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**Datasheet for the decision  
of 5 September 2008**

**Case Number:** T 1403/06 - 3.2.01

**Application Number:** 01300898.2

**Publication Number:** 1122449

**IPC:** F16B 37/12

**Language of the proceedings:** EN

**Title of invention:**  
Anti-galling fastener inserts

**Applicant:**  
Newfrey LLC

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
-

**Relevant legal provisions (EPC 1973):**  
EPC Art. 56

**Keyword:**  
"Inventive step (no)"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 1403/06 - 3.2.01

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.01  
of 5 September 2008

**Appellant:** Newfrey LLC  
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Delaware 19711 (US)

**Representative:** Clayton-Hathway, Anthony Nicholas  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 24 March 2006  
refusing European application No. 01300898.2  
pursuant to Article 97(1) EPC 1973.

**Composition of the Board:**

**Chairman:** S. Crane  
**Members:** C. Narcisi  
S. Hoffmann

## Summary of Facts and Submissions

I. The European patent application No. 01 300 898.2 was refused with the decision of the Examining Division posted on 24 March 2006. The Examining Division decided that the subject-matter of claim 1 according to the main and to the auxiliary request did not involve an inventive step with respect to the obvious combination of D1 (US-A-4 563 119) and D2 (US-A-4 039 356). An appeal against this decision was filed by the Applicant on 17 May 2006 and the appeal fee was paid at the same time. The statement of grounds of appeal including sets of claims corresponding to the main and the auxiliary requests considered by the Examining Division was filed on 26 July 2006.

II. Oral proceedings were held on 5 September 2008. The Appellant requested that a patent be granted on the basis of claims 1 to 5 according to the main request submitted with the grounds of appeal. The auxiliary request was withdrawn.

Claim 1 of this request reads as follows:

"A helically coiled screw thread insert for insertion into a tapped hole or nut and receiving a threaded fastener, said insert being formed from a nitrogen strengthened stainless steel alloy comprising:

- a) from 0.05 to 0.15 % carbon;
- b) from 5.0 to 12.0 % manganese;
- c) from about 2.0 to 6.0 % silicon;
- d) from 12.0 to 20.0 % chromium;
- e) from 6.0 to 12.0 % nickel;
- f) from 0.02 % to 0.8 % nitrogen;

with the remainder being iron."

III. The Appellant's submissions may be summarized as follows:

The skilled person would understand D2 teaching that the austenitic stainless steel as disclosed therein would be unsuitable for use as a threaded fastener insert as known from prior art D1. D2 mentions in particular the use of said stainless steel for manufacturing "fasteners of various types" (D2, column 8, lines 56-57), however these are different from fastener inserts according to the present invention, which, as is well known per se, have the form of a helically coiled wire, see for example D1. These fastener inserts are subject to stringent requirements, such as high flexibility and high resistance to stress and loads, which are relevant both when inserting the fastener insert into the tapped hole and upon attachment of the fastener into the insert, the latter step causing high shearing forces. As a result of metal-to-metal contact galling often occurs, particularly between the fastener and the fastener insert. The skilled person would therefore, according to the object of the invention, look for a fastener insert material having anti-galling properties, which is flexible and has the capacity to withstand high stresses, without however having a high lubricity, which if present would lead to poor retention of the fastener insert in the tapped hole as the fastener is screwed into the insert. The steel alloy of D2 does not fulfil these conflicting requirements since it has a high lubricity (D2, column 3, lines 47-50) and work hardening rate (D2, column 3, lines 45-50; column 4,

lines 41-43; column 6, lines 66-68), the latter implying a high brittleness. This is confirmed by the affidavits of Mr Giannakakos, one of the inventors, Mr Wind, Director of the Business Planning and Analysis of the automotive product group of Emhart Teknologies LLC and Mr Downing, retired Engineering manager of the Heli-Coil product group of Emhart Teknologies LLC. In fact, forming of the steel alloy into wrought products occurs according to D2 in the annealed state (D2, column 8, lines 54-59) whereas in the present invention the helical coiling of the wire into the final form of the insert is performed after the wire has already been subject to severe cold working. The Appellant had ingeniously found that the high stiffness of the cold worked steel alloy of D2 could in fact be used to effectively compensate for its high lubricity and brittleness. It was well known to produce fastener inserts which were radially compressed on insertion into the respective tapped hole in which they were to be used, this compression producing the frictional forces necessary to hold the insert in the hole. The high stiffness of the steel of D2 allowed the production of higher frictional forces even if the diameter of the insert and hence the degree of compression was less than in the state of the art. The lower degree of compression avoided the problem of brittleness. Finally it is emphasized that it took almost 25 years to discover that this steel alloy could be used for making helically coiled fastener inserts which would solve the indicated problems, albeit the steel material of D2 being known already from the mid-1970' where it was marketed under the brand name Nitronic 60. The present invention thus has satisfied a long-felt need. In conclusion, on account of all the

given reasons the combination of D1 with D2 would not be obvious for the skilled person.

### **Reasons for the Decision**

1. The appeal is admissible.
  
2. D1 represents undisputedly the closest prior art and discloses a helically coiled screw thread insert for insertion into a tapped hole or nut and receiving a threaded fastener. The difference to this prior art resides in that according to the invention the insert consists of a steel alloy as indicated in claim 1 of the main request. The object of the invention is to provide a fastener insert which does not exhibit a propensity to galling despite the shearing forces which act during assembly of the insert and of the fastener. This objective problem is explicitly stated in the published patent application (herein denominated as EP-A) in paragraph [0011]. Galling is a phenomenon which is well known in the art, see e.g. D1 (column 1, lines 62-64) and D2 (column 1; see cited literature), and results from metal-to-metal contact under high contact pressure. Despite the fact that D1 is apparently mainly concerned with galling arising between the fastener insert and the substrate, nevertheless the skilled person would know, due to the general nature of the galling problem which arises from metal-to-metal contact, that a galling problem also exists between the fastener and the fastener insert and that proper material choice for the fastener insert could likewise lead to a significant improvement in this respect.

3. Looking for a solution permitting to achieve the object of the invention, the skilled person would, in view of the above, certainly retain D2 among the consulted prior art documents, since D2 clearly addresses galling as its main technical problem. D2 discloses a steel alloy having the features indicated in claim 1 of the main request (see D2, table on the top of column 4) and having a superior galling resistance (D2, column 5, lines 28-30), and this has not been contested by the Appellant. The Appellant however in essence alleges that the skilled person, albeit knowing the steel alloy of D2 and its anti-galling properties, would not have used this alloy for manufacturing a helically coiled threaded insert because of the known high lubricity and brittleness of the material.
  
4. The Appellant's arguments are not found to be convincing by the Board. The passages in D2 cited by the Appellant do not allow to conclude that the steel alloy of D2 has a high lubricity which would make it unsuitable for use in manufacturing a fastener insert. In fact, in D2 (column 3, lines 40-62) it is merely stated that "the silicon present in the surface oxide film is believed to be dispersed as a substitutional atom in the oxide lattice providing a low shear strength oxide film which is tightly adherent to the surface" and that "upon removal of the surface oxide film, as by abrasion, another oxide film rapidly forms at ordinary temperatures, so that the surface, is in effect, "self-healing"". Evidently, this seems to explain why this steel alloy has only a weak propensity to galling, shearing forces apparently having a lesser impact on the outer surface of such a steel alloy than

on conventionally used steel alloys. However, no indication and no hint is given here or in any other passage of D2 that the steel alloy has such a high lubricity that it would be unsuitable for the presently claimed purpose. Quite to the contrary, it appears from its proposed use for manufacturing "fasteners of various types" (D2, column 8, lines 54-59) that this steel alloy cannot exhibit an excessive lubricity, since a large amount of fasteners function on the basis of frictional engagement.

In any case, from a technical point of view, it is difficult for the Board to see how the potentially high lubricity of the steel of D2 could have represented a genuine mental hurdle for the skilled person to using the steel in a helically coiled fastener insert. There are two reasons for this. Firstly, it is apparent that high lubricity, if present, would also reduce the friction between the fastener insert and the fastener itself when this is screwed into the insert, thus reducing the moment acting on the insert which would tend to screw it out of the tapped hole. Secondly, there are numerous options available to the skilled person for increasing the holding force of the insert in the tapped hole, such as adapting the cross-section of the wire and/or the thread profile of the tapped hole.

Thus, without entering into further discussion of what constitutes a genuine technical prejudice and of the required standard of proof, on which extensive case law exists, the Board is satisfied, given the undisputed superior galling resistance of the steel alloy under discussion, that any perceived problem with its



lubricity would not have prevented the skilled person from trying to use this steel alloy for manufacturing fastener inserts, in an attempt to solve the posed technical problem.

5. As to the alleged brittleness of the steel alloy of D2, the Board notes, quite similar to the situation described above, that there is no explicit indication or suggestion in D2 that the steel alloy in question may have an excessively high brittleness. D2 essentially merely states that "an increase in the silicon content increases the work hardening rate of the steel" (D2, column 4, lines 40-43). This is manifestly only a relative statement and, much the same way as it is known to the skilled person that an uncontrolled increase in the content of the alloying elements generally leads to excessive hardness and even brittleness, the skilled person is merely told here that the silicon content cannot be increased at one's own discretion but has to be kept within acceptable limits since otherwise the work hardening rate would increase too much. Indeed D2 clearly states in column 4, lines 56-60 : "a silicon content in excess of 7% adversely affects hot workability, and for best cold formability the silicon content should not exceed 5%. For optimum properties the maximum silicon content is about 4%". This can be compared with the lower limit of 2% silicon allowed by present claim 1. Finally, D2 also mentions that, as known in metallurgy, in the annealed condition the steel alloy may be softened and becomes ductile (column 8, lines 54-62), thus improving the cold working properties.

In summation, it appears from D2 that the steel alloy disclosed therein has good cold working properties and is not affected by serious brittleness problems. Insofar as the Appellant refers to the two stage process of forming the insert, namely drawing of the wire to the required cross-section with subsequent coiling and implies that after drawing the wire would be too brittle to coil, the Board points out that intermediate annealing between forming steps is a technique well known to the skilled person to cope with such situations.

The fact that specific arrangements were necessary to manufacture a fastener insert from the steel alloy of D2, such as modifications to the pitch of the coiling mandrel to reduce the outer diameter of the insert, given the higher yield strength of such fastener inserts compared to conventional ones, appears to come within the customary practice of the skilled person. Moreover, no mention is made in claim 1 and in the patent application of any modification of the insert's structure, dimensions or configuration resulting from the use of the steel alloy of D2 in the manufacturing process.

6. Finally it is noted that the fact that for over 20 years nobody came up with the idea of employing the steel alloy of D2 to manufacture helically coiled screw thread inserts does not necessarily imply the presence of an inventive step. Commercial aspects usually play a crucial role when taking a decision on the development of new products and in the present case it appears that the relatively high cost of an insert made from the steel alloy disclosed in D2 (see affidavit of Mr Wind,

point 5) might have been a reason for delaying the use of this steel alloy until such a time as the desire to avoid galling had taken on prime importance, in particular in the computer industry, see the affidavit of Mr Wind.

7. In view of the above reasons the combination of D1 with D2 would be obvious to the skilled person and it would lead to the subject-matter of claim 1 (Art. 56 EPC 1973).

## **Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

A. Vottner

S. Crane