**CORROSION**

|  |  |
| --- | --- |
| to harm  to reduce  rust  therefore  stainless steel  layer  oxide  surface  film  to contain  roughly  tube  moisture  to occur  to rivet  damp  purity  dissimilar  common | завдавати шкоди  скорочувати  іржа  саме тому  неіржавка сталь  прошарок  окис  поверхня  плівка  містити  приблизно, грубо  труба  вологість  траплятися, відбуватися  заклепувати  сирий, вогкий  чистота  різнорідний  звичайний |

Corrosion attacks all engineering materials, especially metals. Corrosion is any chemical action which harms the properties of a material. It reduces the life of a material and increases the cost of a structure. For example, a steel bridge must be repaited regularly to protect it from rust. Various metals have therefore been developed to resist corrosion. Among them are the stainless steels. These metals contain from 12 to 35% chromium which forms a very thin layer or film of chromium oxide on the surface of the metal. This film protects the metal from corrosion. Alloys made from copper and nickel are also corrosion-resistant. For example Monel metal, which contains roughly 60% nickel and 30% cooper, is resistant to both fresh and salt water corrosion. It is therefore used for marine engine parts, and for other surfaces which are in contact with sea water. Cupronickels, which contain a smaller proportion of nickel, have a similar resistance to fresh and sea water. They are mainly used to make tubes.

When two different metals touch each other in the presence of moisture, corrosion occurs. This type of corrosion is known as galvanie or electrolytic corrosion because it has an electrical cause. The metals and the moisture act like a weak battery and the chemical action which results corrodes one of the metals. If, for example, aluminium sheets are riveted with copper rivets, the aluminium near the rivets will corrode in damp conditions.

No material can be completely corrosion-resistant. Even stainless steels will corrode. Engineers can, however, fight corrosion. For example, they can use high-purity metals because these metals are more resistant than alloys. They can also make sure that two dissimilar metals are not allowed to touch each other. Finally engineers can protect the surfaces of the metals in many different ways. One of the most common methods is to paint them.

**I. Answer the following questions:**

1. What is corrosion?

2. What kind of materials does corrosion attack?

3. How can different metals resist corrosion?

4. What is Monel metal?

5. What materials are used for making tubes? Why?

6. How does galvanie occur?

7. How can engineers fight corrosion?

**II. Match synonyms:**

|  |  |
| --- | --- |
| to harm  to protect  roughly  to rivet  moisture  common  to contain  film | to shelter / to shield  ordinary  to comprise  to clinch  approximately  lamina  humidity  to damage |

**III. Make word-combinations:**

|  |  |
| --- | --- |
| engineering  corrosion  chromium  damp  chemical  dissimilar  electrolytic | material  action  corrosion  resistance  oxide  metals  conditions |

**IV. Translate into English.**

1. Термін "корозія пластмас і гум" використовується у випадку втрати експлуатаційних властивостей цих матеріалів.

2. Корозієстійкими деякі матери стають у сплавах з іншими металами.

3. Корозія металів – це руйнування металів у випадку їх хімічної або електрохімічної взаємодії.

4. Хромування, нанесення шару хрому, проводиться для захисту металу від корозії або для збільшення твердості поверхні.

5. Зазвичай сплави, створені з міді і нікелю є корозієстійкими.

6. Монел метал часто використовується у морському машинобудуванні завдяки своїй стійкості до впливу солоної води.

**FRICTION**

|  |  |
| --- | --- |
| friction  to oppose  motion  lubrication  completely  to remove  slightly  static friction  to overcome  sliding friction  plank  to lessen  smooth  brake pad  to exert  to wear down  to double  to halve | тертя  чинити опір  рух  мастило  повністю  видаляти, усувати  злегка  статичне тертя  долати  тертя ковзання  дошка, планка  зменшувати  рівний, гладенький  гальмівна колодка  викликати  зношуватися  подвоювати  зменшувати |

Whenever one surface moves one another, a force is set up which resists the movement. This force, which we call ***friction***, always ***oppose***s ***motion***. It exists in every machine. It can be reduced by lubrication but never completely removed. In general, the force opposing motion is slightly greater before one surface starts moving over another surface than after movement has started. This slightly greater force is called static friction. The force which must be overcome to keep one surface moving over another is known as sliding friction. Static friction is greater than sliding friction.

The value of sliding friction depends on the nature of the two surfaces which touch each other. Thus friction between two rough planks can be lessened if they are made smoth. Sliding friction is independent of the area of surface in contact. In theory a small brake pad will exert as much braking force as a large one of the greater surface area. In practice a small pad will wear down quickly and therefore is not used. One other law of friction should be noted. We can make the normal reaction between two surfaces in contact twice as large by doubling the mass carried by one surface. If we do so we find that sliding friction between the surfaces is also doubled. If we halve the mass carried, sliding friction is also halved. This shows that sliding friction is proportional to the reaction between the surfaces in contact.

**I. Answer the following questions:**

1. What is corrosion?

2. What kind of materials does corrosion attack?

3. How can different metals resist corrosion?

4. What is Monel metal?

5. What materials are used for making tubes? Why?

6. How does galvanie occur?

7. How can engineers fight corrosion?

**II. Match synonyms:**

|  |  |
| --- | --- |
| to harm  to protect  roughly  to rivet  moisture  common  to contain  film | to shelter / to shield  ordinary  to comprise  to clinch  approximately  lamina  to damage  humidity |

**III. Make word-combinations:**

|  |  |
| --- | --- |
| engineering  corrosion  chromium  damp  chemical  dissimilar  electrolytic | material  action  corrosion  resistance  oxide  metals  conditions |

**IV. Translate into English.**

1. Зазвичай, тертя усувається використанням мастила.

2. Тертя, як правило, відбувається на границі контакту двох твердих тіл.

3. Статичне тертя може запобігти ковзанню об’єкта вниз по похилій поверхні.

4. При терті, поверхні багатьох тіл заряджаються, що свідчить про електростатичну природу тертя.

5. Явище внутрішнього тертя у рідинах і газ називається в’язкістю.

6. Негативними наслідками тертя ковзання в механізмах є не тільки зменшення ККД, а й знос механізмів.