

*Alkaline Treatment Without Cyanide* is a general term used to describe the application of an alkaline solution not containing cyanide to a metal surface to clean the metal surface or prepare the metal surface for further surface finishing.

*Aqueous Degreasing* involves cleaning metal parts using aqueous-based cleaning chemicals primarily to remove residual oils and greases from the part. Residual oils can be from previous operations (e.g., machine coolants), oil from product use in a dirty environment, or oil coatings used to inhibit corrosion. Wastewater generated by this operation includes spent cleaning solutions and rinse waters.

*Assembly/Disassembly* involves fitting together previously manufactured or rebuilt parts or components into a complete metal product or machine or taking a complete metal product or machine apart. Assembly/disassembly operations are typically dry; however, special circumstances can require water for cooling or buoyancy. Also, rinsing may be necessary under some conditions.

*Burnishing* involves finish sizing or smooth finishing a part (previously machined or ground) by displacing, rather than removing, minute surface irregularities with smooth point or line-contact, fixed or rotating tools. Lubricants or soap solutions can be used to cool the tools used in burnishing operations. Wastewater generated during burnishing include process solutions and rinse water.

*Calibration* is performed to provide reference points for the use of a product. This unit operation typically is dry, although water may be used in some cases (e.g., pumping water for calibration of a pump). Water used in this unit operation usually does not contain additives.

*Corrosion Preventive Coating* involves applying removable oily or organic solutions to protect metal surfaces against corrosive environments. Corrosion preventive coatings include, but are not limited to: Petrolatum compounds, oils, hard dry-film compounds, solvent-cutback petroleum-based compounds, emulsions, water-displacing polar compounds, and fingerprint removers and neutralizers. Corrosion preventive coating does not include electroplating, or chemical conversion coating operations. Many corrosion preventive materials also are formulated to function as lubricants or as a base for paint. Typical applications include: Assembled machinery or equipment in standby storage; finished parts in stock or spare parts for replacement; tools such as drills, taps, dies, and gauges; and mill products such as sheet, strip, rod and bar. Wastewater generated during corrosion preventive coating includes spent process solutions and rinses. Process solutions are discharged when they become contaminated with impurities or are depleted of constituents. Corrosion preventive coatings typically do not require an associated rinse, but parts are sometimes rinsed to remove the coating before further processing.

*Electrical Discharge Machining* involves removing metals by a rapid spark discharge between different polarity electrodes, one the part and the other the tool, separated by a small gap. The gap may be filled with air or

a dielectric fluid. This operation is used primarily to cut tool alloys, hard nonferrous alloys, and other hard-to-machine materials. Most electrical discharge machining processes are operated dry; however, in some cases, the process uses water and generates wastewater containing dielectric fluid.

*Floor Cleaning (in Process Area)* removes dirt, debris, and process solution spills from process area floors. Floors can be cleaned using wet or dry methods, such as vacuuming, mopping, dry sweeping, and hose rinsing. Non-process area floor cleaning in offices and other similar non-process areas is not included in this unit operation.

*Grinding* involves removing stock from a part by using abrasive grains held by a rigid or semirigid binder. Grinding shapes or deburrs the part. The grinding tool usually is a disk (the basic shape of grinding wheels), but can also be a cylinder, ring, cup, stick, strip, or belt. The most commonly used abrasives are aluminum oxide, silicon carbide, and diamond. The process may use a grinding fluid to cool the part and remove debris or metal fines. Wastewater generated during grinding includes spent coolants and rinses. Metal-working fluids become spent for a number of reasons, including increased biological activity (i.e., the fluids become rancid) or decomposition of the coolant additives. Rinse waters typically are assimilated into the working fluid or treated on site.

*Heat Treating* involves modifying the physical properties of a part by applying controlled heating and cooling cycles. This operation includes tempering, carburizing, cyaniding, nitriding, annealing, aging, normalizing, austenitizing, austempering, siliconizing, martempering, and malleablizing. Parts are heated in furnaces or molten salt baths, and then may be cooled by quenching in aqueous solutions (e.g., brine solutions), neat oils (pure oils with little or no impurities), or oil/water emulsions. Heat treating typically is a dry operation, but is considered a wet operation if aqueous quenching solutions are used. Wastewater includes spent quench water and rinse water.

*Impact Deformation* involves applying impact force to a part to permanently deform or shape it. Impact deformation may include mechanical processes such as hammer forging, shot peening, peening, coining, high-energy-rate forming, heading, or stamping. Natural and synthetic oils, light greases, and pigmented lubricants are used in impact deformation operations. Pigmented lubricants include whiting, lithapone, mica, zinc oxide, molybdenum disulfide, bentonite, flour, graphite, white lead, and soap-like materials. These operations typically are dry, but wastewater can be generated from lubricant discharge and from rinsing operations associated with the operation.

*Iron Phosphate Conversion Coating* is the process of applying a protective coating on the surface of a metal using a bath consisting of a phosphoric acid solution containing no metals (e.g., manganese, nickel, or zinc) or a phosphate salt solution (i.e., sodium or potassium salts of phosphoric acid solutions) containing no metals (e.g., manganese, nickel, or zinc) other than sodium or potassium. Any metal concentrations in the bath are from the substrate.

*Machining* involves removing stock from a part (as chips) by forcing a cutting tool against the part. This includes machining processes such as turning, milling, drilling, boring, tapping, planing, broaching, sawing, shaving, shearing, threading, reaming, shaping, slotting, hobbing, and chamfering. Machining processes use various types of metal-working fluids, the choice of which depends on the type of machining being performed and the preference of the machine shop. The fluids can be categorized into four groups: Straight oil (neat oils), synthetic, semisynthetic, and water-soluble oil. Machining operations generate wastewater from working fluid or rinse water discharge. Metal-working fluids periodically are discarded because of reduced performance or development of a rancid odor. After machining, parts are sometimes rinsed to remove coolant and metal chips. The coolant reservoir is sometimes rinsed, and the rinse water is added to the working fluid.

*Painting-Spray or Brush (Including Water Curtains)* involves applying an organic coating to a part. Coatings such as paint, varnish, lacquer, shellac, and plastics are applied by spraying, brushing, roll coating, lithographing, powder coating, and wiping. Water is used in painting operations as a solvent (water-borne formulations) for rinsing, for cleanup, and for water-wash (or curtain) type spray booths. Paint spray booths typically use most of the water in this unit operation. Spray booths capture overspray (i.e., paint that misses the product during application), and control the introduction of pollutants into the workplace and environment.

*Polishing* involves removing stock from a part using loose or loosely held abrasive grains carried to the part by a flexible support. Usually, the objective is to achieve a desired surface finish or appearance rather than to remove a specified amount of stock. Buffing is included in this unit operation, and usually is performed using a revolving cloth or sisal buffing wheel, which is coated with a suitable compound. Liquid buffing compounds are used extensively for large-volume production on semiautomated or automated buffing equipment. Polishing operations typically are dry, although liquid compounds and associated rinses are used in some polishing processes.

*Pressure Deformation* involves applying force (other than impact force) to permanently deform or shape a part. Pressure deformation may include rolling, drawing, bending, embossing, sizing, extruding, squeezing, spinning, necking, forming, crimping or flaring. These operations use natural and synthetic oils, light greases, and pigmented lubricants. Pigmented lubricants include whiting, lithapone, mica, zinc oxide, molybdenum disulfide, bentonite, flour, graphite, white lead, and soap-like materials. Pressure deformation typically is dry, but wastewater is sometimes generated from the discharge of lubricants or from rinsing associated with the process.

*Solvent Degreasing* removes oils and grease from the surface of a part using organic solvents, including aliphatic petroleum (e.g., kerosene, naphtha), aromatics (e.g., benzene, toluene), oxygenated hydrocarbons (e.g.,