Extrusion and compounding research
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Introduction
Food & Biobased Research performs fundamental and applied research on extrusion processing and compounding of food, feed, agro-materials and bio-plastics. For this purpose we have excellent pilot extrusion and compounding facilities. Added with the available expertise on extrusion processing, Food & Biobased Research can offer extensive support in this field.

Available equipment
For compounding and extrusion research we have 3 co-rotating twin screw extruders:
- Berstorff ZE 25 Twin screw, 25 mm 40D.
- Berstorff ZE 40 Twin screw, 40 mm 38D (and 50D).
- Clextrall BC 45 Twin screw, 45 mm 23D.
These extruders are provided with modular screw- and barrel set-up. The equipment can be provided with (side-) feeders for granulates powders and liquids, a melt-pump, degassing unit and underwater pelletizing systems. This year the installation of a new 16mm twin screw extruder is expected allowing small scale extrusion experiments.

Supporting equipment and facilities
In compound and extrusion research supporting equipment and facilities are equally important as the extruders.
- For preparation of raw materials we have several dryers including a (desiccant) granulate dryer. Moisture contents can be measured on a ppm level.
- Before actual extrusion experiments, small scale testing can be performed on a batch kneader.
- Combinations with product development are possible for example through film blowing, co-extrusion and injection moulding equipment.
- Material evaluation can be performed via a wide range of analytical equipment for (non) food applications.

Extrusion research
The Berstorff ZE 40 is a versatile extruder that can be used for a wide range of extrusion experiments. Throughputs are usually between 15 and 50 kg/h and this allows sample sizes of 5 kg and more.

Up-scaling
The Berstorff ZE 40 is not only a next size as compared to the ZE 25. It is also a machine that will give representative information and results with respect to up scaling towards industrial compounding and extrusion processes. The machine can be used for the production of compounded batches up to 500-1000 kg for pilot production at the facilities of project partners or for example our pilot film blowing equipment.

Reactive extrusion
The Berstorff ZE 40 can be extended to 50D. This allows prolonged residence time in the extruder and additional zones for mixing, degassing and feeding of reactants, additives and fillers. In this setup the machine is suitable for reactive extrusion processes.

Project examples
- Masterbatch preparation for the plastic industry
- Hydrolysis of biomaterials via enzymatic, chemical or physical treatments in an extruder
- Development of natural fibre composites
- Extrusion foaming of proteins, starches and biopolymer products for food (snacks) and non-food (insulation and packaging) application
- Production of micro-granulates
- Development of (biodegradable and/or bio-based) compounds for injection moulding, thermoforming and film blowing
- Revalorization of waste streams via extrusion modification