MECHANICAL CLEANING PROCESSES AS SOLVENT ALTERNATIVES

Revision: 1/95
Product / Process: Metal cleaning, surface preparation, paint removal, degreasing, rust, corrosion, carbonaceous residue, excess product, and scale removal
Process Code: ID-01-08, ID-01-09, ID-01-10, and ID-01-11
Substitute for: Solvent cleaning
Waste Stream: N/A
Applicable EPA Hazardous Waste Codes: D018, D035, D039
Applicable EPCRA Targeted Constituents: Solvents such as benzene, toluene, acetone, trichloroethane, xylenes, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, and perchloroethylene

Introduction: Mechanical cleaning processes are viable alternatives to traditional solvent-based cleaning operations for reducing not only waste production, but also for eliminating potential safety problems with handling and use of toxic, ozone depleting, and often flammable solvents. These cleaning processes are many and varied. Cleaning or surface preparation of almost any piece of equipment, surface, or component is possible if it is sturdy enough to withstand the friction and force produced by the mechanical work of cleaning operations such as sanding, grinding, polishing, brushing, scraping, snaking, or pigging.

Description: Mechanical cleaning processes offer a wide range of cleaning and surface preparation options to solvent cleaning.

1. Brushing - wire or plastic brushes are used to remove product, grime, or grease buildup from equipment. Metal and wooden surfaces can be prepared for painting or repainting by vigorous brushing of the surfaces to remove dirt, loose paint, scale, or corrosion.
2. Grinding - a rotating abrasive stone or disc is used to grind down (or off) some of the hardest and most difficult to remove materials like accumulated dirt, dry paint, long-standing corrosion, and mineral scale.
3. Polishing and buffing - light surface dirt, residue, tarnish, or scale is removed by polishing and buffing. These operations typically use a soft device like a fabric or fiber cloth or belt and slightly abrasive polishing cream to remove dirt, corrosion, scale, tarnish, oxidized paint, and grease residue from painted or bare metal surfaces.
4. Sanding - sanding is an abrading operation using a fiber (paper, cloth, plastic, etc.) sheet embedded with sand or other mineral grit particles that removes surface dirt or loose paint. It can be done manually or with many varieties of motor driven sander.

5. Pigging - material buildup on the walls of pipes or obstructions in lines can drastically reduce a fluids flowrate, resulting in capacity bottlenecks or sometimes even complete loss of fluid flow. A pig is a device that can often clear the obstruction, clean the walls, or even push out and clear residual product after a transfer. The pig accomplishes this by being pressured through the line, typically with nitrogen (or compressed air, depending on the service). Because of its shape, weight, and the speed at which it travels through the line, the pressure it exerts on an obstruction or wall buildup is usually sufficient to clear and clean the line. Pigs come in a variety of materials as well as in numerous shapes, sizes (from 1/4" to 12' in diameter), and configurations to enhance pipe wall cleaning, facilitate turning 90 degree elbows, or clear residual fluid.
6. Snaking - A plugged or stopped drain or pipe can be cleared using a snake, a long flexible coil of wire that is manually or electrically twisted through a pipe until the obstruction is reached and the force of the twisting coil of wire tears through the obstruction.

Materials Compatibility: N/A

Safety and Health: The safety and health concerns of mechanical cleaning processes depend on the surface or type of contaminant that is being cleaned. Caution should be taken to protect workers from physical hazards. Cleaning processes may produce airborne particulate contaminants. Proper personal protective equipment should be used.

Consult your local Industrial Health specialist, your local health and safety personnel, and the appropriate MSDS prior to implementing any of these technologies.

Benefits: Mechanical cleaning avoids the use of toxic or dangerous chemicals by substituting mechanical work for chemical work. This tends to make mechanical cleaning operations the most efficient in terms of producing the least amount of hazardous waste, as no other materials are added. In addition, when compared to chemical cleaning, mechanical cleaning is also one of the most rapid cleaning methods, since chemical action typically must rely on slow surface transport phenomena such as diffusion to achieve reaction and effect cleaning.

Economic Analysis: N/A

Major Assumptions: N/A

Points of Contact: For pig information:
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HQ AFCESA/ENM
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Vendors: Pig Vendors:

Girard Polly Pig Inc. (manufacturer of the Aqua Pig)
6531 N. Eldridge Parkway
Houston, TX 77041
(713) 466-3100
Mr. Dave Henry

Knapp Polly Pig, Inc.
1209 Hardy Street
Houston, TX 77020
(713) 222-7403, (800) 231-7205, Fax (713) 222-7403

Pipeline Pigging Products, Inc.
P.O. Box 692005-300
Houston, TX 77269
(713) 351-6688

NLB Corp.
29830 Beck Road
Wixom, MI 48096-2824
(313) 624-5555, Fax (313) 624-0908

Approving Authority:	Approving authority is controlled locally and is not required by the major claimant.
Note:	This recommendation should be implemented only after engineering approval has been granted by cognizant authority.

Source: PA Technical Inquiry 2040.