

TECHNICAL BULLETIN

TB NO. 1020
REV. 1

**Subject: Industrial Hard Chrome Plating of Crankshafts
for Slow, Medium and High Speed Engines**

INTRODUCTION:

Hard chrome plating is produced by electrode-position from a solution containing chromic acid and a catalytic anion in proper proportion. The metal produced is extremely hard and corrosion resistant. The process is used for applications where excellent wear is required. This includes products such as power valve stems, piston rings, cylinder liners and crankshafts.

Hard chrome deposits are intended primarily to increase the service life of functional parts by providing a hard surface with a low coefficient of friction that resist galling, abrasive and lubricated wear. The rebuilding of mis-machined, damaged or worn parts comprises large segments of the chrome plating industry. Defects can be removed by machining or grinding and the undersized part can be restored to the original specified dimension.

It's important to note that hard chrome plating differs from decorative chrome plating. Hard chrome plating is applied directly to the base material with a specified hardness, porosity and thickness range dependent on size and type of the part. Decorative chrome plating is normally applied over undercoats of nickel or of copper and nickel. These decorative coatings seldom exceed 0.05 mils., and the main purposes are for corrosion resistance and cosmetic.

HARD CHROME PLATING CRANKSHAFTS

Hard chrome plating is recognized as an approved method of correcting mis-machining or defects in new crankshafts by engine and compressor manufacturers worldwide. It is also recognized as an approved method of repairing damaged or worn crankshafts by end users of engines and compressor worldwide. Approved methods apply to slow speed (below 500 RPM), medium speed (500 to 1000 RPM) and high speed (above 1000 RPM) engine and compressor crankshafts.

Historically, the concerns with chrome plated crankshafts are quality, reliability, cost and delivery or turnaround. It's important to use reputable companies with the proper equipment, knowledge, experience and companies that follow published government and industry standards (I.E., ASM International, U.S. Military & British Standards). The standards dictate inspections and repair procedures, material specifications and tolerances. Crankshaft dimensions are based on the manufacturer's specifications.

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Hard chrome plating of crankshafts is not a new process based on new technology. During the past forty-five (45) to fifty (50) years, the reliability of the shafts have been proven based on actual experiences. Reputable companies are expanding their capabilities to meet the growing demands of the market. Some can actually handle crankshaft up to 36 feet long and up to 32,000 pounds. Reliability, cost and delivery are major factors creating the growth. The approximately cost for hard chrome plating crankshafts is ten (10) to twenty-five (25) percent of the cost for a new shaft. Delivery or turn-around could vary from one (1) to four (4) weeks dependent on the size of the shaft.

INSPECTIONS & REPAIR PROCEDURES (TYPICAL)

I. Initial Inspection (Record All Data)

- A. Remove plugs, vat & steam clean
- B. Magnaflux/Fluorescent light inspection
- C. Ultrasonic test
- D. Check surface hardness (HRC)
- E. Perform dimensional inspections as compared to OEM standards
- F. Inspect all keyways and threaded areas
- G. Evaluate total shaft condition as received

II. Standard Hard Chrome Procedures

- A. Straighten Crankshaft Before Pre-grind
- B. Pre-grind the crankshaft. Maintain parallel requirements between the rod journals to main axis.
- C. Magnaflux/Fluorescent light inspection
- D. Build up seal areas
- E. Stress relieve by heat treating if required and shot peening
- F. Spray clean total shaft prior to chroming
- G. Chrome Plate (Mil. Std. QQC320B)
- H. Heat to remove hydrogen
- I. Check the crankshaft for straightness and straighten by peening
- J. Finish grind rod and main journals to the manufacture's specifications
- K. Radius all oil holes and polish top radius
- L. Polish all journals
- M. Magnaflux/fluorescent light inspection
- N. Dye penetrant inspection to check chrome bonding
- O. Check crankshaft for straightness (max .001)
- P. Hone body fit areas and tap all thread areas
- Q. Balance the crankshaft
- R. Clean the shaft, install all plugs, preserve and box for shipment.

RECOMMENDATIONS

Most crankshafts can be repaired with hard chrome plating, with proven reliability, at a very economical price. The strength and rod load capabilities of crankshafts are rated conservatively which permits machining and chroming without deration.

Hard chrome plating is our preference over the metal spray process. The reasons are associated with surface finish and load carrying capability. Metal sprayed surfaces are more course which could decrease bearing life and under high rod load conditions, the sprayed metal flexes and flakes off the shaft.

For more information, please contact our service department.

Reference Material

ASM International, Handbook Volume 5
U.S. Military Specifications QQC320B
British Standards Institution

CUSTOMER REFERENCE LIST (HARD CHROME PLATING CRANKSHAFTS)

Waukesha Pearce Industries, Inc.
Chevron
Stewart & Stevenson
Exxon Chemicals Co. U.S.A.
Lone Star Gas Co.
Arco Oil & Gas
Cooper Energy Services
Dresser Rand
Exxon Co. USA
El Paso National
Mobil Oil
Natural Gas Pipeline
Oryx Energy
Phillips Petroleum
Union Pacific Resources
Warren Petroleum
Texaco International

For further information concerning chroming crankshafts, please contact **EnDyn's** Technical Service Department or your local authorized **PowerParts®** Distributor.

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