G.E. Totten & Associates, LLC
"GLOBAL SOLUTIONS FOR LOCAL PROBLEMS"

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MICROSMOOTH Microhone Process

Electrochemical polishing and deburring is the removal surface ions of metal using Faraday's two laws of electrolysis. Law No. 1 states that the amount of chemical change produced by an electric current, that is, the amount of any substance deposited or dissolved, is proportional to the quantity of electricity passed. Law No. 2 states that the amounts of different substances deposited or dissolved by the same quantity of electricity are proportional to their chemical equivalent weights.

Electroplating is based on the same laws and the Microsmooth process is essentially a "reverse plating" process. When electrical current is applied, metal ions travel from the material being polished to the cathode through the electrolyte solution.

After grinding or otherwise mechanical working a metal surface has protuberances or peaks and valleys. The electrical current tends to concentrate in the peaks and therefore removes ions of metal from them faster than it removes ions from the valleys. This creates a smoothening effect on the metal being polished and because metal is removed, not moved or mechanically worked, there are no torn areas remaining on the surface after polishing.

MICROSMOOTH has developed a number of electrolyte solutions that will allow electropolishing and deburring of a large variety of materials and part configurations. The electrolyte composition is the key to effective processing.

BENEFITS OF MICROSMOOTH PROCESS:

- Low cost for bright finishing and deburring
- Easily fits into JIT manufacturing cells or mass production
- Polishes and deburs simultaneously
- No directional lines
- Reduces friction and surface drag and therefore,
  - Increases life of cutting tools
  - Increases life of gears and shafts and other loaded surfaces
- Removes hydrogen from the surface, retards multiplication of bacteria, and the polished surface provides for,
  - Easier sterilization and maintenance of clean surfaces for medical and dental instruments, and for food, drug, beverage, and chemical processing equipment
  - Better resistance to tarnish and corrosion
- Better passivation of stainless steel surfaces and improves corrosion resistance
- Removes surfaces stresses
- Polishes in areas other methods can't reach and provides more uniform luster on intricate parts
- Excellent surface preparation for welding, plating, conversion coatings, etc.
- Reduces annealing or stress relieving steps between cold forming

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APPLICATIONS FOR MICROSMOOTH PROCESS:

- Cutting tools, particularly tungsten carbide
- Medical and dental instruments
- Knives and other cutting blades or discs
- Gears and shafts
- Fasteners
- Welded and brazed parts
- Plumbing fittings and fixtures
- Ammunition and firearms parts
- Wire products
- Printed circuits and other electronic parts
- Marine hardware and propellers
- Pump parts and impellers
- Food & beverage machinery parts
- Stainless steel parts of all types
- Aircraft parts
- Bearings and bearing parts
- Pipes and tubing
- Automotive engine and transmission parts
- Injection molding dies and forming dies
- Chains
- Electric motor parts
- Jewelry

CASE STUDIES:

1. An engine manufacturer uses tungsten carbide tipped gun drills for drilling holes in SAE 4140 steel crankshafts. After the Microsmooth treatment he reported a drill-life increase of 2X. He also reported that the mode of drill failure changed from chipping of the cutting edge, to just dulling. Therefore, he increased the number of sharpenings before scrapping the drill. The load on the motor driving the drill decreased by approximately 8% after the Microsmooth treatment.
2. A customer uses double end carbide mills cutting a radial kidney slot in 303SS. After the Microsmooth treatment of the mills he reported a 60% increase in mill life.