

Hard Cr Plating-less Wear Resistant Sliding Parts

Technical background

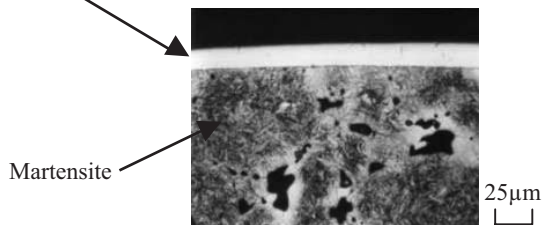
In sliding components of engine fuel injection system, a specification requiring hard Cr plating had been used. Problems with this specification included reduced engine output due to increased wear, high cost, etc.

Hitachi Powdered Metals developed a new material which solves these problems. Because the wear resistance of this material is improved by dispersing hard particles in a martensite matrix, it was possible to eliminate the conventional hard Cr plating, greatly reducing the cost of parts.

Conventional technology

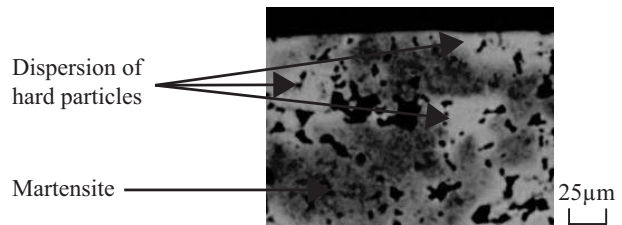
Material : Nikalloy ENK (Fe-Ni-Cu-C)
 Heat treatment : Carburizing and quenching
 Surface treatment : Hard Cr plating (partial plating)

Plating thickness: 10-15 μ m



New technology

Material : Nikalloy ENK H-1
 (ENK + hard particles)
 Heat treatment : Carburizing and quenching
 Surface treatment : None



Features of the new technology

- (1) Having excellent wear resistance because hard particles are dispersed in the matrix.
 Wear resistance in bench test Total wear: Approximately 1/3 the conventional level (hard Cr plated product; 21 μ m; developed product: 8 μ m)
- (2) Enabling cost reduction by eliminating hard Cr plating.

Wear test

1. Sample materials (pin material)

Conventional material:
 ENK + hard Cr plating
 Developed material
 (ENK + hard particles): ENKH-1

2. Test conditions

- 1) Testing machine: Pin-on-disk friction tester
- 2) Test contact pressure: 0.5MPa
- 3) Rotational speed: 1000rpm
- 4) Test time: 1hr
- 5) Environment: Dry test
- 6) Disk material: Nikalloy EN (Fe-Ni-Mn-C)
 + carburized and quenched material

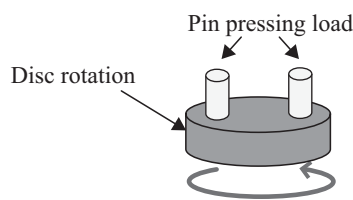


Fig. Illustration of test method

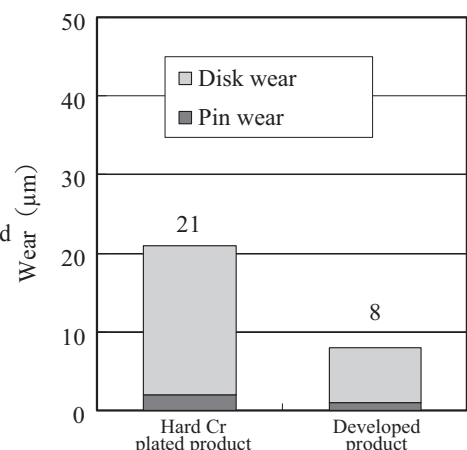


Fig. Amount of pin and disk wear after test

Examples of applicable products

· Wear resistant sliding parts for engines

Cost comparison

Conventional product = 100
 New product = 60