

June 02, 2020

LECTURE NO 3

P 1

Prevention of Corrosion:

Corrosion is outcome of rxn between metal and environment.

To control corrosion we have to control either metal or environment, which is not possible.

We cannot remove corrosion

however

We can minimize corrosion

either by controlling

→ Metal

or

Environment

In Nature of metal, following factors are responsible for affecting the rate of corrosion. P(2)

These include

- i) Purity of a metal
 - ii) Physical state of the metal
 - iii) Nature of the oxide film
 - iv) Position in the galvanic series
 - v) Relative area of anode and cathode
 - vi) Solubilities of products of corrosion.
 - vii) Volatility of corrosion products
-

(3)

In case of Nature of Environment, following factors are

responsible:

1. Temperature
2. Humidity
3. Effect of pH
4. Nature of electrolyte
5. Conductance of corroding medium
6. Formation of oxygen concentration cells.
7. Presence of suspended particles in atmosphere.
8. Presence of impurities in ~~atmosphere~~ atmosphere.

4


Prevention of Corrosion by Material selection and Design

Design

1. Design is the initial stage for protection against corrosion.

2. For Design factors to be taken into consideration are:

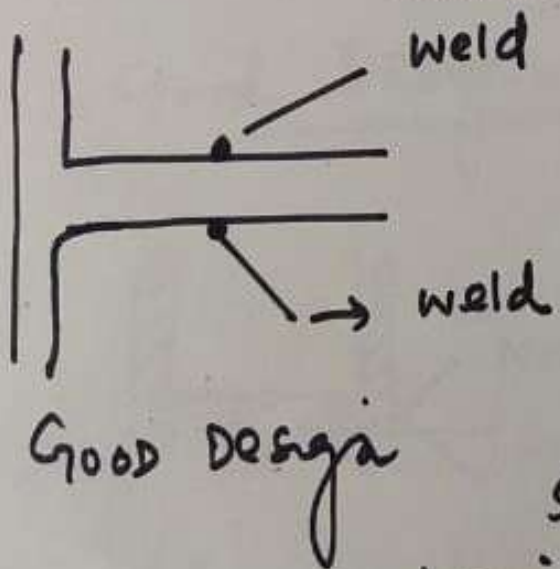
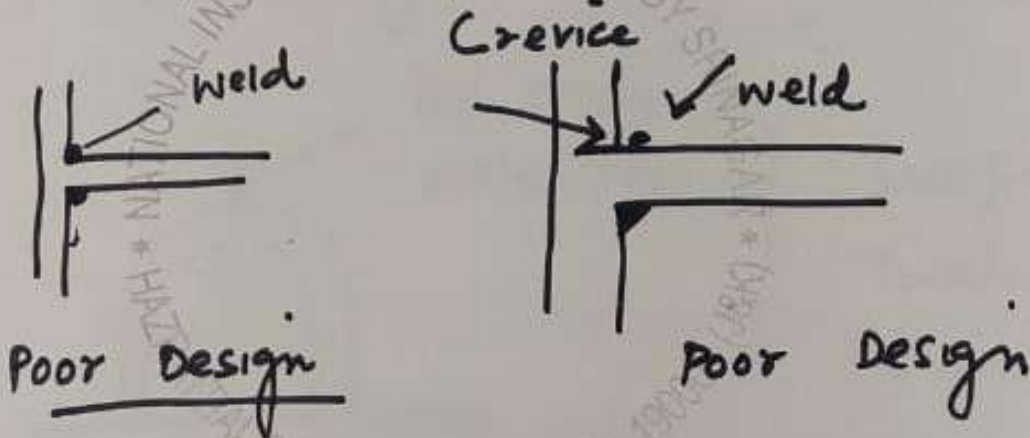
- a. Constructional material
- b. Atmosphere
- c. Environmental conditions.
- d. Accessibility for maintenance & repair

2. 

5

Design & Material selection:

1. Avoid L, T & U shaped profiles in construction as far as possible.



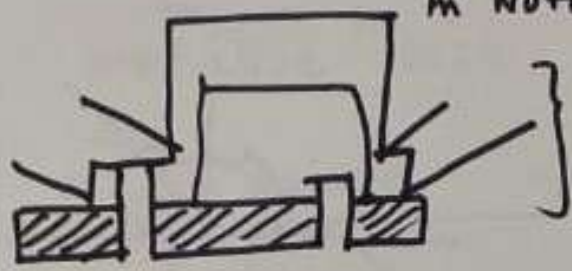
Reason

1. More number of angles, corners edges & internal

surfaces in any design, surface treatment is more Difficult.

Water collection
in notches

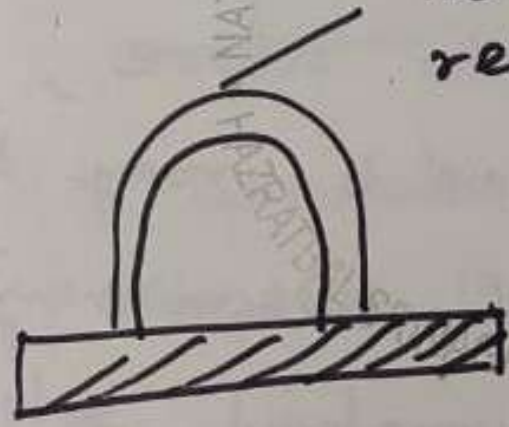
⑥



Water Retention
&
Treatment is
not easy so

Poor Design

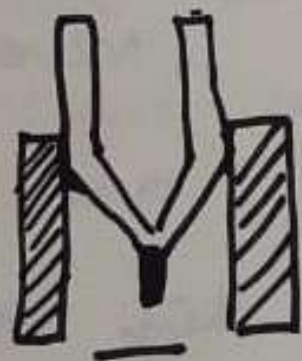
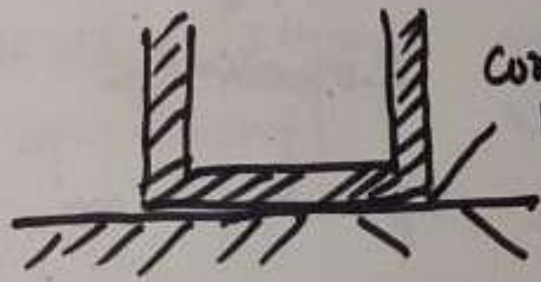
No water
retention



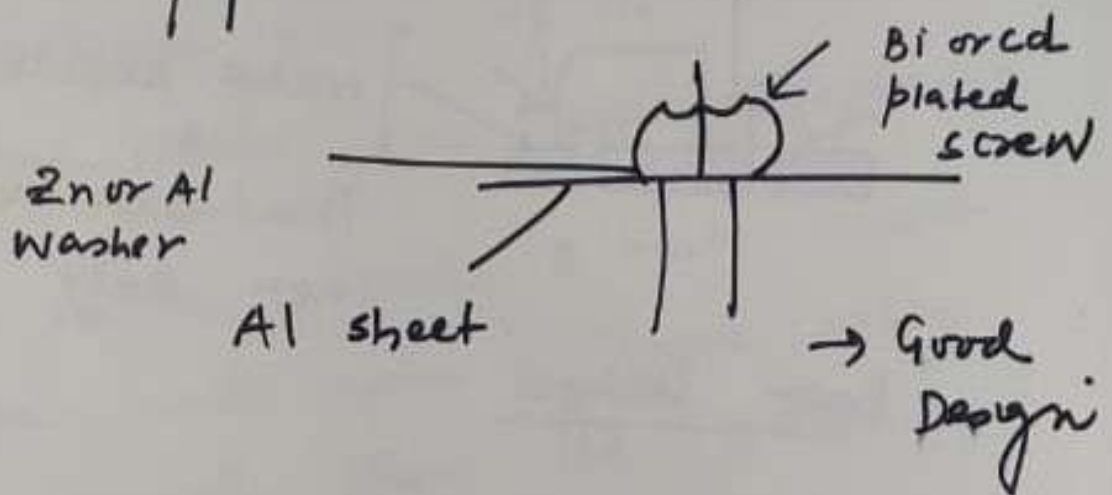
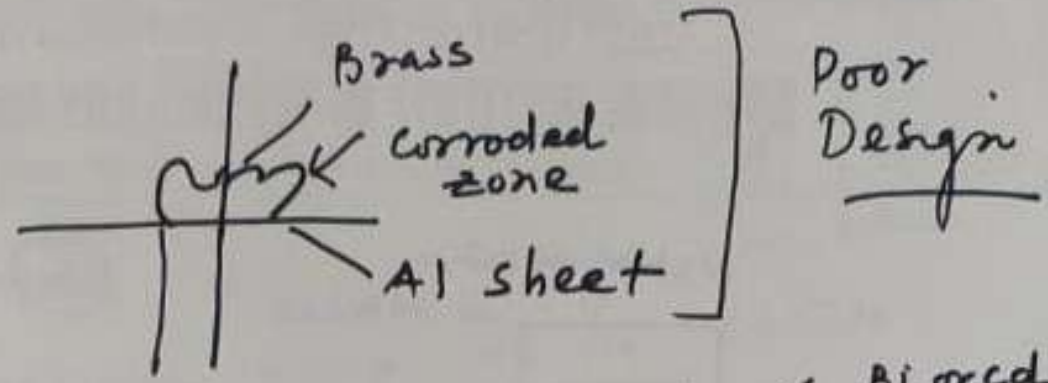
Surface
Treatment
is easy

Good Design

Corrosion
More



Less Corrosion



In addition to above, following methods may be also opted for minimizing corrosion by material selection.

1. Never join different metals and alloys, especially if they are far apart in the galvanic series. If at all they are to be used, insulate them with efficient moisture resistant electrical insulator.

(8)

- Never use a design in which relative size of the cathode and anode are widely different.
- ~~So~~ screws, bolts & nuts must be made from a more noble material than the joined material.
- Continuous welds are more preferable than intermittent welds.
- Avoid improper insulation otherwise Leakage of current takes place. such stray currents cause anodic corrosion;

- ⑨
- Avoid Contact of metallic Objects with moisture.
 - Design should support zero retention of moisture. Even if moisture is there, aeration and self cleaning should be through that Design.

- Design of storage Containers should allow easy draining out & cleaning.

- Arrange profiles in a way that water is completely drained
- Avoid crevice corrosion
- Avoid design where stress, & pitting and localised corrosion.