



Technology 090: Brake Pad Spring Coating with Low Friction & NVH

Hybrid combination of coatings reduces pad retraction force and high frequency vibrations and noise while providing corrosion resistance from temperature extremes and exposure to harsh elements.

- Brake pad springs are spring-steel shims that hold, position and guide brake pads within the caliper of disk brake systems.
- Coating applied to the spring surface in contact with the brake pad reduces friction and allows more complete, rapid and reliable retraction of the brake pad.
- Different coating applied to the other side of the spring reduces high frequency vibrations and noise.
- Unique coating process allows the coating to adhere to the spring in very harsh environments.
- No need for retooling or redesign of the brake systems.
- Application cost is low.

Implementation:

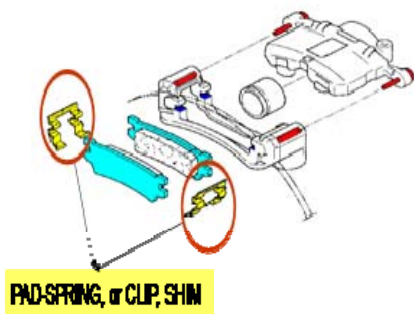
Hyundai began testing the coated spring in 2002 & in 2004 selected it for the newly designed 2006 Sonata. 60% of Hyundai and Kia passenger vehicles today utilize the innovator's coated spring. Hyundai just confirming that 100% of their vehicles will have this coated spring beginning Sep. 2009—Hyundai discovered problems with pad adherence to the backing plate on the 40% of their vehicles that were not equipped with this coated spring).

Testing:

The following tests compared new uncoated brake pad springs to the same spring with the innovator's coating.

- Sliding force reduction: 70% (Average among 23 spring designs tested by Hyundai, Kia and ManDo).
- Corrosion resistance improved 85% (Data from ManDo field claims in North America).
- 37% of the drag torque friction typical in broken-in brake pad springs and 24% of the drag torque friction of new springs. Results in brake pads more fully and quickly retracting, reducing drag torque on the brake rotor when brakes are not being applied. May have an impact on vehicle fuel economy and brake longevity (Tests conducted by Link Engineering on coated and uncoated spring sample).
- Winner of Dupont's Plunkett Awards for Innovation.
- Brake engineers, chief engineers and team leaders from Hyundai's and Kia's Design, Testing and Quality Assurance R&D Departments stated the innovator's coated spring had a measureable effect reducing sliding force, noise, and stick-slip phenomenon, and improving pad adherence and drag torque stability. They also stated that ABS performance improved.

Corrosion resistance: The uncoated caliper on which the coated brake pad spring (black) is mounted shows significant corrosion although both components have weathered through the same conditions.





IP Status:

- Korea, June 26th 2008, patent registered. (Patent No. is 10-0843108)
- United States, application made May 6th 2008 PCT.
- Japan, application made May 9th 2008 PCT.

Future products:

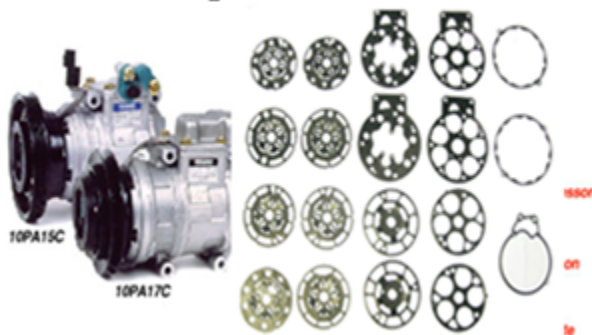
Brake, Pad-Anti-Noise Shim



Engine, Head-Gasket



Compressor-Gasket



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