SECTION 10. FERROUS METALS

6-164. GENERAL. One of the most familiar kinds of corrosion is red iron rust. Red iron rust results from atmospheric oxidation of steel surfaces. Some metal oxides protect the underlying base metal, but red rust is not a protective coating. Its presence actually promotes additional attack by attracting moisture from the air and acts as a catalyst to promote additional corrosion.

a. Red rust first shows on bolt heads, hold down nuts, and other unprotected aircraft hardware. Red rust will often occur under nameplates that are secured to steel parts. Its presence in these areas is generally not dangerous. It has no immediate effect on the structural strength of any major components. However, it shows a general lack of maintenance and may indicate attack in more critical areas.

b. When paint failures occur or mechanical damage exposes highly-stressed steel surfaces to the atmosphere, even the smallest amount of rusting is potentially dangerous and should be removed immediately.

6-165. SPECIAL TREATMENT OF HIGH-STRENGTH STEEL. (High-strength steels heat treated above Rockwell C40, 180,000 psi tensile strength). Any corrosion on the surface of a highly-stressed steel part is potentially dangerous, and the careful removal of corrosion products is mandatory. Surface scratches or change in surface structure from overheating can cause sudden failure of these parts. The removal of corrosion products is required and will be performed carefully and completely.

a. Acceptable methods include careful use of mild abrasive mats, cloths, and papers, such as fine grit aluminum oxide, metallic wools, or fine buffing compounds.

b. Undesirable methods include the use of any power tool because the danger of local overheating and the formation of notches that could lead to failure. The use of chemical corrosion removers is prohibited, without engineering authorization, because high-strength steel parts are subject to hydrogen embrittlement.

6-166. SPECIAL TREATMENT OF STAINLESS STEEL. Stainless steels are of two general types: magnetic and nonmagnetic.

a. Magnetic steels are of the ferritic or martensitic types and are identified by numbers in the 400-series. Corrosion often occurs on 400-series stainless steels and treatment is the same as specified in high-strength steels. (See paragraph 6-165.)

b. Non-magnetic stainless steels are of the austenitic type and are identified by numbers in the 300-series. They are much more corrosion resistant than the 400-series steels, particularly in a marine environment.

(1) Austenitic steels develop corrosion resistance by an oxide film, which should not be removed even though the surface is discolored. The original oxide film is normally formed at time of fabrication by passivation. If this film is broken accidentally or by abrasion, it may not restore itself without repassivation.

(2) If any deterioration or corrosion does occur on austenitic steels, and the structural integrity or serviceability of the part is affected, it will be necessary to remove the part.

6-167. EXAMPLE OF REMOVING CORROSION FROM FERROUS METALS. If possible, corroded steel parts should be removed from the aircraft. When impractical to remove the part, follow the procedure below.

a. Prepare the area for rework.

b. Positively identify the metal as steel and establish its heat-treated value.

c. Clean the area and strip paint if required.

NOTE: Use of acid-based strippers, chemical removers, or chemical conversion coatings are not permitted on steel parts without engineering authorization.

d. Determine extent of corrosion damage.

e. Remove residual corrosion by hand sanding with mild abrasive mats, cloths, and papers, such as fine aluminum oxide grit.

f. Remove heavy deposits of corrosion products by approved mechanical methods for that particular form of steel and/or stainless steel.

g. Inspect the area for remaining corrosion. Repeat procedure if any corrosion remains and the structural integrity of the part is not in danger, and the part meets the rework limits established by the manufacturer or FAA authorized DER.

h. Fair depressions using a blend ratio of 20:1. Clean area using 240-grit paper. Smooth area with 300-grit paper and give final polish with 400-grit paper.

i. Determine depth of faired depression to ensure that rework limits have not been exceeded.

j. Clean reworked area with dry cleaning solvent. Do not use kerosene.

k. Apply protective finish or specific organic finish as required.

NOTE: Steel surfaces are highly-reactive immediately following corrosion removal; consequently, primer coats should be applied within 1 hour after sanding.

l. Remove masking and protective coverings.

6-168.—6-178. [RESERVED.]