

**Cleaning technology,
much more than machines**

selection of cleaning process

**outline of operating conditions, materials to be treated and result
requested**

Selection of the cleaning process and determination of cleanliness is a prerequisite to the selection of the machine.

In a division of tasks, the first is related to contaminants and affects the result, the second defines and verifies the result.

The machine will realize the process in the best industrial way to achieve the determined level of cleanliness.



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selection of cleaning process

Cleaning processes used for removing soils and contaminants are varied and can be compared for different levels of effectiveness. The processing procedures, equipment requirements, effects of variables, and safety precautions that are applicable to individual cleaning processes have to be carefully examined before selecting the cleaning process.

The "FAST CONSULTANT SERVICE" form is to supply us an outline of operating conditions, materials to be treated and results requested which will enable us to the best service to you and the following notes, even if very concise, may be of help in filling the form

GENERAL CONSIDERATIONS

In selecting a metal cleaning process, many factors must be considered, including:

- ✓ the identification and characterization of the soil to be removed;
- ✓ identification of the substrate to be cleaned and the importance of the condition of the surface or structure to the ultimate use of the part;
- ✓ degree of cleanness required;
- ✓ capabilities of the available facilities;
- ✓ impact of the process on the environment;
- ✓ overall cost of the process;
- ✓ subsequent operations to be done, such as machining, assembling, storing, packing, or to be applied as phosphating, plating and painting.

Very few factors in these analyses can be accurately quantified, which results in a subjective analysis.

Frequently several sequences of operations may be chosen which all produce the desired results. As in most industrial operations, the tendency is to provide as much flexibility and versatility in a facility as the available budget will allow. The size and shape of the largest predicted workpiece is generally used to establish the cleaning procedure, equipment sizes, and handling techniques involved.

Because of the variety of cleaning materials available and the process step possibilities, the selection of a cleaning procedure depends greatly on the degree of cleanliness required and subsequent operations to be performed.

CLEANING MEDIA

An understanding of the mechanics of the cleaning action is helpful in selecting a process.

SOLVENT CLEANING, as the name implies, is the dissolution of the contaminant by a liquid, such as organic solvents and chlorinated hydrocarbons; for example, trichloroethylene, methylene chloride, toluene, or benzene. The mechanics are accomplished through swabbing, tank immersion, spray or solid stream flushing, or condensation of the vapour phase, as is found in vapour degreasing. Temperature elevation accelerates the activity. One major drawback to solvent cleaning is the possibility of leaving some residues on the surface, often requiring additional cleaning.

EMULSION CLEANING depends on the physical action of emulsification, in which discrete particles of contaminants are suspended in the cleaning medium and then separated from the surface to be cleaned. Emulsion cleaners can be water or water solvent-based solutions; for example, emulsions of hydrocarbon solvents such as kerosine and water containing an emulsifiable surfactant. To maintain stable emulsion, coupling agents such as oleic acid are added.

ALKALINE CLEANING is the mainstay of industrial cleaning and may employ both physical and chemical actions. These cleaners contain combinations of ingredients such as surfactants, sequestering agents, saponifiers, emulsifiers, and chelators, as well as various forms of stabilizers and extenders. Except for saponifiers, these ingredients are physically active and operate by reducing surface or interfacial tension, by formation of emulsions and by suspension or flotation of insoluble particles. Solid particles on the surface are generally assumed to be electrically attracted to the surface. During the cleaning process, these particles are surrounded by wetting agents to neutralize the electrical charge and are floated away, held in solution

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suspension indefinitely, or eventually are settled out as a sludge in the cleaning tank. Saponification is a chemical reaction involving hydrolysis of an ester to produce a soap.

ACID CLEANING is used more often in conjunction with other steps than by itself. Acids have the ability to dissolve oxides, which are usually insoluble in other solutions. Straight mineral acids, such as hydrochloric, sulphuric, and nitric acids, are used for most acid cleaning, but organic acids, such as citric, oxalic, acetic, tartaric, and gluconic acids, occupy an important place in acid cleaning because of their chelating capability.

SUBSTRATE CONSIDERATIONS

The selection of a cleaning process must be based on the substrate being cleaned as well as the soil to be removed. Metals such as aluminium and magnesium require special consideration because of their sensitivity to attack by chemicals.

Aluminum is dissolved rapidly by both alkalis and acids.

Magnesium is resistant to alkaline solutions with a high pH value, but is attacked by many acids.

Copper is merely stained by alkalis, yet severely attacked by oxidizing acids (such as nitric acid) and only slightly by others.

Zinc and cadmium are attacked by both acids and alkalis.

Steels are highly resistant to alkalis and attacked by essentially all acidic materials. Corrosion-resistant steels, also referred to as stainless-steels, have a high resistance to both acids and alkalis, but the degree of resistance depends on the alloying elements.

Titanium and zirconium have come into common use because of their excellent chemical resistance. These two metals are highly resistant to both alkalis and acids with the exception of acid fluorides which attack them rapidly and severely.

SOIL CLASSIFICATION

Types of soil may be broadly classified into six groups:

- ✓ pigmented drawing compounds,
- ✓ unpigmented oil and grease,
- ✓ chips and cutting fluids,
- ✓ polishing and buffing compounds,
- ✓ rust and scale,
- ✓ lapping compounds
- ✓ residue from magnetic particle inspection.

FORM for "Fast Consultant Service"

The form is a guideline to supply us an outline of operating conditions, materials to be treated and results requested which will enable us to identify the problem and possible solutions.

It shall be filled in all parts,. Even parts or information which may appear obvious or indifferent to the reader are essential to define the problem and can determine a wrong answer or not answer at all if uncompleted.

General informative on parts (like "sheet metal, mechanical parts to be decided not important) where precision information is requested (name of parts, dimensions of baskets) can make the definition of the problem impossible.

Cleanliness is often difficult to define but it is determined by the subsequent use of parts. This information is therefore essential for focussing the real necessities.

Organization of the production process is also essential to the definition of the machine, as well as the space available.

Herein enclosed please find two forms you can directly fill and send back by e-mail using Acrobat Reader or print to be filled and send by e-mail. If you prefer a word text in doc format you can download from the internet at "Fast consultant service"



"fast consultant service"

Mark ✓ and fill up this form in all its parts, print and return by fax to +39.055.720398

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OUTLINE OF OPERATING CONDITIONS, MATERIALS TO BE TREATED AND RESULTS

Requested by (company name)

Information about parts to be cleaned

Technical name of parts (e.g. gears, shaft, pinion)

Materials		Surface		Shape	
Dimensions	minim mm.....XXH		max. mm.XX		H
Weight	min. Kg....		max Kg.....		
To be washed					Quantity per shift / 8h Nr

Further information
about parts to be cleaned

Basket / pallet	mm.	X	X	H	Full weight Kg.	Quantity per shift / 8h Nr
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Further information
about baskets, pallets

information about the process

Main process	Afterward treatment
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Contamination to be removed

System presently used and results obtained
(Please specify all the information in details)

Preferred system	May the treatment be effected by immersion?
Expected results	
Cleanliness requirements	
Method of verification	

Further information, specifications and requests (please!)

Operating conditions			
Energy (available)	Electric V. ... Hz 3ph	Compress. air	Heating

Further information
about energy and heating

information supplied by

Name	Title	
Full address		
Telephone	Fax	E-mail