# SMART COEXTRUSION BLOW MOLDING

## In-Situ Detection of Co-Extrusion Flow Instabilities using Optical Coherence Tomography and Ultrasonic Techniques

Pro²Future

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## MOTIVATION & GOALS

**Co-extrusion** is a widely used processing technique for combining various polymers with different properties into a tailored multilayer product. In these processes, **interfacial flow instabilities** are observed under certain conditions leading to **undesired product quality** such as optical and mechanical defects. For **systematic investigation** of these instabilities an **in-situ ultrasonic (US)** and **optical coherence tomography (OCT)** measurement system were developed:

- **Two-layer co-extrusion die** enabling controlled flow conditions
- **Exchangeable die cover** with glass window for OCT and direct coupling for US
- **Real-time evaluation** of flow instabilities
- Definition of **objective and reliable classification criteria**

### Project FactBox

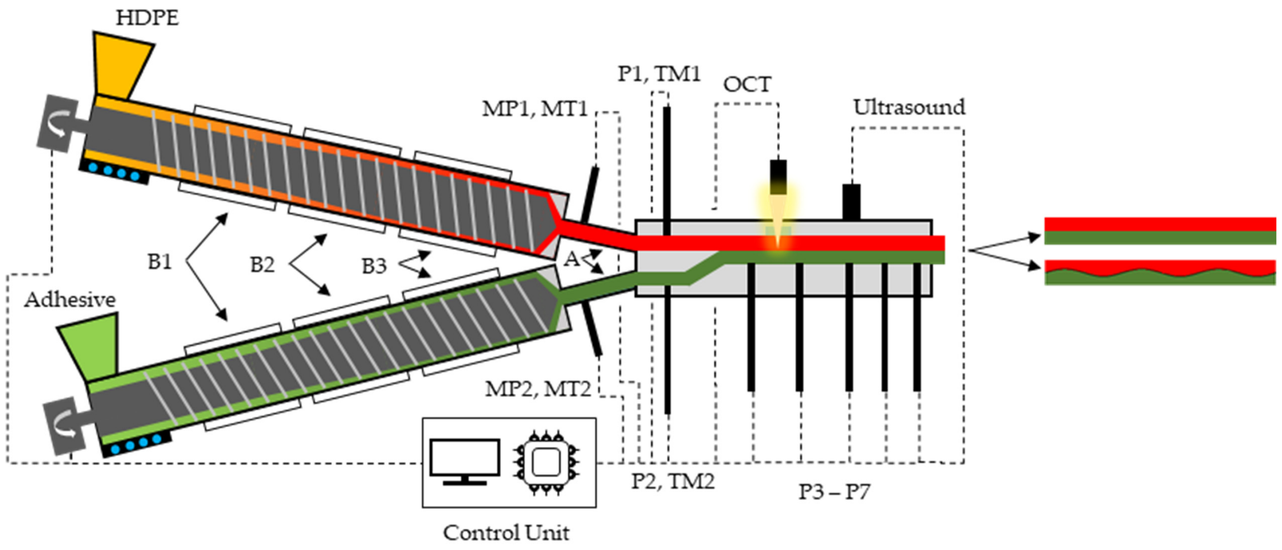
**Project Name** SmartCoEx
**Project ID** MFP II 4.2.1-3
**Duration** 48 Months

**Area 4.2**
Cognitive Production Systems

**Project Lead**
Dr. Wolfgang Roland

## APPROACH

Experimental co-extrusion tests with US and OCT




## CONTRIBUTION

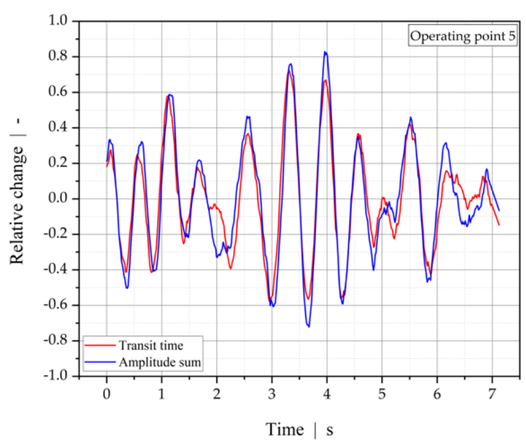
**Scientific contribution**

- Co-extrusion demonstration die
- OCT and ultrasonic sensor technology
- Evaluation of OCT measurement system
- Automatic classification of process stability

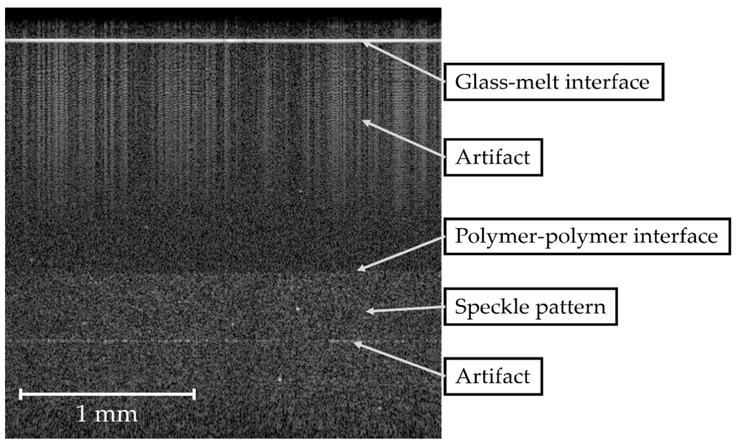
**Economic contribution**

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

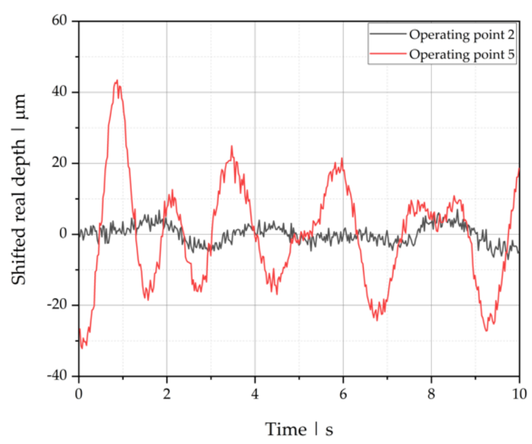
## RESULTS



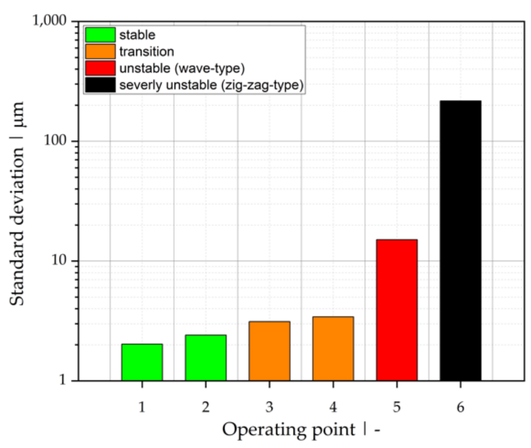

Relative change of transit time and amplitude (intensity) for US detection of flow instabilities




B-scan of OCT measurement during co-extrusion showing glass-melt and polymer-polymer interfaces




Real depth position of the polymer-polymer interface as function of time for an stable and unstable operating point




Process stability indicated by standard deviation of real depth position of the polymer-polymer interface

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**Acknowledgement**: This work was supported by Pro²Future (FFG, 881844), JKU-IPEC and Soplar sa.