

Professional scientific sessions for art, architecture and urban planning Thursday evenings

Held in: Conference hall of Herampey Consulting Engineers

Date: 03.09.2015

Title: The corrosion phenomenon on the buildings and marine structures in the southern Iran

Speakers and panel members: Mr. H. Moslehi and Mr. H. Messqali

The first speaker was Mr. H. Moslehi began his speech explaining the phenomenon of corrosion. The corrosion is a measurable reaction of iron or steel in its sphere that causes damages, reducing or cancelling its characteristics and properties. The corrosion or the effect of rusting of the iron or steel is called also oxidation that has three types that are iron oxide FeO, iron oxide Fe₂O₃, and iron oxide Fe₃O₄. These three types are the most known. The corrosion is an electro-chemical phenomenon, that in some parts of iron they use to free two ions. Mr. Moslehi explained that in environments where oxygen or water are present, half of the oxygen or water is combined taking the place of the lost electron and causing the phenomenon of corrosion.

There are different types of corrosion. One type is when the surface of iron is rusted, another type is when a whole type corrosion occurs, and another type of corrosion is when the corrosion causes cracks because of tension traction in the iron. Another type of corrosion is caused by temperature stresses when welding operations are realized. What permit the corrosion process is the environment, humidity and presence of water sources. Oxygen, chemical salts, electrical flows, increase of temperature, wind and crystal changes are other causes for corrosion. The corrosion of iron and steel in the buildings structures can be divide in three groups: corrosion of iron and steel in iron structures, corrosion of iron and steel in concrete structures, and corrosion of iron or steel in reinforced soil.

Mr. Moslehi explained that to avoid the corrosion is necessary to use special type of iron, than preventing the phenomenon and the last action will be the prevention and restoration. There can be three ways to prevent the corrosion that are the active, inactive and the combined ways. The mentioned third way is the one used in the marine structures. In marine structures because of the phenomenon of ebb and flow, when the bases are continuously dried or wetted, the movement of oxygen causes the corrosion effect on the structures.

Mr. Moslehi shown pictures of corroded structures in Tehran, like the Nature building and its corroded connections.

The second speaker was Mr. H. Mesqali began his speech telling that the maintenance of the structures must begin from the first day of their construction. Having a maintenance program the damages will be limited and reduced. The use of long lasting concretes, having the appropriate components suitable for the southern parts conditions, must be considered seriously. There are

different types like sulfate aggression, chloride aggression, carbonization, alkaline reaction. There are also physical corrosion like the icing or defrosting, the abrasion, the erosion or the vacuum effect.

The signs of corrosion caused by the ion of chlorine are erosion and dimple effect, increase of the iron reinforcements because of rust, so the crack of concrete is the most usual damage in the reinforced concrete. This situation causes the extinction of the alkaline environment and the passive action of concrete. In the pre-span concrete because the iron is under tension it is subject corrosion that is more dangerous.

Mr. Mesqali explained that in order to reduce the corrosion we must use elements in the concrete that reduce the corrosion effect. These materials must have the necessary quality, dimension and form. The principal component of the concrete are the water and cement. The quantity of the aluminate calcium decides the level of the chloride penetration in the concrete. The use of appropriate water that retards the formation of the concrete is another solution for the problem. The added components useful for the southern areas are: the use of lubricants and super lubricant materials that cause a retard in the formation of the concrete, using also a reduced quantity of water.

The most important reason of the destruction of the structures are the iron fittings. If water, oxygen and the salts penetrate the structure causing the rusting of the fittings the structure is in danger. Of course the methods to transport and apply the concrete are important factors.

Ending his speech Mr. Mesqali shown some cases of corrosion in the southern ports' structures.