

EXTRUSION DAYS BATCH-TO-CONTI



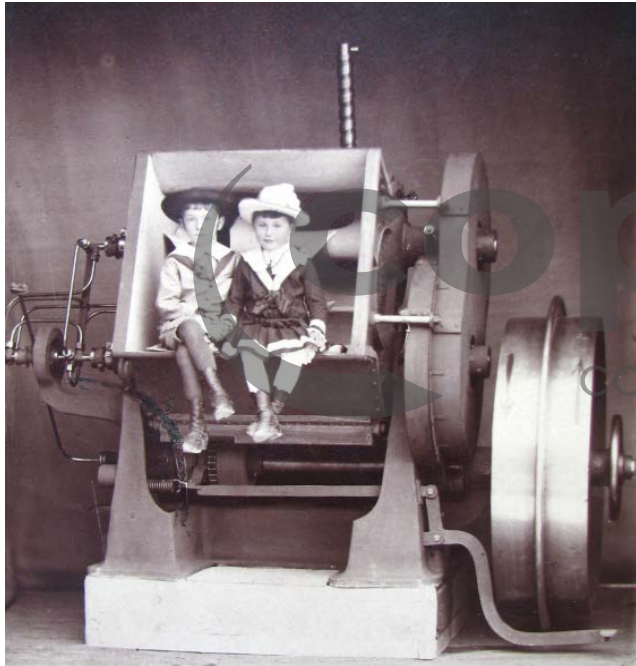
Continuous Mixing with ZSK Twin Screw Extruders in Various Fields of Applications – Case Studies

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Continuous Mixing with ZSK Twin Screw Extruders in Various Fields of Applications – Case Studies



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Continuous Mixing with ZSK Twin Screw Extruders

Batch-To-Conti Customer Fears and Challenges



- Difficult to handle raw materials
- High amount of formulation ingredients
- Process or residence time
- Product temperature
- Material of construction
- Process control



Raw Materials

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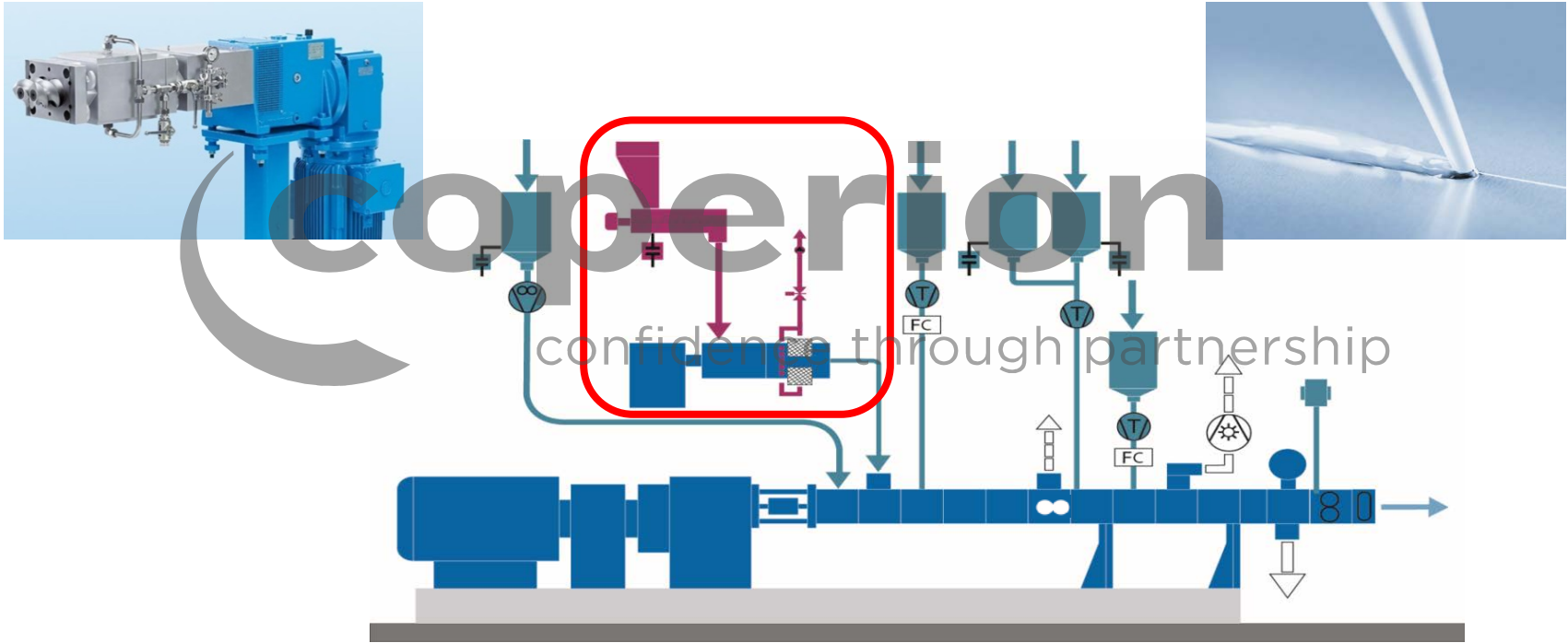
Continuous Mixing with ZSK Twin Screw Extruders

Raw Materials



Continuous Mixing with ZSK Twin Screw Extruders

Raw Materials – RTV Sealant

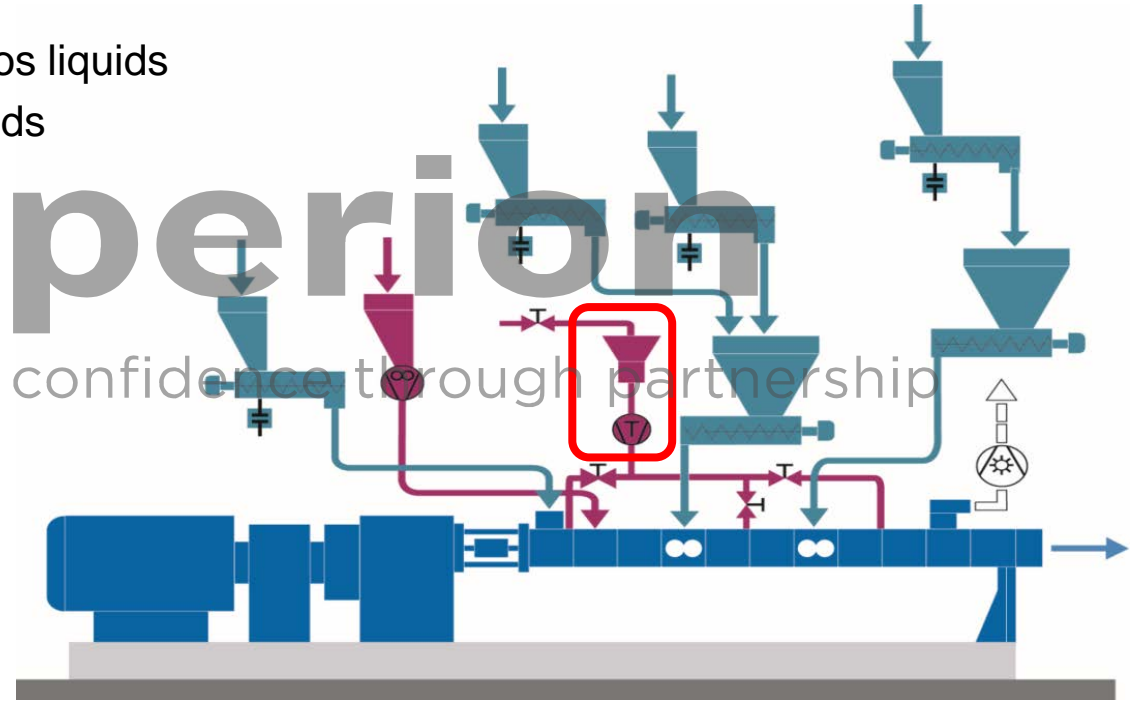


Continuous Mixing with ZSK Twin Screw Extruders

Raw Materials – Sealants / Adhesives

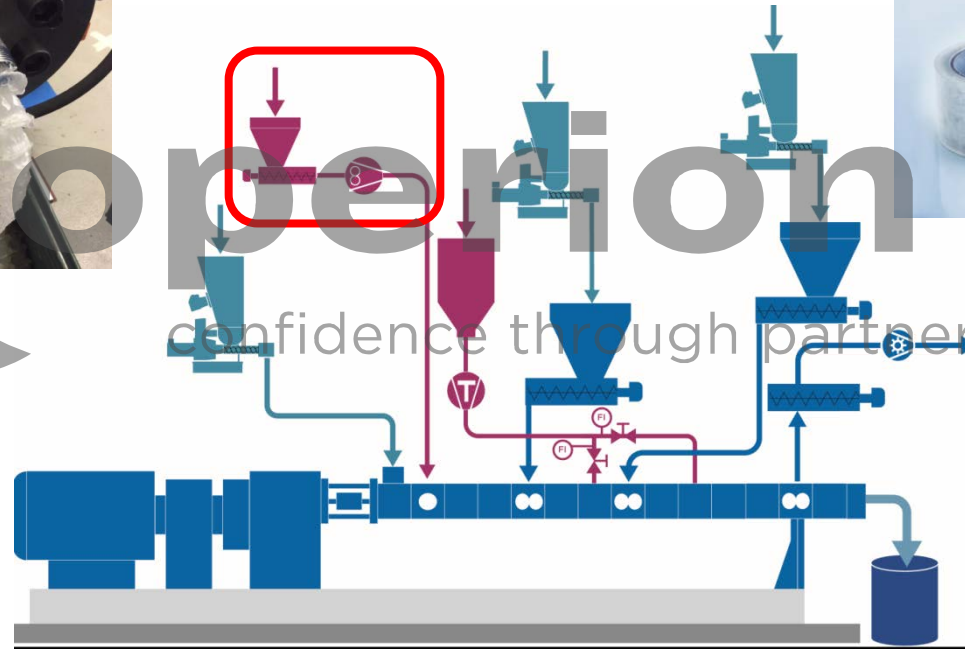


- Precise feeding of high viscos liquids
- Split of high volumes of liquids



Continuous Mixing with ZSK Twin Screw Extruders

Raw Materials – Adhesives



Residence Time

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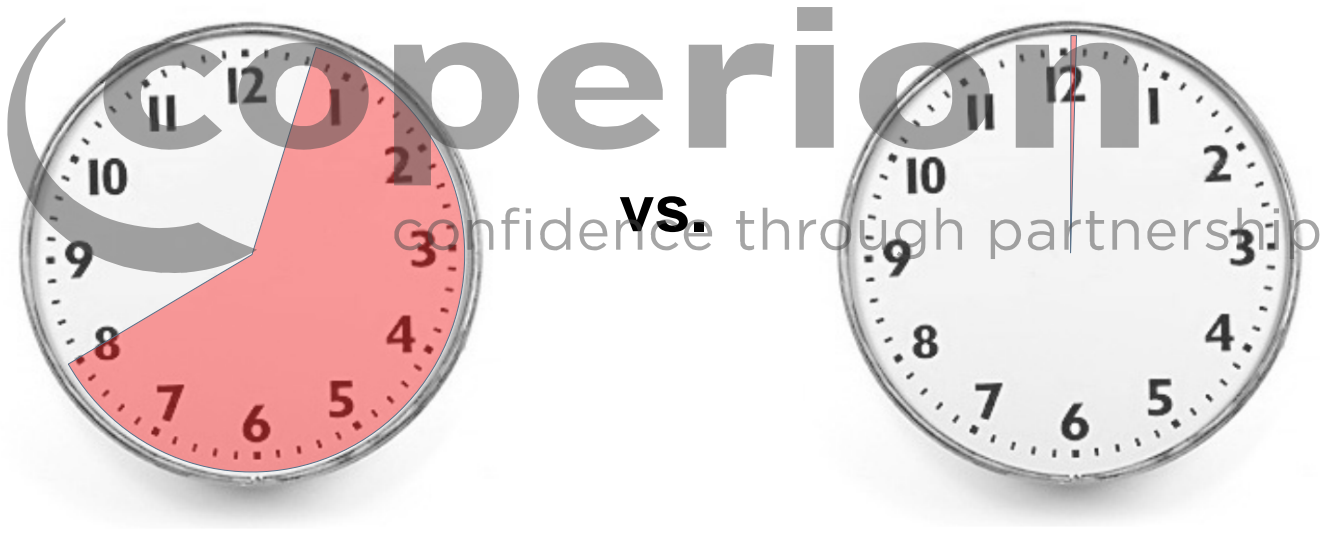
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Residence Time



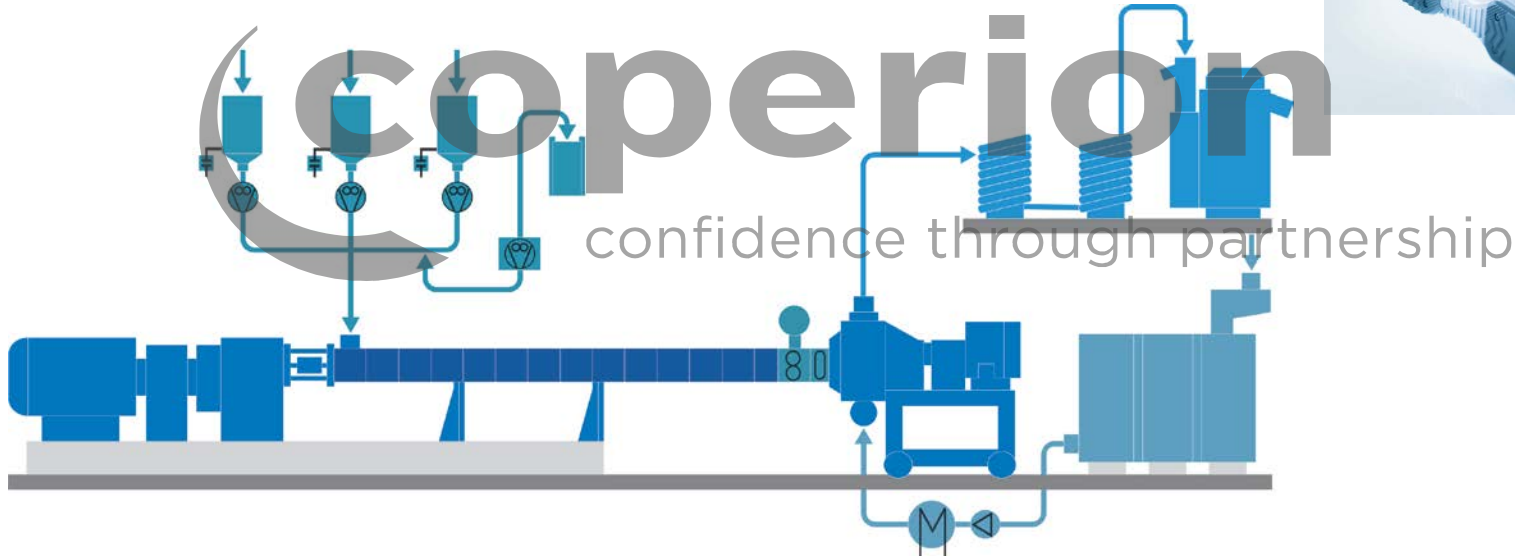
Batch

Conti



Continuous Mixing with ZSK Twin Screw Extruders

Residence Time – TPU Reaction



Continuous Mixing with ZSK Twin Screw Extruders

Residence Time – TPU Reaction



Batch

600 l vessel (net.)

45 min process

15 min discharge / preparation

Approx. 600 l/h

Conti

600 l/h capacity

ZSK 76 Mv PLUS

Inner volume approx. 15l

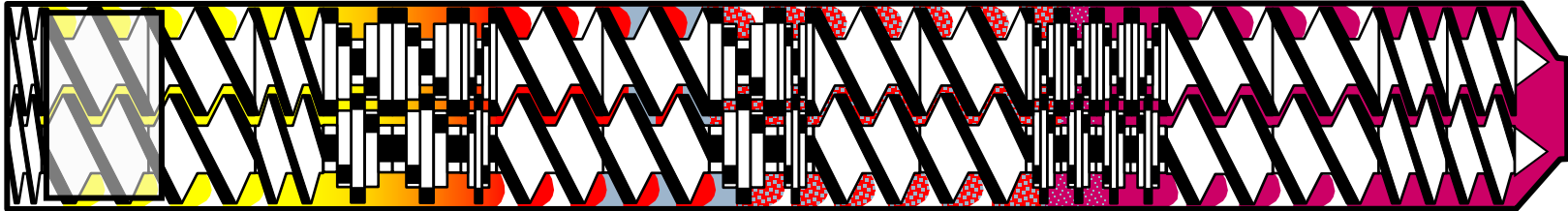
fill level < 50%

VS.

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Rosendahl



Product Temperature

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Continuous Mixing with ZSK Twin Screw Extruders

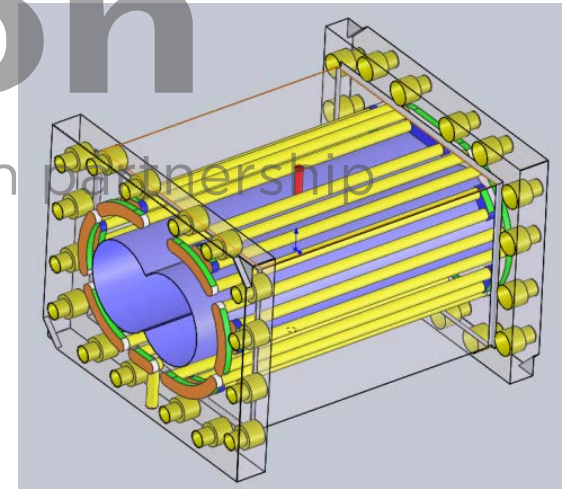
Product Temperature



- Each barrel individually heated/cooled



- Intensive shear in co-rotating twin screw extruder
- Dissipated energy into the product raises temperature
- Higher temperatures for very short time
- If needed intensive cooling possible
- Must be taken into consideration for scale-up



Continuous Mixing with ZSK Twin Screw Extruders

Product Temperature – Ceramic Compounding



- Discharge pressure > 250 bar
- Friction has high impact on product temperature
- Cooling liquid temperature < -30°C
- Low screw speed



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Material of Construction

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Material of Construction – Wrong Selection



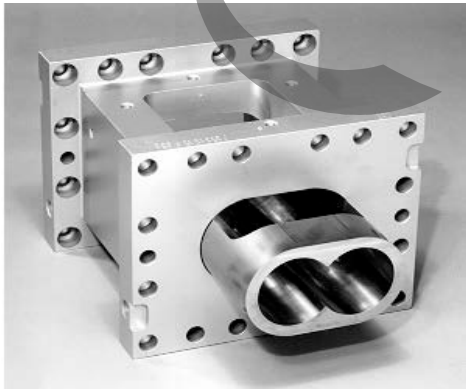
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Material of Construction



- Stainless steel or ceramic plating not suitable
- Various kind of materials available
- Depending on the process, required level of protection selected

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Continuous Mixing with ZSK Twin Screw Extruders

Material of Construction – Ceramic Compounding



- Raw materials highly abrasive
- Corrosion due to nitric-acid content



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Process Control

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Continuous Mixing with ZSK Twin Screw Extruders

Process Control – Battery Slurry



- Wide process window
- Fast feedback of product quality
- If feasible online monitoring possible
- Data collection in control system



Advantages of Continuous Mixing

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Continuous Mixing with ZSK Twin Screw Extruders

Advantages of Continuous Mixing



- Short residence time in the mixing process, reduced stress for the material
- Constant product quality
- Very good degassing efficiency
- Self cleaning profile of the extruder process part
- Easy change of formulations
- Immediate quality check after start-up of the line
- Online monitoring of extrusion parameters

Thank you very much for your attention!



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