

## Automated Shot Peening Delivers Consistent Benefits, Quality and Value for Today's Manufacturers



Manufacturers in the aerospace, automotive, infrastructure and other critical industries rely heavily on automated shot peening to boost the performance and service life of their high-strength metallic products and parts. This is because important metal parts that are subject to frequent forms of stress may fail prematurely through a fracture that begins at the surface, leading to potentially disastrous results.

Controlled and automated shot peening improves the permissible stress levels for these parts and materials while also providing the essential documentation manufacturers desire for achieving their unique quality objectives. While the shot peening needs of different manufacturers can vary widely, those with certain common challenges can benefit from shot peening in numerous ways.

### **Increase Fatigue Life**

Fatigue failure is the wearing out of metal due to repetitive and cyclical stress loading, which causes bending and twisting. Shot peening improves fatigue life on parts exposed to repeated stresses, but it must be

controlled and repeatable and therefore performed in an automated manner. Automated shot peening is very effective for increasing fatigue life in aircraft landing gear, helicopter blades, leaf and coil springs, gear teeth, drive shafts, torsion bars, axles, chilling equipment, rotors, compressors, turbine blades, fuel injector parts, cam shafts, connecting rods and steering parts.

### **Reduce Stress Corrosion Cracking**

Residual stress leaves metals more susceptible to corrosion, especially in high-strength materials. Stress failures result from the complex interaction of corrosives on sustained tensile stress in a metal surface. By applying a compressive stress layer to the surface metal through shot peening, its susceptibility is reduced. This application is effective with aircraft landing gear and stainless steel hydraulic tubing.

### **Prepare Parts for Plating**

Chrome plating can have a detrimental effect on the fatigue life of metal parts. Fine cracks commonly develop in metal plating. Shot peening parts prior to plating strengthens the part and enables it to resist the transfer of cracks from the plating through the base metal. This is an effective application for landing gear cylinders and other metal parts to be plated.

### **Straighten Parts Deformed During Manufacturing**

Parts can be straightened by selective peening along a critical area. The radial stretching and plastic flow effects of an opposing surface caused by shot peening can straighten parts to a certain degree. This can help with out-of-round piston rings, bulkheads, large structural shapes deformed during machining and parts deformed during heat treatment.

### **Reduce Tensile Stress After Grinding**

The shot peening process converts residual stress from tension to compression in many parts. The tensile layer where failure occurs is converted to a uniform comprehensive layer, thereby increasing fatigue strength and lengthening service life. This is an effective application for high strength steel parts.

### **Test Bonding of Electroplated Surfaces**

Poorly bonded surfaces will blister when shot peened, whereas a lack of blister indicates good adhesion. Shot peening can also expose imperfections and quality problems in electroplated surfaces. Best uses for this application are in detecting decarbonized (softer) surface areas on metal parts and in inspecting plated engine parts.

### **Reduce Casting Porosity**

Shot peening parts with a carefully chosen media size can pack and compress surface grain, closing the pores through which hydraulic

leakage can occur. This is an effective treatment for aluminum die-cast parts, transmission housings and gearboxes.

### **Alter Dimensions of Parts**

During the design phase of product development, shot peening can be incorporated into the manufacturing process to slightly enlarge or reduce the part size as needed. During rebuilds, shot peening can be used to alter the dimension of parts negatively affected by wear. This process is effective for increasing the diameter of a shaft or decreasing the diameter of a hole.

### **Improve Oil Retention and Lubricity**

Shot peening alters the surface of a part to reduce friction and improve oil retention, thereby improving lubricity of some bearing surfaces, engine pistons and cylinder walls.

### **Reduce Notch Sensitivity in High-Strength Steel**

The stronger the steel, the more susceptible it becomes to failure from notching or fatigue cracking. Shot

peening improves the life cycle of steel and reduces fatigue cracking. It is commonly used in many applications to treat steel strengths greater than 200,000 psi, particularly in landing gear and springs.

### **Deliver Value To Customers**

The peening process, when properly controlled, delivers the same benefit to each part treated. Because so many variables can affect shot peening results, many manufacturers set their own process standards to ensure consistent quality whether shot peening is delivered in their plant or by their vendors. Maintaining and documenting the peening process provides essential evidence that the manufacturer is committed to quality and to providing value for their customer.

Clemco offers world class engineered and automated solutions that help today's manufacturers optimize their entire shot peening process and achieve the value-added results they seek. ■

