Analytik Service Obernburg
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GLASS FIBER REINFORCEMENT OF PLASTICS - MADE MORE VISIBLE

TASTK

Glass fibers are a frequently used filler to improve the mechanical properties such as the strength of a plastic. However, it is not only the filler content that is important, but also the homogeneity of the distribution and the orientation of the glass fibers in the component. Incorrect distribution/orientation can lead to undesirable properties or even failure of the injection molded component. Glass fibre orientations can only be visualized in the commonly used microsection if a large number of fibres are parallel to the microsection plane. However, this is only approximately the case very close to the surface.

SOLUTION

Analytik Service Obernburg uses thin sections as well as microsections to analyze glass fiber orientation.

Industries
Automotive suppliers
Plastics processors
Textiles

Analysis objectives
Competent implementation of initial sample approval tests

Materials
Prefabricated plastic parts
Painted components
Textiles

Analysis methods
Odor tests
e.g. according to
Ford BO 131-03
Hyundai MS 300-34
Opel/GM GMW 3205
PSA D10 5517
SAE J1351 VDA 270
Volvo STD 1027,2712
VW/Audi PV 3900

Similar questions
Emission tests
VDA 278

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EXAMPLE - BETTER VISUALIZATION OF THE FIBER OPTIC ORIENTATION

Because the fibers inside a component are always oriented at a slight angle to the section plane, only the puncture points of the glass fiber through the surface are visible in reflected light (corresponds to a normal section preparation) (Fig. 1 left). As with a sausage section, the resulting area is very small and it is difficult to assess the orientation. In contrast, the thin section (Fig. 1 right) clearly shows the glass fiber orientation.

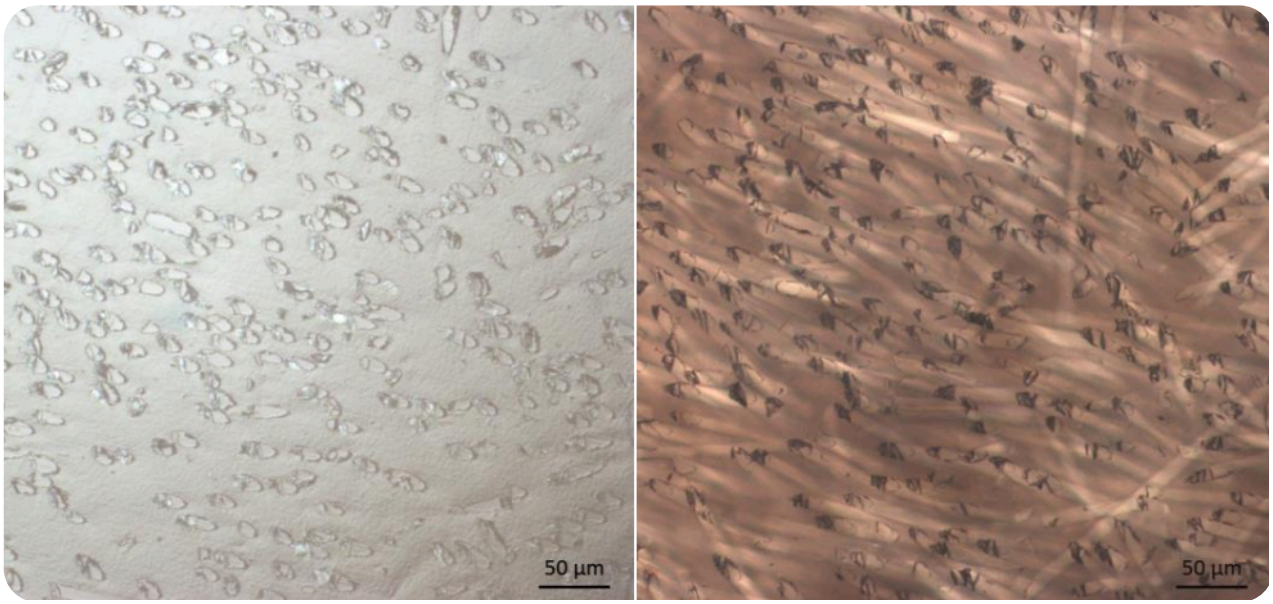

FIG. 1: ACRYLATE COMPONENT OF AN EMBEDDING AGENT. AMONG OTHER THINGS, THE FINAL HARDNESS IS INFLUENCED BY THE AVERAGE MOLECULAR WEIGHT OF THE POLYMER

EXAMPLE - INVESTIGATION OF CRACK FORMATION IN GLASS FIBER REINFORCED COMPONENTS

An incipient crack can only be seen in the polished section if the polished surface is very well polished (yellow arrow in Fig. 2 left) and can easily be mistaken for scratches. In contrast, the crack can be clearly seen in the thin section preparation in transmitted light and the glass fiber orientation in the surrounding area can be analyzed (Fig. 2 right). In the above case, the crack has spread from the top right to the bottom left. In the right-hand section of the image, the glass fibers are largely oriented perpendicular to the ground joint plane and can hardly influence the crack propagation. In the left part of the image, however, the glass fiber orientation changes and the crack propagation has been stopped.

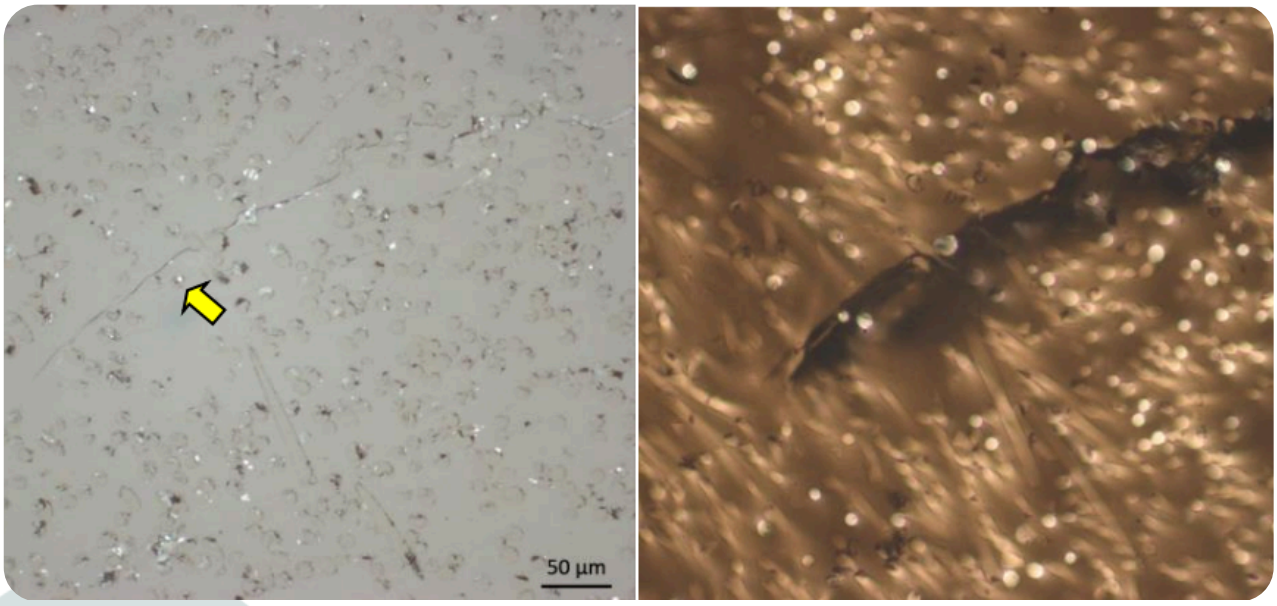

FIG. 2: EXAMINATION OF CRACK PROPAGATION IN RELATION TO GLASS FIBER DISTRIBUTION/ORIENTATION (COMPARISON OF THE SAME SPOT IN REFLECTED LIGHT ON THE LEFT AND TRANSMITTED LIGHT ON THE RIGHT).

ADVANTAGE

The described method of thin sections allows a much better visualization of the orientation of glass fibres in a polymer matrix. It can also be used if the glass fibers are not parallel to the direction of the section. It is also possible to make statements about the polymer between the glass fibers. The results can be used to optimize the injection moulding parameters or the tool in critical areas during the development of new products. In the event of damage, it is possible to find the causes of quality problems (e.g. breakage of a component). Analytik Service Obernburg also has extensive expertise in other microscopic procedures and chemical or spectroscopic analysis.