

## Maintenance strategy

Maintenance is necessary if the stability and functionality of the steel construction are to last as long as the expected technical life.

Many factors can modify maintenance costs and conditions.

The plant subject to the protection treatment could, after some time, be used for something other than the use than was initially planned, which leads to a change in anti corrosion requirements.

Also, environmental regulations, new technologies in paints and new developments in surface preparation and painting might alter the whole maintenance procedure.

### Maintenance in the project stage

Already in the project stage corrosion and maintenance costs can be reduced regardless of the choice of the right protective system.

Corrosion phenomena generally start in areas such as cavities or corners where water or dust are easily collected, without any drainage opportunity. A skilled designer can always change the type or the position of the sections, to avoid such drawbacks.

All surfaces exposed to corrosion should be within easy reach, in order to allow simpler inspections and maintenance.

When applying the first protection, all of the surface areas where corrosion usually begins (bolt heads, nuts, corners and section edges, cracks) should be stripe coated with the same primer as planned, in order to guarantee also in these areas the complete thickness requested by the specifications.

### Procedure for maintenance planning.

When specifying paint systems for maintenance, various objects and conditions have to be considered. It requires a total and systematic approach to ensure service life of the structure is extended or to avoid mistakes that have been done in previous painting activities.

Inspection of the existing paint condition will lead to a maintenance advice. This advice may not only suggest a paint system but also point out structural details or imperfection in design that are prone to corrosive attack.

### Intact coating

Provided that adhesion is sound, the system does not require any intervention, unless a reduction of thickness has been noticed indicating that recoating might be convenient. In this case, the existing layer makes an excellent primer for the maintenance coating.

Essential is to check the compatibility with the foreseen fresh paint system by applying a test patch first.

In cases where the old system is very hard, it is advised to abrade the surface either by hand/power tools or by abrasive blasting. Thorough high-pressure fresh water cleaning is always required in order to remove salts and other contaminants.

### Exposed substrate and/or paint defects

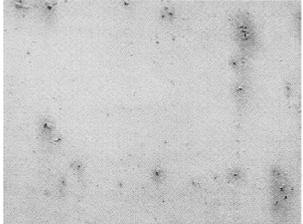
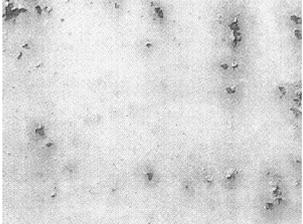
It is important that before actually starting the maintenance the reasons for the breakdown are clear and recognized. Structural failures in design or imperfections in steelwork such as rough weld seams, sharp edges etc have to be dealt with otherwise painting is a waste of money.

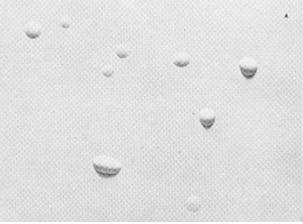
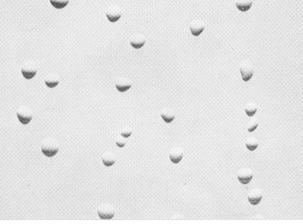
Paint defects such as blistering, cracking and delamination of existing paint systems have to be treated properly in order to stop further deterioration.

Although not a set rule, experience has learned that at a certain level of defects it is better to repair to whole area rather than to repair the defected areas only (spot repair).

**Cracking** is usually caused by a wrong selection of paint system for instance when a hard coating is applied on top of a soft coating. Alternatively, cracking might occur when minimum recoating times are not observed. Cracking might also be the logical result of years of weathering without any maintenance carried out. Since in general the whole area is affected, repair has to be done accordingly.

**Delamination** can be caused by contamination between layers due to for instance long periods in recoating or spillage of chemicals by work carried out in the vicinity of the area. Incompatibility between the old and new coat due to solvent and/or binder incompatibility is a possible reason for failure too. Finally, paint applied too thick or temperature changes may lead to internal stress resulting in detachment and/ or cracking. The decision for spot- or full repair is dependent on the reason why delamination took place. It may be necessary to repair the whole area when breakdown of yet intact areas can be expected. Otherwise as a rule of thumb spot repair is done when less than 15% of the total area is affected.

<b>Rusting</b>	<b>Possible causes</b>	<b>Visible example according to ISO 4628/3 (*)</b>	<b>Maintenance strategy</b>	
	<ul style="list-style-type: none"> <li>• Presence of salts</li> <li>• Inclusion of grit particles</li> <li>• Low coating thickness</li> <li>• Aggressive chemicals</li> <li>• Mechanical damage</li> </ul>	 <p><b>Re3 – 1% of corrosion.</b></p>	Below Re 3	Spot repair
		 <p><b>Re4 – 3% Corrosion</b></p>	Re3 – Localised Re3 – Scattered Re 4 and above	Spot repair Total repair Total repair

<b>Blistering</b>	<b>Possible causes</b>	<b>Visible example according to ISO 4628/2. (*)</b>	<b>Maintenance strategy</b>	
	<ul style="list-style-type: none"> <li>• Presence of salts or other contamination under or in the paint system.</li> <li>• Low dry film thickness</li> <li>• Contact with chemicals/ wrong paint selection.</li> <li>• Cathodic over protection</li> <li>• Solvent retention</li> </ul>	 <p><b>Size No. 2 – Few.</b></p>	Affected area below 3% and localized.	Spot repair
		 <p><b>Size No.2 - Medium</b></p>	Affected area above 2% scattered Affected area above 3%	Total repair Total repair

(\*) These pictures were reduced in size. For assessments in practice the original ISO standard 4628 should be used.

### Important details.

- When using power tools such as wire brush or sanding discs, avoid extensive cleaning of a single spot as it will only polish the steel instead of roughening it.
- It is important to pay attention to weld seams and edges, as neglectance of these areas will result in preliminary coating breakdown. Sharp edges of steel plates needed to be rounded off, weld seams must be smooth and weld splatter to be removed.
- Avoid paint application under adverse conditions such as strong winds as it leads to dry spray, poor levelling and higher consumption of paint.
- In complex steel structures, weld seams, nuts and bolts, corners and edges must be stripe coated prior to a full-coat application.
- Observe at all times technical instruction as given on datasheets and/or by technical supervisors. Take notice of the health and safety regulations and act accordingly.
- In case of doubts about the quality of surface preparation, application methods, use of paints and thinners or safety instructions: never jump to assumptions but consult the responsible inspector on duty or get in touch with your local Transocean representative.