

## MILANCO CHEMICALS

### METAL CLEANING PART I - SOILS AND SURFACES

This is a basic guide for every metal finishing employee or salesperson. Metal cleaning is definitely an essential step in every metal fabricating, assembling and finishing operation. If you can start with a clean part the rest of your job can be a whole lot easier.

Cleaning is generally defined as the removal of dirt or soil which is simply matter out of place. Painting, plating, anodizing, phosphating, conversion coating, and ceramic, PTFE, PVD coatings are finishing operations that require the metal surfaces to be free of industrial soil. What do we mean when we say industrial soils? Industrial soils can be defined as:

- (1) Buffing compound residues
- (2) Cutting oils
- (3) Drawing compounds
- (4) Heat scale
- (5) Heat treating salts
- (6) Paint, stop-off lacquers, inks
- (7) Phosphate coatings, with and without oils
- (8) Quenching oils
- (9) Rust and corrosion inhibitors
- (10) Slushing oils
- (11) Smuts
- (12) Tarnish and finger prints
- (13) Inside and outside storage dirt

As you can readily see from the aforementioned list, soils encountered in metal finishing operations vary widely. They may be of an oil, grease, or wax nature deposited from the use of metal forming lubricants and coolants, rust preventative compounds, buffing and polishing materials. These types of soils respond to solvent and alkaline cleaners best.

Pigments, abrasives, metal chips, smuts and shop dust are usually held to surfaces by oils or greases. Alkaline cleaners are used to emulsify the oily binders and disperse the solid particles.

Oils or organic finishes may be combined with oxide films, rust, heat scale, tarnish, finger prints, phosphate coatings or chromate conversion coatings. When this happens, pre-cleaning with solvents or alkaline cleaners may be necessary prior to acidic cleaning for effective removal of these soils. Acid treatment may be undesirable at times; chelated alkaline cleaners (IF THEY ARE NOT A WASTE TREATMENT PROBLEM) should then be used to remove these soils.

Pre-planning in the choice of the various industrial metal working or finishing chemicals can minimize cleaning problems. Such as, the use of easy to remove buffing and drawing compounds well as cutting oils and pre-cleaning before heat treat. These are just a few hints that make the old cliché pay off; "An ounce of prevention is worth a pound of cure."

Now that we have established what industrial dirt and soil is, we have to decide when to clean. Cleaning is generally carried out:

After: Stamping	and before: Painting
Drawing	Plating
Buffing	Phosphatizing
Machining	Coating
Polishing	Inspection
Heat treating	Assembly
Storage	Welding

Cleanliness, like most things in life is relative. It is virtually impossible to obtain, within general industrial operating parameters, chemically clean surfaces - surfaces that are completely free of films. A more commonly acceptable definition of an industrial clean surface is, "one on which objectionable surface films have been replaced by films more suitable and acceptable for electroplating." We can simply extend this definition to include painting, phosphating, etc.

To date, no satisfactory method has yet been devised to absolutely ascertain the cleanliness a surface. There have been cases where fluorescent dyes and radioactive compounds have been used to test for soils. These are isolated and narrow attempts to check for cleanliness.

In industrial operations, the most practical test is the presence or absence of "Coates break" on the metal surface. If water rinses from the surface in one continual sheet the surface is considered clean; breaks in the sheet of water, or water beads on the surface are evidence that not clean.

Not all cleaning operations require the same degree of cleanliness. Parts being cleaned between manufacturing processes to permit inspection, etc., are protected from rusting and finger printing, if a light oily film remains after cleaning.

Surfaces to be bronzed, galvanized, tinned, soldered, spot welded, electroplated, or coated with other engineered coatings require a high degree of cleanliness to insure adhesion.

We now know what cleanliness is and have identified the roles of industrial soils and dirt. We are now ready to choose a cleaner, or are there other factors we have to consider before we select a cleaner? The following list of factors affecting the selection of a cleaner is a list you should be very familiar with. Use it as a check list before selecting a cleaner.

#### Parameters of Cleaners Selection

- (1) Surface to be cleaned
- (2) Soil to be removed
- (3) Required degree of cleanliness
- (4) Water quality
- (5) Cost
- (6) Safety
- (7) Disposal
- (8) Method of application

If you are somewhat familiar with the soils to be cleaned, how about the surfaces which are commonly cleaned? Listed alphabetically are some of the surfaces that are generally cleaned in industry:

Aluminum, brass, bronze, copper, galvanized metals, glass, iron, lead alloys, magnesium, monel metal, nickel, nickel silver, plastics, silver, steel, stainless steel, tin, titanium and zinc.

The ferrous or iron surfaces are by far the most prevalent cleaned surfaces in industry. The ferrous metals, titanium and magnesium alloys are not appreciably affected by highly alkaline cleaners. The rest of the non-ferrous metals such as Al, Zn, etc. may be attacked by uninhibited alkaline cleaners. Unless an etched surface is desired, either for appearance or better adhesion of subsequent finishes, a properly inhibited cleaner should be chosen. Aluminum alloys may be subject to even more complicated electrolytic chemistry and should be carefully supervised even in inhibited cleaning solutions.

Having learned a little about soils and surfaces, we are now ready to enter the technical world of cleaners.