the appellant in the event that the Board remitted the case to the Opposition Division for consideration of the late introduced prior use.
- (iii) Claim 1 according to the main request reads as follows:

"1. A machine for microfinishing a cylindrical surface of a workpiece (18), said machine using an abrasive tape (30) as the machining agent, comprising: means for rotating said workpiece (18), a shoe assembly (60) having means for attaching said tape and having at least one rigid insert (36) having a rough surface which presses said tape (30) into contact with said workpiece surface, and an arm (22) which supports said shoe assembly such that relative movement between said workpiece surface and said tape occurs as said workpiece is rotated

relative to said tape, characterised in that the abrasive tape (30) is an abrasive coated tape of incompressible polymeric plastics film material."

Claim 1 according to the auxiliary request 1 differs from claim 1 according to the main request in that at its end the following wording has been added:

"so that the machine is capable of correcting geometry imperfections in the finished surface of the workpiece (18) as the rigid insert (36) does not cause the abrasive tape (30) to conform to the surface profile of the workpiece (18), whereby said insert (36) has a predetermined surface shape which relates to the desired workpiece surface shape, said insert surface pressing said tape (30) into contact with said workpiece (18) surface whereby said workpiece (18) surface is caused to conform to the shape of said insert (36) surface."

Claim 1 according to the auxiliary request 2 differs from claim 1 according to the auxiliary request 1 essentially in that the feature "whereby the abrasive tape (30) has a wrap-around angle around the workpiece (18) is greater than 120°" has been added.

III. The appellant argued essentially as follows:

In the light of the description of the patent in suit the expressions "rigid insert" and "incompressible polymeric plastics film material" had to be interpreted as meaning that the insert had a hardness exceeding 90 Durometer and that the film was relatively incompressible as compared with paper or cloth.

With respect to the disclosure of document D8 and the advantages listed therein, the person skilled in the art would replace in the microfinishing machine known from documents D2 or D7 the abrasive coated paper or cloth tape by the 3M abrasive coated tape recommended in D8, which tape consisted of incompressible polymeric plastics film material, and thus the person skilled in the art would arrive without the exercise of any inventive activity at a microfinishing machine comprising all the features of claim 1 of the main request.

Documents D10, D11 or D12 would not prevent the person skilled in the art from using the 3M-tape in a microfinishing machine according to D2 or D7 having rigid inserts. D10 and D11 did not lead away from the use of rigid inserts, but mentioned inserts having a hardness of 80 to 90 Shore A, which was only slightly below the hardness used in the machine of claim 1, and which inserts, in a general sense, also had to be considered as rigid inserts. Also the teaching of document D12 did not lead away from the combination of rigid inserts with an incompressible tape, since the relevant paragraph thereof suggesting not to use rigid inserts in a paper polishing method related to a specific final polishing step wherein any geometrical alterations of the workpiece surface should be avoided.

The alleged new effect of the combination of rigid inserts with incompressible tape, namely the capability of correction of geometric imperfections during the microfinishing step, could not support an inventive step. Firstly, this effect was not new but already present in the prior art techniques according to documents D2 or D7. Furthermore, this effect was also known from document D4 which mentions that it was generally possible in band-finishing methods to correct the geometry of the workpiece surface. Secondly, this

effect could at most be considered as a bonus-effect, which was obtained as an additional advantage of the obvious combination of the teachings of documents D2 (D7) and D8.

Also the subject-matter of claim 1 according to the auxiliary requests 1 or 2 did not involve an inventive step having regard to the teachings of documents D2 (D7) and D8, since the machines according to D2 or D7 already comprised the feature "said insert has a predetermined surface shape which relates or corresponds to the desired workpiece surface shape", and since the drawings of documents D2 and D7 showed a wrap-around angle of the abrasive tape around the workpiece lying in the range of greater than 120°.

IV. The respondent argued essentially as follows:

The interpretations of the expressions "rigid insert" and "incompressible...film" given by the appellant were accepted.

The problem underlying the invention, namely to provide a microfinishing machine which is capable of correcting geometry imperfections in finished surfaces, was neither addressed in D2 (D7) nor in D8. Therefore, the person skilled in the art had no reason to combine the teachings of those documents. Moreover, D8 did not disclose the feature "incompressible plastics film tape".

At the time when the patent in suit was filed, the technical development proceeded from the assumption that rigid inserts could not be combined with incompressible film tapes. In documents D10 and D11, both of which were dated 1983, i.e. a time shortly before the priority date of the patent in suit, only non-rigid inserts were recommended for use in

combination with the microfinishing film tape according to D8. Moreover, document D12 stated that, when using abrasive tapes for microfinishing, rigid inserts would be disadvantageous. Also document D4 did not teach the use of rigid inserts in a microfinishing process and was silent about the problem underlying the invention.

Therefore, the combination of rigid inserts with an incompressible plastics film tape as claimed in claim 1 of the patent in suit was not obvious having regard to the state of the art.

Claim 1 according to the auxiliary request 1 or according to the auxiliary request 2 contained additional technical features, which contributed to the solution underlying the invention, and which were not suggested by the prior art documents.

## Reasons for the Decision

### 1. *Main request*

#### 1.1 Interpretation of claim 1

The meaning of the expressions "rigid insert" and "tape of incompressible polymeric plastics film material" contained in claim 1 require interpretation.

The Board concludes from column 5, lines 4 to 7 and lines 45 to 49, and from claim 5 of the patent in suit that the term "rigid" has to be construed as meaning that the insert has a hardness of greater than 90 Durometer (Shore A). From column 6, lines 14 to 20 of

Durometer (Shore A). From column 6, lines 14 to 20 of the patent in suit, it can be derived that the term "incompressible" associated with the tape film material means that the plastics film tape is relatively incompressible as compared with paper or cloth tapes.

## 1.2 Novelty

The subject-matter of claim 1 according to the main request has to be considered as novel with respect to the prior art documents D1 to D12, since none of them discloses a microfinishing machine comprising all the features of claim 1.

In fact, novelty with respect to the prior art documents D1 to D12 was not in dispute.

## 1.3 Inventive step

### 1.3.1 Closest prior art

The closest prior art is represented by documents D2 or D7. These documents disclose a machine for microfinishing a cylindrical surface of a workpiece, which machine uses an abrasive tape as the machining agent, and comprises means for rotating said workpiece, a shoe assembly having means for attaching said tape and having at least one rigid insert having a rough surface which presses said tape into contact with said workpiece surface, and an arm which supports said shoe assembly such that relative movement between said workpiece surface and said tape occurs as said workpiece is rotated relative to said tape. The abrasive tape used in this prior art machine is an abrasive coated tape of paper or cloth.

It is true that documents D2 or D7 represent a rather old state of the art. However, the respondent did not contest the view of the appellant that machines as disclosed in D2 or D7 were still in use at the priority date of the patent in suit and that D2 (D7) is to be considered as representing the closest prior art.

1.3.2 Problem underlying the invention

At the latest, when reading document D8, the person skilled in the art was aware that abrasive coated tapes of paper or cloth have some drawbacks with respect to tear- and water-resistance, thickness, uniformity and flatness, which drawbacks could be avoided by the use of abrasive coated tapes of polymeric plastics film material.

Therefore, the problem underlying the invention to be solved with respect to the microfinishing machines according to documents D2 or D7 is to eliminate the drawbacks associated with the use of abrasive tapes having a backing of paper or cloth.

1.3.3 Solution

According to claim 1, the aforementioned problem is solved in that in the microfinishing machine known from documents D2 or D7 the abrasive coated tape having a backing of paper or cloth is replaced by an abrasive coated tape having a backing of incompressible polymeric plastics film material.

1.3.4 This solution is obvious in the light of the teaching of document D8.

Document D8 is a brochure of the company 3M, a supplier of abrasive coated tapes for microfinishing machines. This brochure was published in 1981 and, apparently,

was intended to address manufacturers and users of microfinishing tools with the aim of persuading those manufacturers and users to buy the product of 3M offered therein. The "product" offered in D8 is an abrasive coated tape having a backing of polyester, i.e. "a tape of incompressible polymeric plastics film material" in the sense of the interpretation given under paragraph 1.1 above. Hereinafter this abrasive coated tape is called the "3M-tape".

Document D8 discloses the following advantages of the 3M-tape over conventional tapes having a backing of paper or cloth:

- superior uniformity of the backing and therefore superior flatness of the tape (see page 1),
- reduced thickness of the tape, therefore more length of tape in a roll (up to 600 feet as compared to 150 feet for conventional tapes), resulting in 75% less down time for changing the rolls (see page 1),
- the tape is water-resistant and can therefore be used with less expensive water soluble oil (i.e. an oil-in-water emulsion), whereas conventional tapes are not water-resistant and require expensive regular oil (see page 1),
- improved tear resistance resulting in less down time due to broken rolls (see page 1),
- the tape produces a finer finish (see page 2 of D8, Table "case history").

These improvements and advantages provide sufficient reason for the manufacturer or user of a microfinishing machine according to D2 or D7 to consider the 3M-tape of D8 as an advantageous alternative and replacement for previous tapes having paper or cloth backing.

Therefore, following the teaching of document D8 and being confronted with the aforementioned problem, the person skilled in the art would use the 3M-tape in the microfinishing machine known from D2 or D7 instead of the conventional tape having a paper or cloth backing, and thus, would arrive in an obvious manner at the subject-matter of claim 1.

The respondent submits that a new effect, namely correction of geometry imperfections in the finished surface of the workpiece was achieved by combining an incompressible plastics tape with rigid inserts, and that this new effect was neither addressed in D2 (D7) nor in D8, and that therefore, the person skilled in the art had no reason to combine the teachings of these prior art documents.

The Board does not agree with this contention, for the following reasons:

It is true that the effect "geometric correction" is not mentioned in documents D2 (D7) and D8. However, as stated above, the combined use of the 3M-tape according to D8 in a machine having rigid inserts according to D2 (D7) was obvious, because it could be expected to produce the various advantageous effects which are described in D8. The alleged new effect "geometric correction" has to be considered as an extra effect - a so called "bonus-effect" - obtained as a result of the obvious combination of the teachings of documents D2 (D7) and D8.

It is established case law of the Boards of Appeal that such a "bonus-effect" cannot substantiate an inventive step (see Case Law of the Boards of Appeal of the EPO, 1996, pages 113/114, chapter 7.7.1).

Further, the Board considers to be unfounded the assertion of the respondent that the disclosures of documents D10, D11 and D12 prevented the person skilled in the art from using a 3M-tape in a microfinishing machine having rigid inserts.

D10 and D11, which are brochures of the 3M company, give mechanical tips (D10) or lubricant information (D11) when using the 3M-tape according to D8 in a microfinishing machine. From these documents it can be learned that a Shore hardness of "generally 80 to 90 Shore A is common" (D10) or that the lubricant tests were carried out on a microfinishing machine comprising urethane shoes of a hardness of 80 Shore A (D11).

It is true that the shoe hardness referred to in D10 or D11 is below the shoe hardness "of greater than 90 Durometer (Shore A)" chosen in the microfinishing machine according to claim 1 (see paragraph 1.1 above). However it has to be noted that a hardness of 80 to 90 Shore A as mentioned in D10 or D11 can, in a general sense, be considered as "rigid" and is just below a shoe hardness of "greater than 90 Shore A" as recommended in the patent in suit. Moreover, the patent in suit does not contain any indication or proof that the use of shoes having a hardness of "greater than 90 Shore A" results in a superior finishing effect when compared with the use of shoes having a hardness of between 80 and 90 Shore A.

In any case, no indication can be found in D10 or D11 that the shoes should be non-rigid or that the 3M-tape should only be used in combination with non-rigid shoes.

Document D12 is concerned with stone microfinishing and mentions under the chapter "paper or abrasive film polishing" that paper polishing could sometimes, but very rarely and with doubtful success, be practiced after stone microfinishing on a second station of a stone microfinishing machine, and that in such a second final polishing step resilient back-up pads for the abrasive paper should be used, in order not to destroy the geometry and microfinish of the workpiece which was previously produced by stone microfinishing. This indication in D12 clearly refers to an optional second final polishing step, which can be carried out after the proper stone microfinishing process during which the desired geometry and microfinish is produced. Therefore, the said indication in D12 does not prevent the person skilled in the art from using in a proper band-microfinishing station a combination of rigid shoes with a 3M-tape.

Thus, no tendency or prejudice can be derived from the disclosures of documents D10, D11 or D12, which would prevent the person skilled in the art from using a 3M-tape in a microfinishing machine having shoes of a hardness of greater than 90 Shore A.

- 1.3.5 Therefore, the subject-matter of claim 1 according to the main request does not involve an inventive step in the sense of Article 56 EPC.
- 1.4 Consequently, the main request of the respondent is not allowable.

2. *Auxiliary request 1*

The additional wording of claim 1 of auxiliary request 1, which contains terms describing functions and results to be achieved, means that the insert has a predetermined surface curvature which corresponds to the desired final curvature of the workpiece, so that the insert transmits its surface geometry onto the workpiece.

The respondent contends that this feature was neither disclosed in nor suggested by documents D2 or D7, since the compressible paper or cloth tape used in these prior art machines did not allow geometric surface corrections.

The Board does not agree with this contention, for the following reasons.

Document D2 teaches on page 2, right-hand column, lines 104 to 128, that the rigid shoe inserts should have a cylindrical surface conforming substantially to the shape of the workpiece. Document D7 contains the same teaching on page 2, right-hand column, line 123 to page 3, left-hand column, line 11, in combination with Figures 4 and 5.

The person skilled in the art understands this teaching as meaning that the shoe insert surface has a predetermined surface curvature which corresponds to the desired final curvature of the workpiece.

If the person skilled in the art replaces in the microfinishing machine according to D2 or D7 comprising shoes of such a predetermined surface curvature the paper or cloth tape by a 3M-tape - which replacement is

obvious in the light of the teaching of document D8 (see paragraph 1.3.4 above) - he arrives at the subject-matter of claim 1 according to auxiliary request 1.

Therefore, also the subject-matter of claim 1 according to the auxiliary request 1 does not involve an inventive step, and consequently, also the auxiliary request 1 of the respondent is not allowable.

3. *Auxiliary request 2*

Claim 1 according to the auxiliary request 2 contains the additional feature "the abrasive tape has a wrap-around angle around the workpiece of greater than 120°".

This additional feature is not disclosed in the originally filed application documents.

The originally filed description and claims do not contain any indication that the tape should be wrapped around the workpiece in a certain minimum wrap around angle. It is true that from the originally filed drawings (Figures 4, 11, 13) it can be seen that the tape is wrapped around a large portion of the circumference of the workpiece. However, these drawings are mere schematic drawings which cannot serve as a basis for the determination of the dimension or extent of the wrap-around angle. Therefore, the drawings also do not disclose that the wrap-around angle of the tape should be greater than 120°.

Therefore, claim 1 according to auxiliary request 2 is not allowable with respect to Article 123(2) EPC, and consequently, also the auxiliary request 2 of the respondent cannot be granted.

4. *Request of the respondent for apportionment of costs*

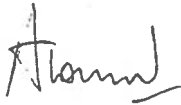
Since the Board did not consider the late invoked prior uses, the respective conditional request of the respondent for an apportionment of costs is invalid.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

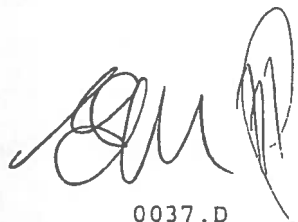


A. Townend

The Chairman:



A. Burkhart



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