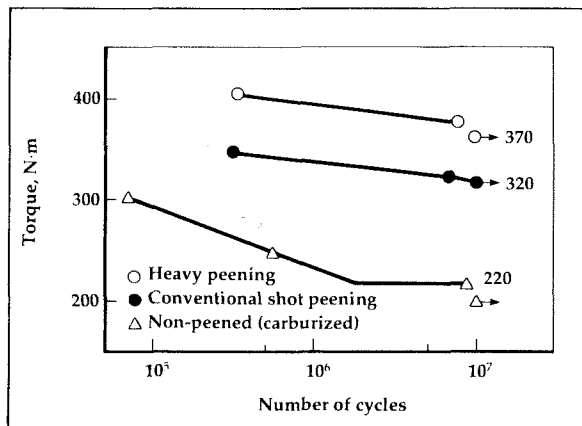


Shot Peening For Carburized Steel

Shot peening is a method of cold working in which compressive forces are induced in the surface layers of metallic parts by the impingement of a stream of shot. These compressive forces enhance fatigue strength by offsetting the "stretching action" of applied tensile stresses. Therefore, either higher loads can be allowed with the same life, or the same loads can result in longer life.

Shot peening of carburized parts is applied at Isuzu Motors Ltd., Kawasaki, Japan, to increase the strength and reliability of transmission gears and springs. Researchers found that although the conventional rotating-wheel method of projecting shot improves properties, a "heavy peening" method using compressed air helps fatigue life even more.



Influence of shot peening on fatigue strength of carburized gears.

The rotating-wheel method projects shot of hardness HRC 50 to 53 at speeds of 60 to 70 m/sec (200 to 230 ft/sec), while the compressed air method projects HRC 50 to 60 shot at speeds of 70 to 100 m/sec (230 to 330 ft/sec). The harder shot projected at higher speeds results in increased depth and magnitude of compression on a carburized surface.

Residual stress levels remaining after rotating wheel peening are -1100 MPa (-160 ksi), compared with -1400 MPa (-205 ksi) after heavy peening. In addition, the fatigue limit of carburized gears increases by 16% compared with 10% with conventional peening.

Researchers also found that cracks below the surface of heavy-peened gears often initiate at the point of a nonmetallic inclusion, typically an oxide. By reducing oxygen levels from the conventional 21 ppm to 9 ppm, the fatigue limit is increased by 12%.

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