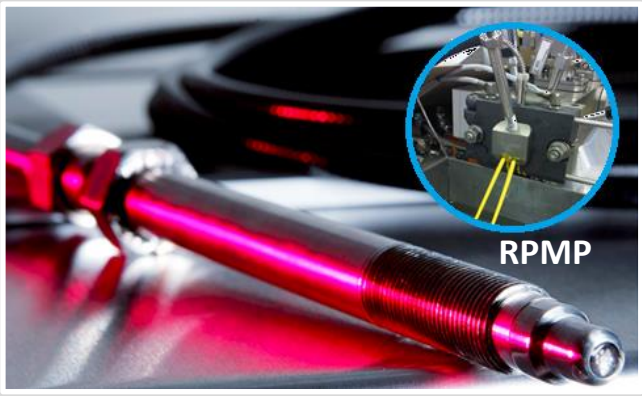
INLINE PROCESS MONITORING DIRECTLY in the EXTRUDER by MEASURING COLOR in the MOLTEN POLYMER



APPLIED TECHNOLOGY

- **Leistritz Extruder ZSE 18 MAXX**
- **COLVISTEC Inline Spectrophotometer**
- **Flexible optical probe**
- **Probe tip made of sapphire**
- **Probe body fitted into the die-plate with ½"-20 UNF Standard Dynisco® thread**

OBJECTIVE: DOCUMENTATION of PROCESS PROPERTIES in the EXTRUSION

During an extensive series of experiments together with the Leistritz Extrusionstechnik GmbH, Nuremberg, some of the most important aspects of polymer extrusion were investigated.

For this purpose a color measurement probe, RPMP (Reflection Polymer Melt Probe), was fitted in the die-plate (1/2"-20 UNF thread, Standard Dynisco®) of a Leistritz extruder ZSE 18 MAXX. This type of installation guarantees that the polymer melt has high-shear and optimal flow over the probe tip's sapphire window. The inline color measurement taken directly in the extruder delivered clear and insightful results. It is a fast and precise measurement method, which immediately delivers important information to every extruder user, relevant for production as well as development- and lab work. Older working practices can now be reinterpreted, improved and even replaced through this new and fast method. **The results of this are better product quality, significantly less waste and discarded production, no loss of time, optimal machine operations and reduction of costs.**

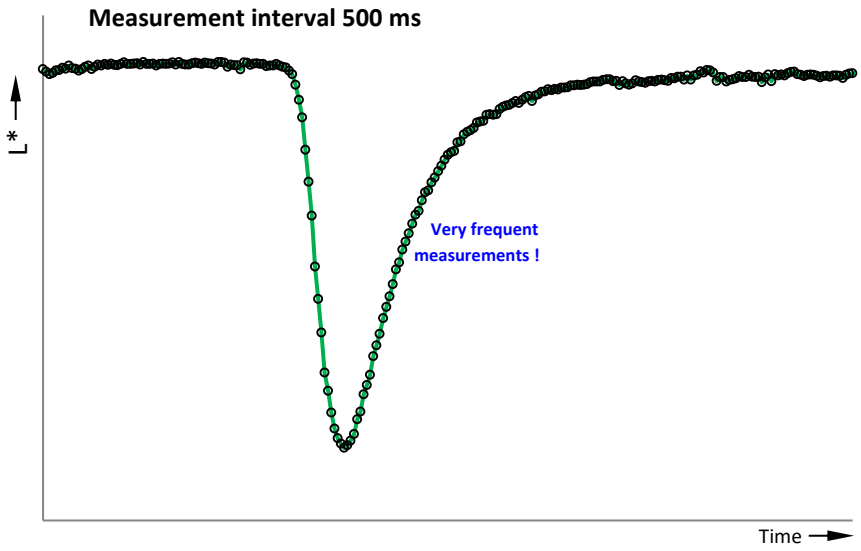
Examples from this selection of experiments (results on reverse page):

- ***Residence time determination***
- *Simulation and determination of the **optimal** extruder **screw configuration***
- *Determination of the **optimal speed** for the different recipes*
- *Quantification of the impact of **speed changes** on the quality of the extrusion*
- ***Dosage elevation** und changes in throughput*

Please contact us for further information about the findings:

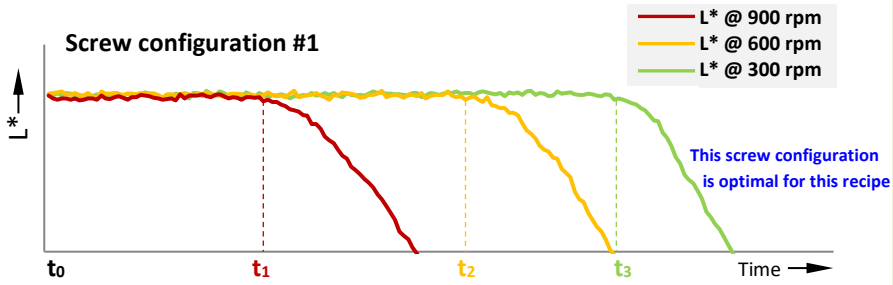
LEISTRITZ Extrusionstechnik GmbH *Contact person: Dipl.-Ing. Sebastian Fraas*

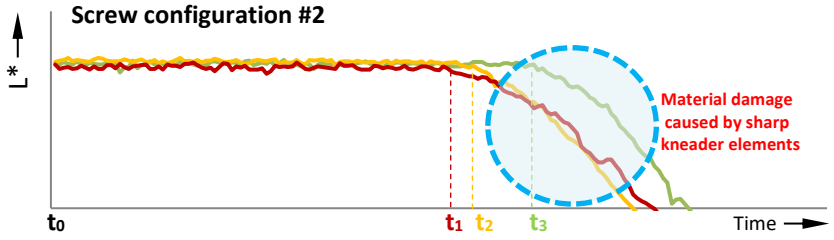
COLVISTEC AG *Contact person: Dipl.-Ing. Fuat Eker*



FAST RESIDENCE TIME DETERMINATION

- **Very short measurement interval of 500 ms**
- **Better and faster method**
- **Try to do that with the *"Ash Method"***



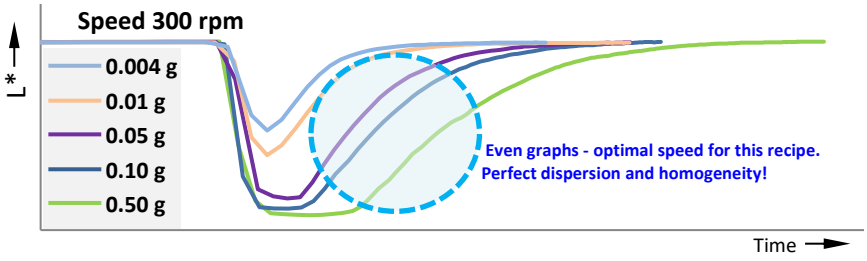


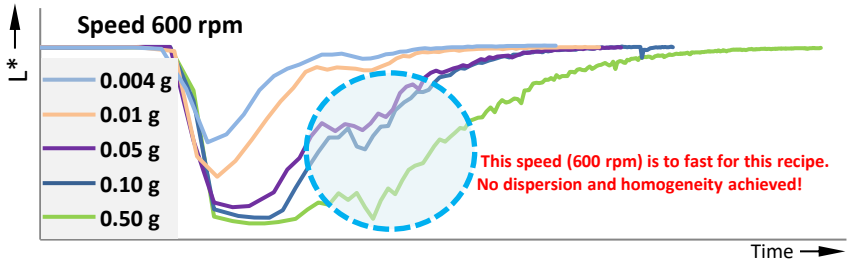
SELECTION of OPTIMAL SCREW CONFIGURATION

- Identical recipe
- Two screw configurations
- Three different speeds
- t_0 : MB pellet added to the extruder
- t_1 to t_3 : first detection of color change at the die-plate (depending on speed)

➢ **Screw configuration 1** shows the expected behavior for this recipe - **good dispersion & homogenization.**

➢ **Screw configuration 2**, results in **uneven processing** for all three speeds.





DETERMINATION of OPTIMAL SPEED and ELEVATION in DOSAGE SYSTEM

- Identical base material
- Five concentrations (recipes)
- Two different speed levels

➢ **Identification of optimal speed**

➢ **Determination of optimal dispersion and homogeneity**

➢ **Detection of dosage elevations**

➢ **Identification of off-spec batches - waste & contamination**