

## Analysis of the cause of imperfect adhesion of cataphoretic coating using SEM and EDS method

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The automotive industry is one of the most overloaded and stressed in the point of view materials selection, characterization, application and their corrosion prevention and surface protection. Cataphoretic coating is one of the used and technologically most advanced method of anticorrosive surface treatment processes and it is usually used as surface treatment of metal products. The process itself is a set of several steps of pre-treatment, paint application and curing and although each sub-process is rigorously controlled (including production of parts and their storage), it can occur that the final product of the cataphoretic coating process are parts with a defective coating. Consequently, the anti-corrosion protection can be reduced even due to relatively small defects and thereby increasing, among other things, the safety risk. In this contribution, case study of the cause analysis of a non-conforming cross-cut test of cataphoretic coating surface on metal part is shown, where it is necessary to use the methods of scanning electron microscopy (SEM) and scanning electron microscopy with energy dispersed X-ray spectroscopy (EDS).

The metal part with a non-conforming cross-cut test of cataphoretic coating surface were examined by the SEM and EDS method. SEM analyses were taken with scanning electron microscope Quanta FEG 250 (FEI) at the regime pressure of the low vacuum mode and high vacuum mode. Further, EDS analysis were measured with TEAM™ Software Suite, coupled with the Octane Plus System, as well at the regime pressure of the low vacuum mode and high vacuum mode.

A metal part with a cataphoretic coating on the surface was examined in a place with a non-conforming cross-cut test. In this place (of the peeled coating on the metal part), elements that may originate from the zinc-phosphate layer were locally detected. Therefore, the peeled off coating from its underside was further analysed. Differently sized crystals were found here, and their composition may correspond to the zinc-phosphate layer.

Analyzing a metal part with a cataphoretic coating on the surface with with a non-conforming cross-cut test by using SEM and EDS methods, it was proven that the zinc-phosphate layer in the pre-treatment was applied, but did not adhere to the surface of the part as it should have. It is necessary to further focus on the individual steps of pre-treatment. There may have been insufficient degreasing at the beginning of the pre-treatment process. Or the cause is the poor quality of the zinc-phosphate solution.

### Keywords:

Cataphoretic coating, EDS, SEM

### Reference:

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