Analytik Service Obernburg
Part of viridiusLAB AG

BLISTERING ON GALVANIZED COMPONENT

Determine causes of defects after climate simulation

TASK

Several apparently perfectly galvanized PC/ABS components showed clear blistering in some areas after a temperature cycling test (Fig. 1). This led to the entire production batch being blocked.

SOLUTION

The bubble was opened at Analytik Service Obernburg. The polymer surface below the bubble appears darker than in the freshly removed reference area (red arrow in Fig. 2). In the bubble area, hardly any polymer adheres to the metal, while the adhesion in the reference area is so high that part of the polymer was torn off when the metal layer was peeled off - the underside of the metal is covered by numerous polymer flags (Fig. 3). In a further step, the polymer in the reference area was chemically dissolved away and the metal underside exposed (Figs. 4 and 5), revealing a cavern structure of varying degrees of intensity.

Industries
Automotive suppliers
Electroplating companies
Plastics processors
Medical technology

Analysis goals
Failure analysis
Process optimization

Materials
Galvanized plastics

Analysis method
Scanning electron microscope

Supplementary procedures
Light microscopy
IR spectroscopy
Climate storage Initial sample testing

Related questions
Flaw analysis
Crater paint adhesion
Wetting problems

Fig. 1: Galvanized component with blistering

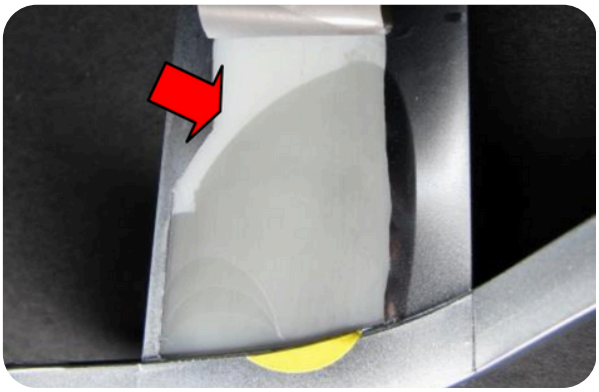

Fig. 2: Opened bladder

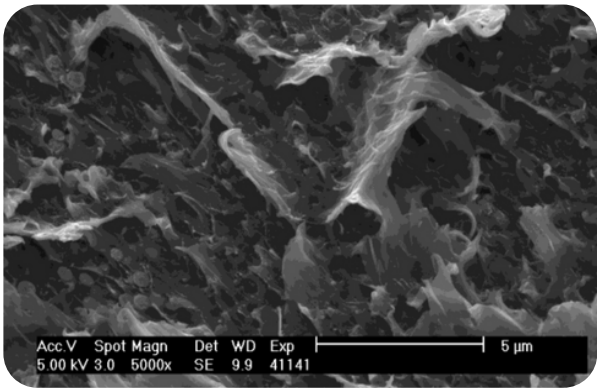

Fig. 3: Metal underside of the reference area with adhering polymer

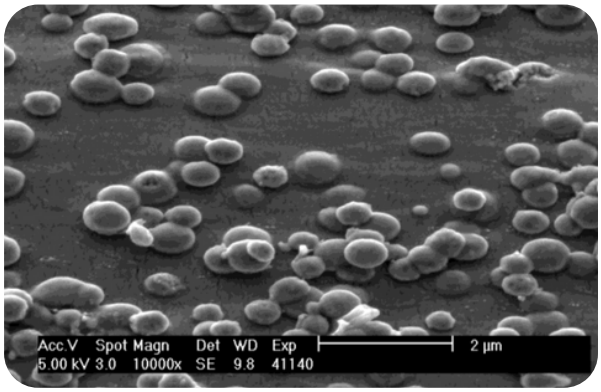

Fig. 4: Metal underside in the bubble area with relatively few anchoring points

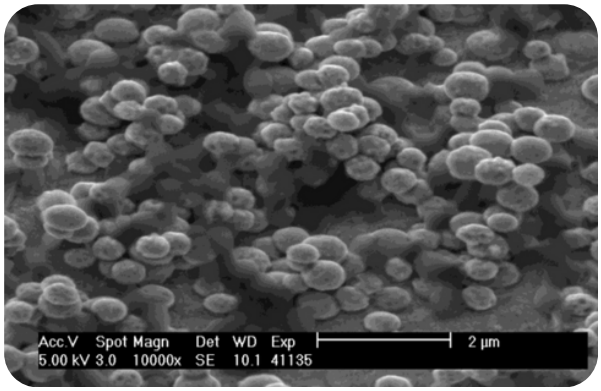

Fig. 5: Cleaned metal underside in the reference area (many spherical caps allow an intimate connection with the polymer)

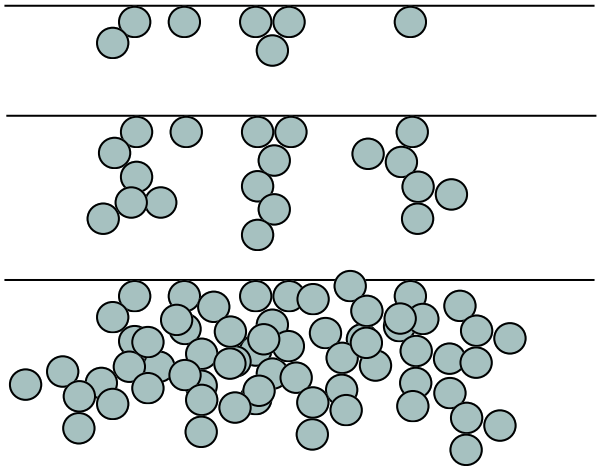

Fig. 6a-c: Surfaces stained to different degrees

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During electroplating, the butadiene component of the ABS is first oxidized in a pickling process. This creates a cavern structure that is filled with metal in the subsequent process steps, which causes the anchoring. If the pickling is too low (Fig. 6a), too few anchoring points are created. If, on the other hand, it is too high (Fig. 6c), too few polymer bars remain and the strength is also reduced.

ADVANTAGE

The method described allows damage to be analyzed for various defect patterns. The method is also suitable for determining the element composition in the defect area and thus identifying possible foreign materials.