**WPC Treatment** (Fine Particle Peening) is a shot peening method that improves the mechanical property of metal products. It was jointly developed by Fuji Manufacturing Co., Ltd. and Fuji Kihan Co., Ltd. (Japan Patent No. 1594395, Heat treatment method for surface finishing of the metal products.)

WPC differs from conventional shot peening in that conventional shot peening sprays ferrous media 600 – 800 µm in diameter at a velocity of 70 – 80 m/s, whereas WPC sprays a much harder and finer media of 40 – 200 µm in diameter at a velocity of 200 m/s. Consequently, quick heating and cooling are repeated and a heat-treatment and forging effect with a small-dimpled surface is created.

The Merits of WPC Treatment
The main cause of metal product failure is fatigue. There are many cases where a minute crack occurs on the outermost layer, then it grows and leads to failure. WPC treatment provides a highly compressive residual stress close to the surface layer, and restrains the progression of the cracks at the surface by improving surface roughness and effectively raising the fatigue limit. WPC will lower repair costs due to fatigue failure. WPC improves the fatigue life of components without making them larger and even lowers energy costs and materials usage in some cases since the size and weight of the parts can be reduced.

WPC treatment creates a hard surface that improves abrasion resistance. A lubricant is usually used on the sliding parts of metal products. Under certain conditions, a lubricant dries up and friction occurs. The WPC treatment creates small dimples that hold the lubricant, making a near no-contact state, reducing the oil temperature and preventing friction. When WPC treatment is applied on engine parts and other sliding parts, the slide resistance is lower, increasing the power and providing higher fuel efficiency, and shortening the initial engine running-in period.

WPC treatment improves chip flow around the cutting tools and lowers the meshing sound between the surfaces of gear teeth. It also prevents burns and scratches.

The Mechanism of WPC Treatment
Figure 1 shows the depth direction distribution of the residual stress of the carburized and quenched SCM420 to which conventional shot peening treatment and WPC treatment were applied respectively.

MoS2 and the WPC Treatment
Solid lubricants such as Molybdenum Disulfide (MoS2) can be utilized as media in the WPC process to embed MoS2 into the product surface. The MoS2 shot process sprays fine powders of MoS2 at a high speed against aluminum and other low melting-point materials. The process forms a MoS2 layer, which does not include a binder, on the outer layer of
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The MoS2 shot process is used on pistons’ skirt parts, other automotive components, and bearing metal.

Proven Results
The following are a few examples of the proven results obtained by Fuji Manufacturing:
- 14 times the life improvement for gears (SCM)
- Over 10 times the life improvement for torsion bars (SCM)
- 10 times the life improvement for pumps (SK)
- 5 times the life improvement for cutting tools of high-speed steel
- 5 times the life improvement for a die cast (SKD)
- Over 5 times the life improvement for shafts (SCM)
- 4 times the life improvement for SKD11 punches

Future Prospects for WPC Treatment
WPC treatment is effectively used for automotive components and other metal components. It even extends the life of cutting tools and metal molds. This is the technology that can reduce friction, improve lubricity, and contribute to energy and resource savings by improving the surface strength of metals without making components larger and heavier.

For more information on the WPC treatment, visit www.fujimfg.co.jp/english/wpc.html.