CORROSION PROTECTION

Corrosion causes great damage due to material loss. That is why it is necessary to protect material against corrosion.

It is possible to categorize methods of corrosion protection into several groups:

1. **Protection by suitable selected material**
   There are alloyed steels, for example with chromium, which are more resistant against corrosion. According to the kind of stress and type of corrosion environment it is necessary to carefully select steel, which doesn’t have a tendency to corrode in specific conditions.

2. **Protection by suitable structures or production technology**
   It is necessary to limit the formation of galvanic micro- and macro-cells, which speed up the course of corrosion. In regards to structure durability it is possible to add surplus material against corrosion, which ensures the stability of the structure during its entire life.

3. **Protection by changing the corrosive environment**
   This deals with reducing the concentration of matter, which speeds up the course of corrosion, for example reducing moisture in an environment, the treatment of industrial water, adding corrosion inhibitors to heating systems, and other operations.

4. **Electrical-chemical protection against corrosion**
   It is used as protection against corrosion, which is formed by stray currents close to electrified lines. Stray currents cause the corrosion of metal piping and wiring placed in the ground.

   **By sacrificial anode** – the anode is of lesser noble material

   ![Sacrificial Anode Diagram]

   1. Conductor
   2. Protective piping
   3. Sacrificial anode

   **By the source of external current** – the anode is from the same material as the protective piping and the source of the current directs the flow of electrons so that the anode melts.

   ![External Current Diagram]

   1. Current source
   2. Protective piping
   3. Auxiliary anode

5. **Protection against corrosion using coatings**
   It is possible to categorize coated materials according to their function into several groups:
a) Coats fully isolated from the corrosion environment

- Plastics
  - Thermoplastics
  - Elastomers
  - Reactive plastics

Isolation of pliers  Plastic-coated wire fence  Teflon-layer covered piston

- Enamels
  Enamel is borosilicate glass, which has a compact layer created as its coat. For example, it is used in the food processing industry for health sanitariness.

Enamelled kitchen sink

- Tar and asphalt
  These substances are used for hydro-isolation coats, which protect against atmospheric corrosion.

- Metal coatings
  With an electrical-chemical potential higher than the electrical-chemical potential of the protected material - for example the coating of tin.

b) Protective coats on the basis of an electrical-chemical function

Zinc coating
Zinc is melted and ZnOH is created. It fills in a crack so that it does not lead the surrounding environment to a protected metal with a higher electrical-chemical potential.

c) Coats containing corrosive inhibitors – paints

It is possible to categorize paints according to many points of view:
- according to the number of layers: single-coated or multi-coated (the base coat contains corrosion inhibitors and the upper layer is permeable)
- according to drying temperature: coats can dry in normal or higher temperatures, or are baked
- according to the drying mechanism: physical, chemical or physical-chemical drying

Coating with paint:
Before painting, it is necessary to carefully delubricate a surface, to remove a corrosive layer by jet-spraying, or pickling and other operations.

Methods of coating with paints:
- By painting using a paint brush or roller
- By spraying
- By soaking
- By rolling up on a sheet
- By spraying powdered paint in an electric static field and the consequent baking of the coated layers

Literature and sources used: Hluchý a kolektiv: Strojírenská technologie 2, SNTL, Internet, Interní odborné texty SPŠ
VOCABULARY

bake vypalovat
base coat základový nátěr
cell článek
cell coat, coating nátěr, natírání
conductor vodič
corrosion koroze
corrosive korozní
crack trhлина
current proud
drying zasychání
due to kvůli, vlivem
durability životnost, trvanlivost
enamel smalt
ensure zajistit
fill in vyplnit
inhibitor inhibitor, zpomalovač
jet-spraying otryskání
melt tavit, tavenina
moisture vlhkost

noble ušlechtilý
permeable propustný
pickling moření
piping potrubí
pliers kleště
protect chránit
protection ochrana
remove odstranit
sacrificial obětovaný
soaking namáčení
source zdroj
speed up zrychlovat
stray bludný
suitable vhodný
tar dehet
tin cín
wire fence drátěný plot
wiring vedení, rozvod

COMPREHENSION QUESTIONS
1. What do you know about corrosion?
2. How do we categorize methods of corrosion protection?
3. What is enamel?
4. What methods of coating with paint do you remember from the text above?
EXERCISES
1. Name what you see in the pictures:

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 
2. Match A with B. Then translate the expressions into Czech:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>industrial</td>
<td>a current</td>
</tr>
<tr>
<td>corrosive</td>
<td>b system</td>
</tr>
<tr>
<td>electrical</td>
<td>c protection</td>
</tr>
<tr>
<td>protective</td>
<td>d material</td>
</tr>
<tr>
<td>alloyed</td>
<td>e cell</td>
</tr>
<tr>
<td>heating</td>
<td>f water</td>
</tr>
<tr>
<td>macro-</td>
<td>g anode</td>
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<td>corrosion</td>
<td>h steel</td>
</tr>
<tr>
<td>sacrificial</td>
<td>i inhibitor</td>
</tr>
<tr>
<td>noble</td>
<td>j piping</td>
</tr>
</tbody>
</table>

Then translate the expressions into Czech:

1. industrial a current
2. corrosive b system
3. electrical c protection
4. protective d material
5. alloyed e cell
6. heating f water
7. macro- g anode
8. corrosion h steel
9. sacrificial i inhibitor
10. noble j piping
EXERCISES – KEY FOR TEACHERS

1. Name what you see in the pictures:
   1. crack
   2. paint brush
   3. piston
   4. corrosion
   5. kitchen sink
   6. wire fence
   7. pliers
   8. piping

2. Match A with B. Then translate the expressions into Czech:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Czech Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>industrial</td>
<td>f water</td>
<td>průmyslová voda</td>
</tr>
<tr>
<td>corrosive</td>
<td>i inhibitor</td>
<td>inhibitor koroze</td>
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<tr>
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<td>elektrický proud</td>
</tr>
<tr>
<td>protective</td>
<td>j piping</td>
<td>chráněné potrubí</td>
</tr>
<tr>
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<td>h steel</td>
<td>legovaná ocel</td>
</tr>
<tr>
<td>heating</td>
<td>b system</td>
<td>topení, vytápěcí soustava</td>
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<td>e cell</td>
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<tr>
<td>noble</td>
<td>d material</td>
<td>ušlehtilý materiál</td>
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</tbody>
</table>