

## ANALYSIS OF SPINNERET GEOMETRY AND OTHER SURFACES THAT ARE DIFFICULT TO ACCESS

### TASK DEFINITION

A precisely maintained geometry of spinneret channels is crucial for optimum production conditions in fiber processes. Any deviations affect either the spinning stability or the product quality. As spinneret channels are usually long and very narrow, direct microscopic inspection is not possible.

### SOLUTION

Analytik Service Obernburg GmbH uses a combination of microscopy and impression technology in such cases. This produces an exact negative impression of the duct, which offers numerous advantages.

#### Industry

Chemical fiber manufacturer

#### Analysis goals

Analysis of geometries that are difficult to access

#### Materials

Spinnerets

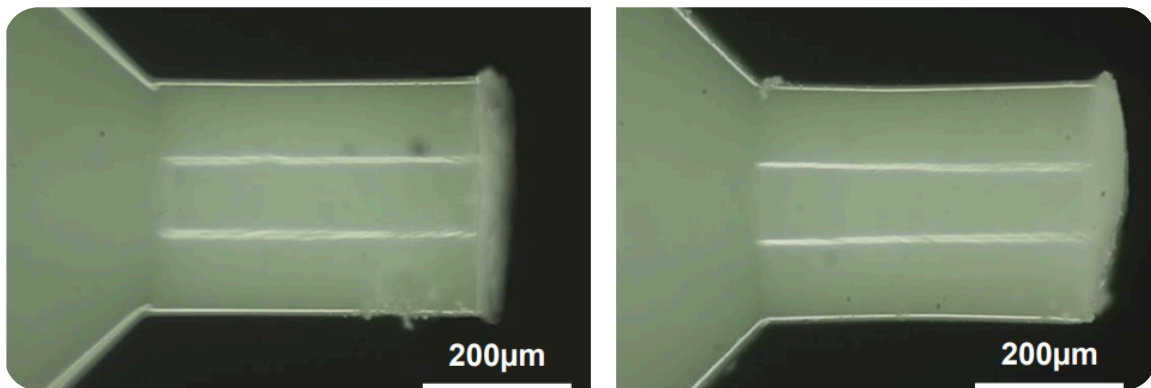
#### Analysis method

Impression method  
Light microscopy  
Scanning electron microscopy (SEM)

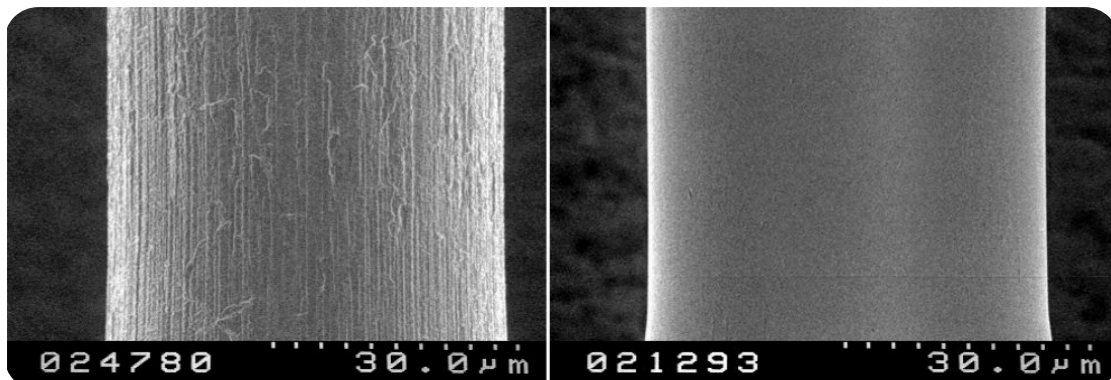
- Our impression material is characterized by low adhesion, so that the impression can be easily removed even from very long channels (up to several cm) without damaging the spinneret or the impression itself.
- The shrinkage of our impression material is very low, so that geometries and angles are reproduced with high precision. This makes it easy to analyze the surface morphology in side view using optical microscopy (Fig. 1) or scanning electron microscopy (SEM).
- Structures in the sub- $\mu\text{m}$  range are preserved (Fig. 2). The surface roughness and the canal structure can thus be examined in high resolution using SEM.
- Our impression material has a short curing time (a few minutes), so that the downtime of a spinneret remains correspondingly short. The actual analysis takes place offline on the impression.

## ADVANTAGE

Scanning electron microscopy provides high-resolution images with a high depth of field. With the many years of experience that Analytik Service Obernburg has in the fiber sector, the various damage patterns can usually be directly assigned to their causes. Elemental analysis in the SEM can provide additional information. The results obtained in this way often allow conclusions to be drawn from which solutions can be derived to prevent future faults.



**Negative impressions of two spinneret channels. Both channels are geometrically specified in the same way. However, you can see that the channel lengths differ by approx. 10 %. In addition, the duct on the right shows a slight widening in the outlet area.**



**Internal structure of spinneret channels for poor quality (left) and high quality (right) spinnerets.**

---