

## BUBBLES ON PAINTED INJECTION-MOLDED PART

### TASK

After painting an injection molded component, defects in the form of tiny, punctiform elevations were detected, which render the component unusable (Fig. 1). In order to reduce the reject rate, it is necessary to know the cause of the defects and the associated process step.

### SOLUTION

In such cases, Analytical Services Obernburg uses analytical scanning electron microscopy (SEM-EDX). The cross-section shows the structure of the coating (primer, middle layer and top coat). The defect is clearly located within the middle layer and is surrounded by it on all sides (Fig. 2). Contamination of the surface of the injection molded part before painting can therefore be clearly ruled out.

#### Industries

Paint manufacturer  
Paint shops  
System suppliers  
Automotive suppliers

#### Analysis goals

Damage analysis

#### Materials

Painted components  
Paints

#### Analysis methods

Light microscopy  
Scanning electron  
microscopy  
(SEM-EDX)

#### Similar questions

Paint craters



## **SOLUTION**

In DIN SPEC 91446:2021-12, the quality criteria are assigned to data quality levels (DQL 1 - 4). Below you will find a summary of the tests that are possible with ASO, which can be recommended or optionally supplemented in accordance with the standard.

The element composition of the inclusion (Fig. 3) corresponds to the composition of the top coat. It is an organic varnish colored with a ferrous dye, silicate as a filler and titanium dioxide as a matting agent. The size and distribution of the fillers is also comparable in both areas (Fig. 4). Consequently, the coating of the component was not done properly. A paint particle of the top coat either got onto the finished primer and was infiltrated by the paint of the middle layer or it was applied together with the paint of the middle layer during the painting process.

## **ADVANTAGE**

The method described allows visualization and analysis of the coating structure, possible defects and measurement of the local coating thickness. It requires a great deal of experience and skill in micropreparation and damage analysis. The SEM-EDX method is also suitable for many other characterizations, such as soiling on surfaces.



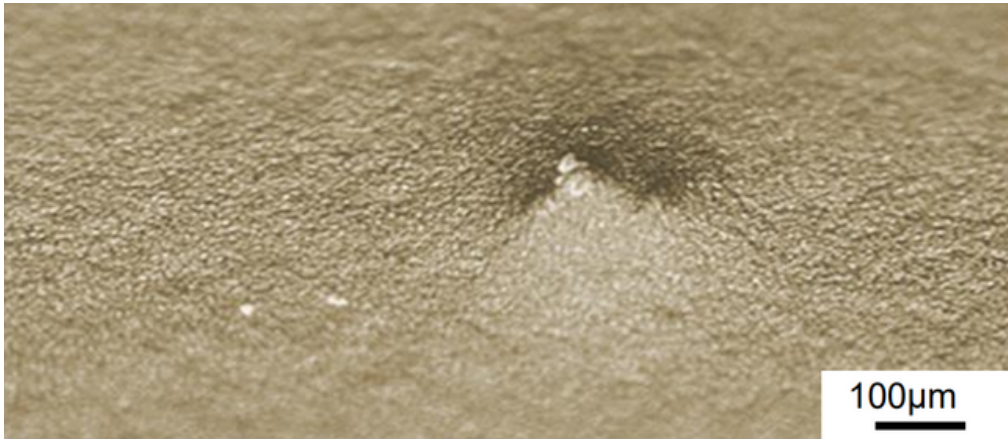


Fig. 1: Bubbles in varnish layer

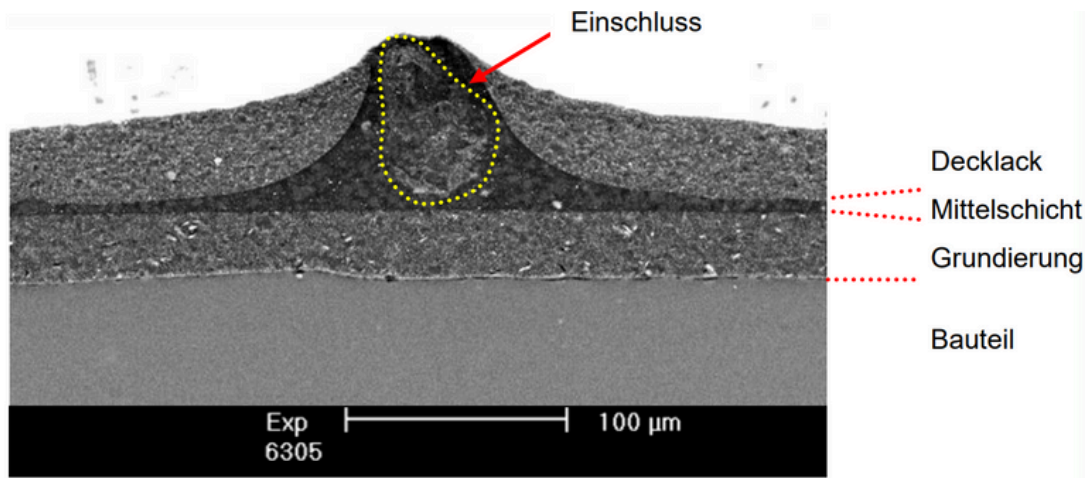


Fig. 2: Cross-section through defect in varnish layer (material contrast)



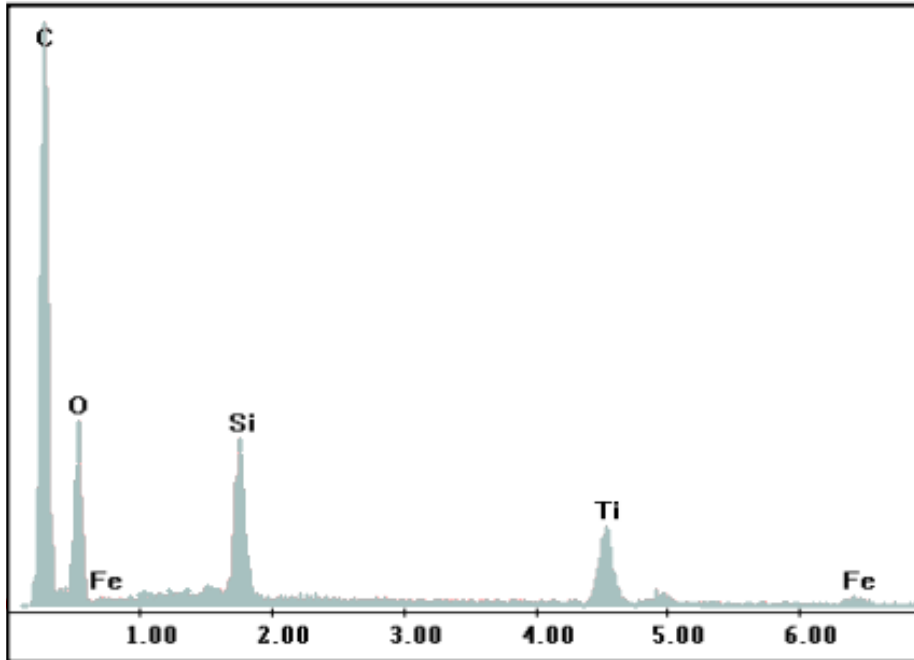


Fig. 3: Determination of the local element composition within the defect using energy-dispersive X-ray spectroscopy (EDX).

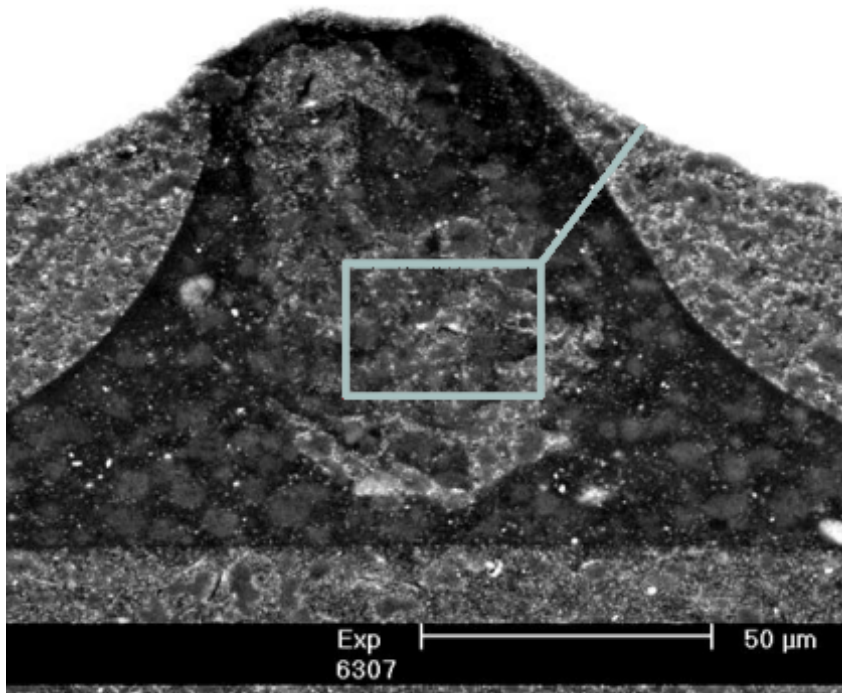


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