

## **DIRECTORATE GENERAL BORDER ROADS**

### **GENERAL MAINTENANCE INSTRUCTION NO. 134**

#### **ON**

#### **CLEANING METHODS DIGRESSING**

#### **INTRODUCTION**

1. The removal of Oil/Grease from components received for repair/overhaul is a routine requirement in all GREF Workshops Components also accumulate during the course of repair/overhaul, to a greater or lesser degree scale, dirt oil and finger marks which will have to be removed before any satisfactory protective finish can be given to them. Considerable attention has to be paid to the preparation of the base metal which is to receive the protective treatment.

#### **DETAILS**

2. Clean surfaces may be broadly classified under three main headings:-

(a) Generally clean. By generally clean it is understood that a portion of the dirt/grease has been removed but that traces of contamination are in all probability still remaining. Such cleaning may be produced by mechanical means and also by certain in chemical methods, such as acid picking.

(b) Grease free. 'Grease free' is understood mean a completely oil and grease free surface generally produced by an efficient solvent degreasing treatment but which in all probability presents a surface still retaining traces of scale and surface oxides.

(C) Chemically clean. Chemically free surfaces are those from which all surface contamination such as oil, dirt, scale etc has been removed. These are very difficult to obtain and are not generally required in GREF Workshops.

3. Degreasing is necessary before derusting and subsequent preservative treatment as the grease is on the surface only any scale, rust or oxide of the metal is in intimate contact with the metal itself. It follows, therefore, that metallic articles must be freed of the grease prior to processes for removing other surface contamination. Greases may be classified under general headings:-

(a) Mineral oils such as petroleum type lubricants (non-saponifiable).

(b) Vegetable and animal oils and fats (Saponifiable).

(c) Sulphonated or sulphurous oils.

(d) Chlorinated oils.

(e) Mixture of any of the above.

4. Specifiable oils are those oils, which normally can be turned into soap or soap products by treatment with alkali. They normally combine with alkali to form soap or soap product. Non-specifiable oils are most easily removed by organic solvent degreasing, generally they will not dissolve out in chemical solution degreaser, although they may to some extent be removed by emulsification. On the other hand, saponifiable oil may be broken down and dissolved by emulsification, what generally or not so readily removed by the unusual organic solvent degreasing methods.

### **LIQUID ORGANIC SOLVENT DEGREASERS**

5. For removing heavy deposits of oil and greases on work. A common method is to immerse the parts in organic solvent, such as petroleum, benzene, white spirit etc, which are very efficient but which suffer from the serious disadvantage of being highly inflammable and of course, constitute a fire risk. Further more, on parts of intricate shape there is a danger of the degreasing medium being carried over with the work, giving rise to trouble on following processes.

6. For this reason, non-inflammable chlorinated hydrocarbons such as trichloroethylene or perchloroethylene have many advantages and can, of course, be used warm if adequate precautions are taken. It cannot be stressed too strongly that in any process involving organic solvents great regard must be paid to the toxicity of such compounds, particularly when using chlorinated hydrocarbons of the trichloroethylene type which, when heated above the recommended heating limit form corrosive hydrochloric acid. Further, with these compounds a stabilizer is incorporated in the solvent itself to eliminate the possibility of corrosion in the container.

7. The majority of the trouble which can arise with organic solvent degreasers in liquid form due to carry over, can be almost completely overcome if vapour degreasing is used. This process gives extreme flexibility and not only can it be used for all metals, but with certain limitations for almost all size and shape of components. The system comprises a tank which contains a comparatively small quantity of the degreasing solvent in the bottom, means being provided for heating the solvent, in order to create the vapour. A bank of condensing coils are provided at the top to prevent escape of solvent vapour. On applying heat to the solvent, vapour will be formed which will rise and fill the space between the liquid level and the condensing coils, the solvent condensing and following back into the section of the bath on reaching these condensing coils.

8. The scheme of operation normally employed with batch loading plants is to have some form of hanging jig from which the work to be degreased is suspended in a basket into bath. As the work enters the vapour chamber, a proportion of the solvent condenses on the component and washes off the grease. At the same time, the parts being processed are warmed so that on withdrawing from the bath no solvent is left, the work-pieces remaining clean and dry.

Contd....P/3

9 The great advantages of organic degreasers over the petroleum type are that the solvents normally employed, that is trichloroethylene and perchlorethylene, have a low surface tension which allows penetration into parts of intricate form with good wetting of the surfaces, and a low specific heat and latent heat of vaporization, giving low that of air in place of organic solvent degreasing methods, heat inputs and quick condensation, high vapour density, in the case of trichorethylene approximately 3 times, it is sometimes preferable to use emulsion type cleaners or alkali cleaners.

10. Emulsion degreasing. Emulsion cleaners are normally based on petroleum or coal tar solvents with an emulsifier, so that emulsion is formed with water. These are used either for tank type dip treatments or for spray cleaning. Also, particularly with spray type plants, paraffin in an aqueous alkaline solution is widely used. Whilst emulsion cleaners are perfectly suitable for generally clean and 'grease free' conditions, if "chemically clean" surface is required then it is necessary to follow emulsion cleaning with alkali degreasing or vapour degreasing. Normally emulsion cleaners work at water temperature without the application of heat, though in some cases accelerated conditions can be obtained by the use of heated tanks.

11. Alkali cleaning. Alkali cleaning mediums usually have a basis of caustic potash and soda ash with the addition of such materials as sodium phosphates, silicates, borax, organic phosphates, organics emulsifiers and synthetic wetting agents. The mechanism of operation of these solutions is by the saponification of vegetable oil and greases, and the emulsification of these and mineral oils. Wetting agents are included in order to ensure that the whole of the surface area of the work piece completely wet remove surface contamination and to provide a film-free surface. It is, of course, necessary to have following rinses after either emulsion or alkaline degreasing tanks, the first tank being of the old type with free running water in order to prevent buildup of alkalinity, the second tank being generally a warm tank.