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THE INVESTIGATION OF CORROSION PROBLEMS, PRECAUTIONS AND THE NEW SYSTEMS REGARDING TO THE HUMAN HEALTH IN AUTOMOBILE INDUSTRY

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ABSTRACT
In every part of our life and in every division of the industry, the corrosion is one of vital problems. It becomes a subject for research and progress in the automotive sector. Based on the knowledge that the lifetime is the most important insurance that is given to the customers by the firms in a though competition, the prevention of corrosion occurs depending on the environmental protection factors and the utilization of new technology. Necessary importance should be given to the human health and the production of vehicle according to the climate changes.
On this study, primarily the types of corrosion in the automotive industry has been investigated and then the data of corrosion process and the protection concepts of corrosion have been given. Mostly the dynamic corrosion program and tests that have been applied to the test vehicle took place. And then the process of surface cathodic deep dying and the development of establishment have been mentioned. Lastly, the systems for the prevention of the corrosion with the environmental protection factor determined.
The usage of test vehicle met with all the corrosion problems that normally do not happen, the region of corrosion can be easily determined and all the preventive precautions can be taken before corrosion occurs. Nowadays the advanced isolation techniques such as the phosphatising, the surface process, the cathodic deep dying, the coating of surface and the other protection concepts that realize the techniques to continue by the constructive application, the successful results on the surfaces of the vehicles have been taken.
Keywords: Corrosion, dynamic corrosion program, phosphatising, cathodic deep dying, isolation techniques.

1. INTRODUCTION
Corrosion that is the biggest problem in every field of the competitive and continuously-developing automotive industry as in every branch of the metal industry is a field which is a subject of the most intense research and development studies. Automotive industry tries to take a series of precautions against corrosion by using more resistant materials to corrosion, working on painting and plating techniques and developing new protecting, plating and painting materials for this purpose without ignoring the environment factor and creating designs which ensures the minimum exposure level to corrosion.

The dynamic corrosion test applied to the vehicles causes abnormal corrosion problems in test vehicles and enables to take precautions for the parts of the vehicle having the risk of corrosion. Anodic and cathodic immersion paint technologies are also developed for eliminating the corrosion

problems in the unreachable parts of the constructive structures of vehicles. While these studies are carried out, created with an environmental consciousness, the solutions, which not only have no adverse effect on environment protection and human health but also create more positive working conditions, are found highly acceptable in both industry and academic studies.

2. THE TYPES OF CORROSION IN AUTOMOTIVE INDUSTRY

The vehicles' most vulnerable parts to corrosion are the components forming the body and the parts directly contacting with outer environment. Therefore, the vehicles are exposed to different kinds of corrosion depending on the environment in which they are. Uniform or general corrosion occurs as a general wasting away of metal from the open surface of the material of the part. Crevice corrosion occurs due to the holes caused by the intense assembly procedures or the possible gaps between the connections in especially bus manufacturing. Galvanic corrosion is caused by the contact between the steel and aluminum, which are the most common metals used in automotive industry, as well as their contact with an electrolyte. Layer corrosion is a crevice corrosion type which occurs on the bottom of the automobile, fenders and shroud surfaces.

Figure 1. The examples of corrosion occurring on the parts of vehicle directly contacting with outer

3. THE PRECAUTIONS OF CORROSION IN AUTOMOTIVE INDUSTRY

3.1 The precautions necessary to be taken for preventing corrosion on the automobile structure

The most common corrosion problems are as follows: preventing from area-hole corrosion through protective layers (zinc, phosphatising, KTL, insulating materials, wachs); preventing gap corrosion by designing seams/additional procedures; preventing hole corrosion by determining the locations of profiles and discharge holes; and preventing galvanic corrosion and cavitation corrosion in the piping system by selecting right raw material and insulation.

3.2 Lubricating

For short time corrosion protection, steel parts can be lubricated and during this procedure, it is important to remove the grease on the receiver. Therefore, grease must not become resinous during storage or transformation.

3.3 Phosphatising

For short time corrosion protection, steel parts are lubricated. Phosphate layer serve as retention layer for following paintings.

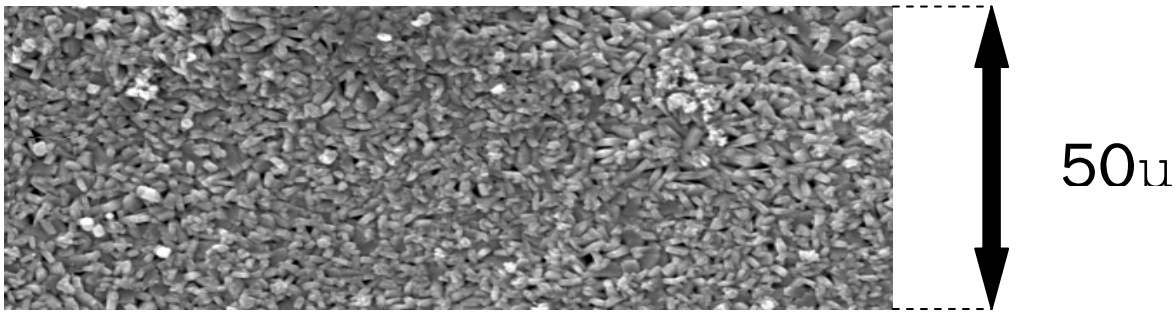

Figure 2. The zinc phosphate layer under microscope

3.4 Zinc Plating

In flame zinc plating, the work piece is treated in a melted zinc bath. Flame zinc plated plates are preferred for especially bus structure.

3.5 Powder Coating

A zinc phosphatising treatment followed by powder coating treatment is an alternative for KTL (cataphoretic immersion painting). In this method, electrostatically charged powder coating is sprayed onto the work piece. The powder dried in a burner is melt and forms a closed thin layer. Finally, a chemical reaction occurs thanks to a network-like structure contained in the powder coating. Powder coating is used for coating the baggage carriers in the buses.

4. DYNAMIC CORROSION PROGRAMME APPLIED TO THE VEHICLE SELECTED AS CORROSION TEST VEHICLE IN BUS MANUFACTURING

The vehicle whose body and assembly is specially-produced for a study including the applications, problems and the results of the precautions to be taken is subjected to a 12-weeks dynamic Nfz-corrosion program.

Test bus is dynamically loaded to environment chamber (Operating the doors and covers). 5 tours is taken on the bad road with salted water flow on a one way line. Daily drive simulation is applied. All tools are heated and brakes are loaded. A continuous drive is made along 90 kms. Mixed salt is sprayed onto the vehicle in salted fog chamber. This and similar treatments are repeated.

5. THE SYSTEMS DEVELOPED CONSIDERING THE ENVIRONMENT PROTECTION FACTOR

Ultrasonic washing systems are developed for ensuring to minimize the solvent-based materials, which have harmful effects on environment and human health, in the procedures which are applied during solvent-washing and drying treatments applied to the vehicles and parts before coating; to ensure that no corrosive effect occurs under the coating layer of the vehicles and parts after coating treatment by ensuring a complete and clean drying treatment without remaining solvent on the vehicles and parts washed after treatment.

EVD system designed and developed by Branson Ultrasonics shows the ultimate level to which the ultrasonic cleaning systems are reached. VD system is systems operated by the approved, environment-friendly solvents. Solvent consumption is very low since the solvent used is filtrated and recycled by distillation method. Due to the fact that PVC has handicaps such as low resistance to corrosion and negative effects on human health, environment protection factor, reducing the weights of the vehicles, PVC based materials, which are used as sealing compound for the lower coating and other parts of the vehicle, are given up and two-components polyurethane (PU) based materials are started to be used.

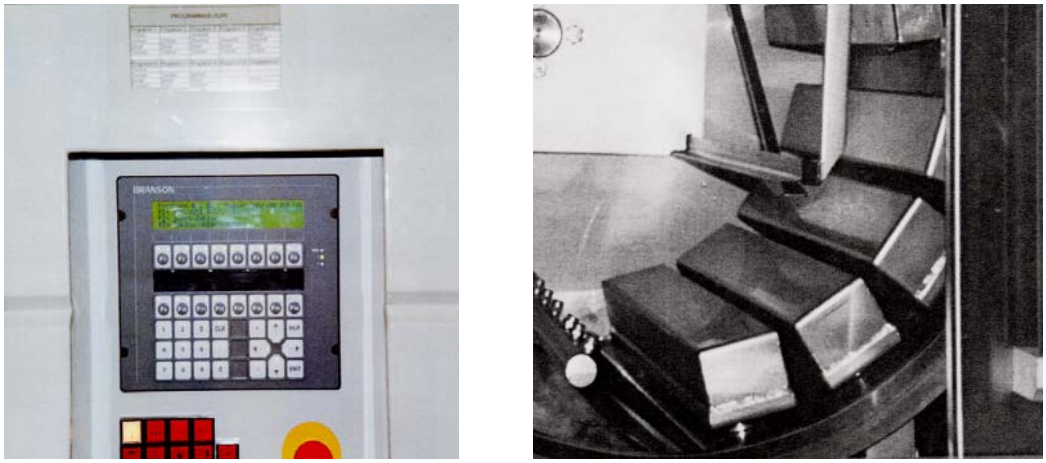

Figure 3. The element of automatic programme of EVD system and ultrasonic parts

6. CONCLUSION AND SUGGESTIONS

In automotive industry, a test vehicle having such properties that can serves as basis fort the vehicles manufactured is selected and a versatile dynamic corrosion test is applied to this vehicle fort the purpose of taking precautions against the potential corrosion problems to be emerged due to the outer reasons when the vehicles manufactured by serial production enter into traffic in future. The purpose here is to determine the parts which are vulnerable to corrosion and the precautions to be taken. At the end of the test, the parts which are sensitive to corrosion and require precautions are found out and the necessary special coatings are made. For example, it is decided to develop an additional coating since the zincification on the lateral carriers, the cable connections to the rear axle and the coating plates on the steering columns are insufficient. Insulating material should be applied to the joints of the walls in the automobiles, buses or similar size vehicles manufactured. It is suggested to spray anti-corrosion water-based chasis paint onto baggage, motor chamber and fuel covers as well as inner side of fender.

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