

INJECTION MOLDED PARTS - VIEWED IN DETAIL

TASK

When injection moulding and thermoforming polymers, it is necessary to optimize the polymer flow. This is the only way to ensure that all corners and edges are sufficiently supplied with polymer and to avoid weak points in the component due to unsuitable processing conditions.

SOLUTION

In such cases, Analytik Service Obernbuurg GmbH creates microtome cross-sections through the areas of interest and uses special imaging methods of light microscopy to visualize the flow lines in the polymer.

ADVANTAGE

The method described allows visualization and analysis of the flow lines within polymers. At the same time, the shape (e.g. dimensional accuracy) of the components and any defects (e.g. gas bubbles) in the polymer can be examined.

Industries

Plastics

Analysis objectives

Failure analysis
Process optimization

Materials

Injection molded parts

Analysis methods

Light microscopy
Microtome sections



EXAMPLE - WEAK POINT IN INJECTION MOLDED PART

Based on the investigations, the weak point in the component could be traced back to a contact point between two polymer fronts (Fig. 1), which does not represent a sufficient connection. By adjusting the sprue locations, it was possible to relocate the contact point to an area that is not critical for the component properties.

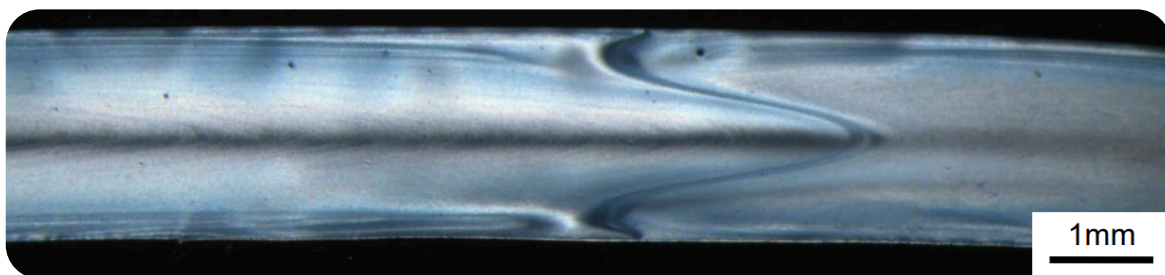


FIG. 1: WEAK POINT DUE TO CONTACT LINE OF TWO POLYMER FRONTS

EXAMPLE - FLOW LINES BEHIND AN OBSTACLE

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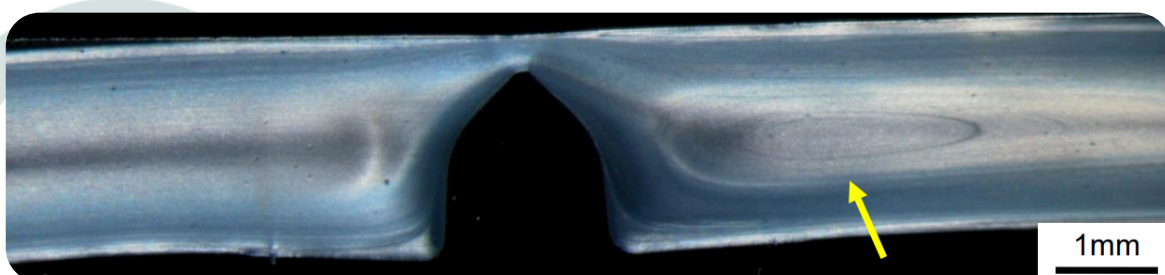


FIG. 2: TURBULENCE OF THE FLOW LINES BEHIND AN OBSTACLE (INDENTATION)

EXAMPLE - WELDING OF POLYMER BARS

To join two materials, bars were used that were thermally formed into a head at their end. The head prevents the bar from being pulled out of the hole. The structures in the cross-section (Fig. 3) show that the left of the two bars was bent and folded in a zigzag shape during welding (red arrow). On the right pin, on the other hand, the polymer was pressed out of the bar on both sides.

In addition, the shape of the head can be used to check the positioning of the tool in relation to the bar (Fig. 3). Both images show a slight shift of the head to the left. A core edge effect can also be seen in the shank area of both webs. This indicates different cooling conditions during the production of the bars. It is differently pronounced.

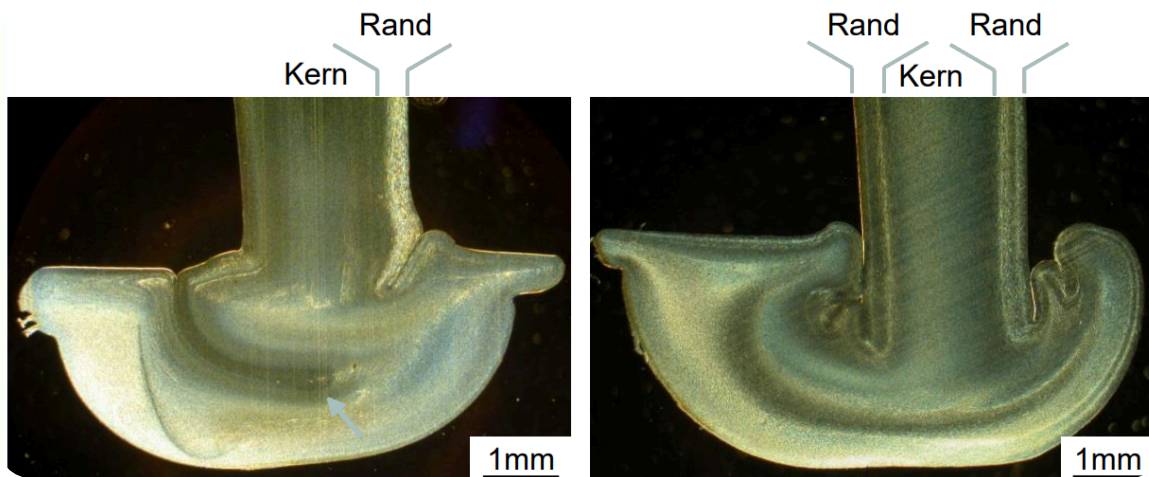


FIG. 3: FLOW LINE ANALYSIS ON WELDED WEBS TO OPTIMIZE THE PROCESS PARAMETERS