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**Tsioptsias et al.**

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(54) **METHOD FOR PRODUCING A FRICTION ELEMENT**

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*F16D 65/12* (2013.01); *F16D 2250/0053*  
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(58) **Field of Classification Search**  
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See application file for complete search history.

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(56) **References Cited**

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 306 days.

U.S. PATENT DOCUMENTS

4,158,579 A 6/1979 Foreman et al.  
5,346,560 A 9/1994 Mournet et al.  
6,212,930 B1 4/2001 Skrabs et al.

(Continued)

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FOREIGN PATENT DOCUMENTS

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DE 1 012 946 B 8/1956  
DE 157 58 26 A1 7/1969

(Continued)

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European Search Report dated Apr. 19, 2012 in European Application No. EP 11 19 1711 with English translation of relevant parts.

(Continued)

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(57) **ABSTRACT**

The invention relates to a method for producing a friction element (3) comprising the steps: providing a metal main body (10), hardening the main body (10) on at least part of its surface (11, 12) in a salt bath, wherein the salt bath hardening is the final method step, and no further processing of the hardened surface (11, 12) is performed. Furthermore, the invention relates to a friction element produced according to this method and a friction component comprising the latter.

(52) **U.S. Cl.**

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**4 Claims, 4 Drawing Sheets**

