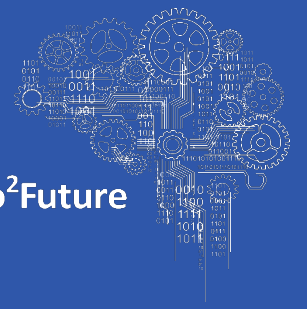


Cognitive Polymer Extrusion & Compounding

Numerically and Experimentally Driven Analysis of Flow Instabilities in Multilayer Co-Extrusion

Pro²Future



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MOTIVATION & GOALS

Co-extrusion is a highly efficient process technology that allows **targeted combination** of individual polymeric materials within a **multilayer structure**. **Interfacial flow instabilities** are a typical **limiting factor** for the **maximum production rate**. Profound knowledge of **critical flow situations** offers possibilities in **optimizing die** and **process design**. The **goals** of this project are:

- Initiation and detection of interfacial flow instabilities under controlled flow situations
- Characterization of co-extrusion flow situations
- Identification of critical parameters causing flow instabilities and determination of their limiting values
- Implementation in co-extrusion flow simulations to predict critical flow situations

Project FactBox

Project Name CoExCo
Project ID MFP 4.2.1
Duration 48 Months
Area 4.2
 Cognitive Production Systems
Project Lead
 Mag. Bernhard Löw-Baselli

APPROACH

Co-extrusion Experiments



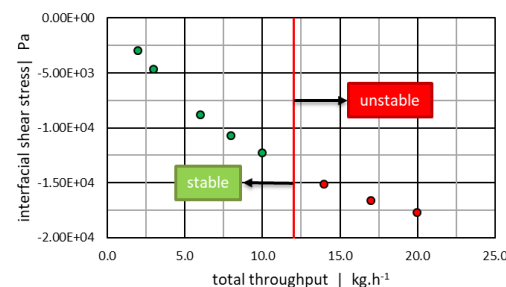
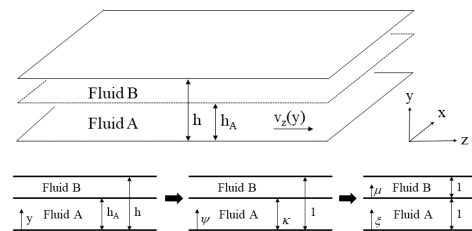
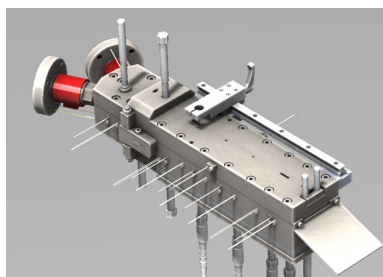
Simulations



Data Analysis



Validation



- Two-layer co-extrusion flow in demonstrator
- OCT / Ultrasonic sensor

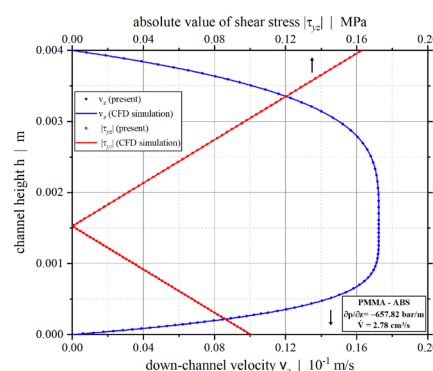
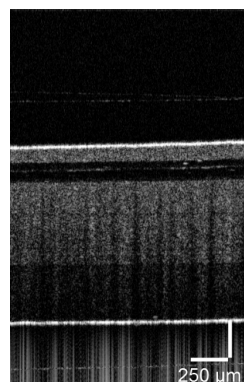
- Velocity profile
- Interfacial shear stress
- Viscosity ratio, ...

- Statistical analysis of experimental and simulation data

- Application of findings to multilayer products

RESULTS

- Co-extrusion **demonstration die** developed
- **Measurement system** to detect interfacial flow instabilities
- **Numerical solver** to evaluate two-layer co-extrusion die flows



CONTRIBUTION

Scientific contribution

Co-extrusion demonstration die
 OCT and ultrasonic sensor technology
 Numerical co-extrusion flow solver
 Novel models for interfacial flow properties

Economic contribution

Expertise in co-extrusion process technology
 Experience of critical flow situations
 Material and equipment for model validation

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Acknowledgement: This work was supported by Pro²Future (FFG, 854184) and Soplar sa.



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