

Separating process steps leads to new foam extrusion machinery

AIXtrusion Consulting

Products & Process:

- able to operate all extrusion foam lines
- training & start up expertise from ~ 30 projects
- permanently developing new products
- optimization & fine tuning

Technology & Patent Licences

Plant Management:

- 4 years plant manager
- 5 company set up projects

Machine Technology:

- Optimization of machinery
- Die & Screw Design

AIXtrusion Consulting

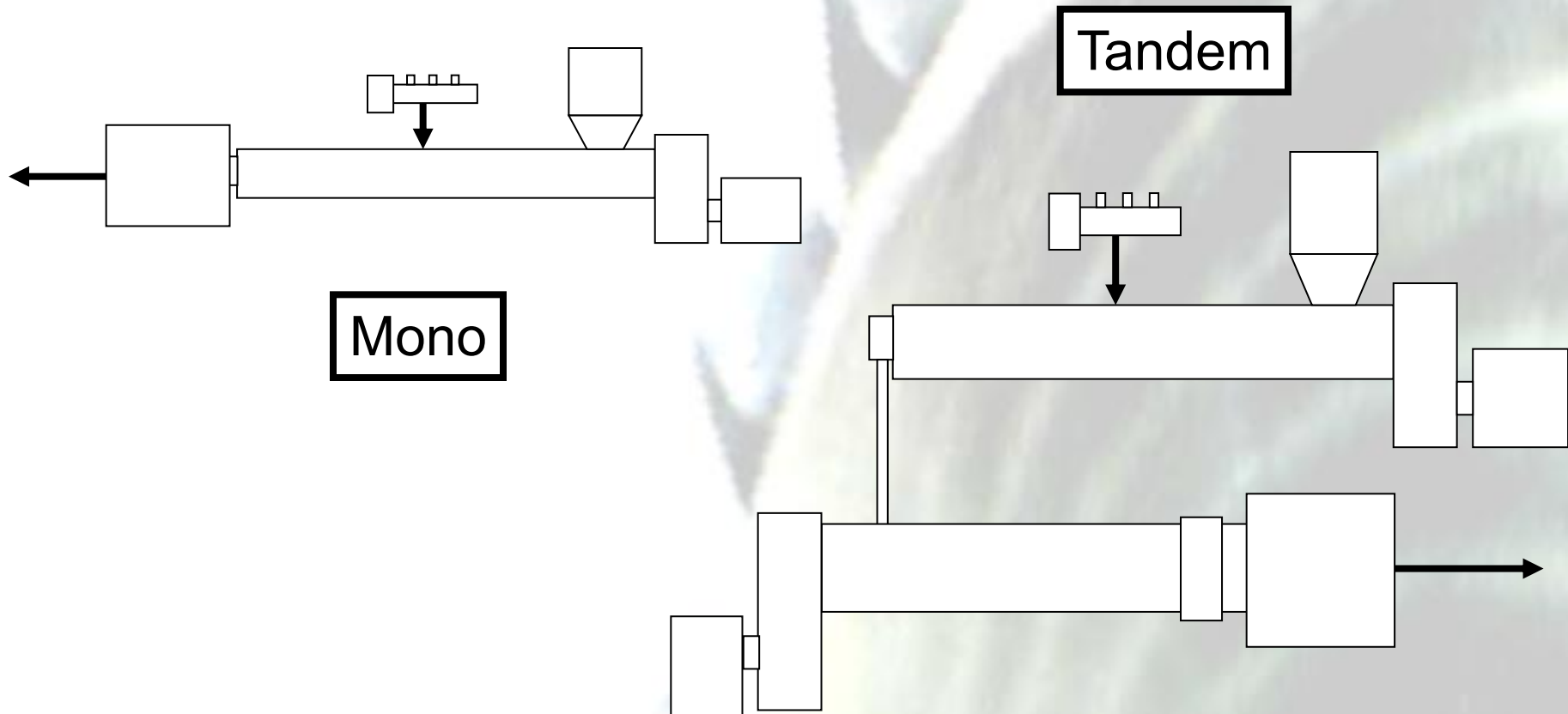
Products & Process

extruded Foam:	XPS	EPS	EPE	EPP	EPET	BIO	Extrusion Machin.
Projects	52	34	18	7	6	10	Recycling, Quality Control, Control Systems
Customers	30	26	12	7	6	7	IWI, Promix, Gneuss, aixfotec, Sunwell
Strength	Screws, Die, Process, Gas, X-over, Mixer	Screw, Die, Process, Products, Mold	Die, Light Foam	Die, Gas, Recipe	Machinery, Application, Gas, Recipe	Material, Process, Machinery	Recycling, Quality Control, Trouble Shooting, Components
Presentations	1				3	8	29
Publications	3					6	3
Patents	3	3	1	1	1	2	5
Other	DIN ISO 9001; BRC, HACCP, Government R&D						

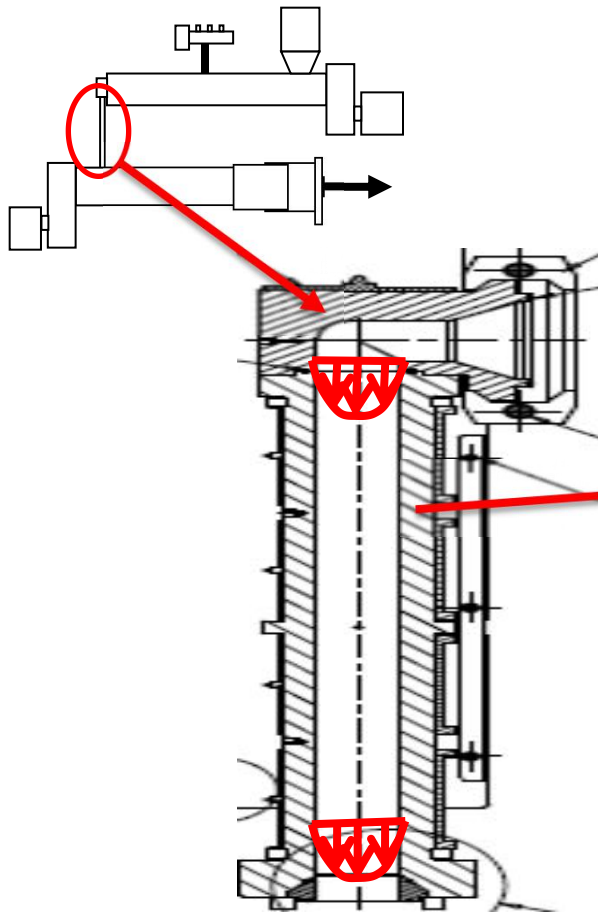
Plant Management

Machine Technology

Foam Extrusion



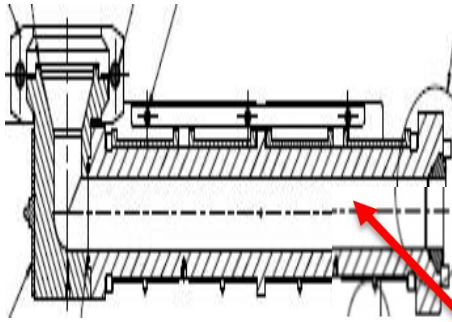
Cross Over



residence time:
wall : center
10 : 1

melt flow profile

Cross Over



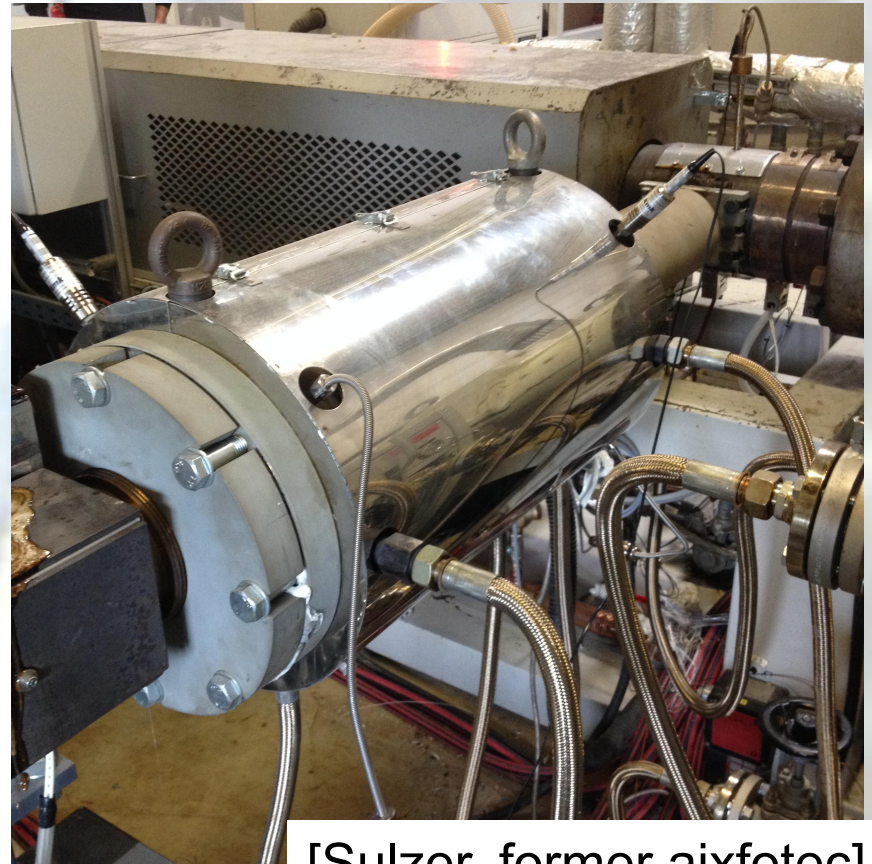
- + residence time OK
- no temperature control
- pressure drop



[Promix]

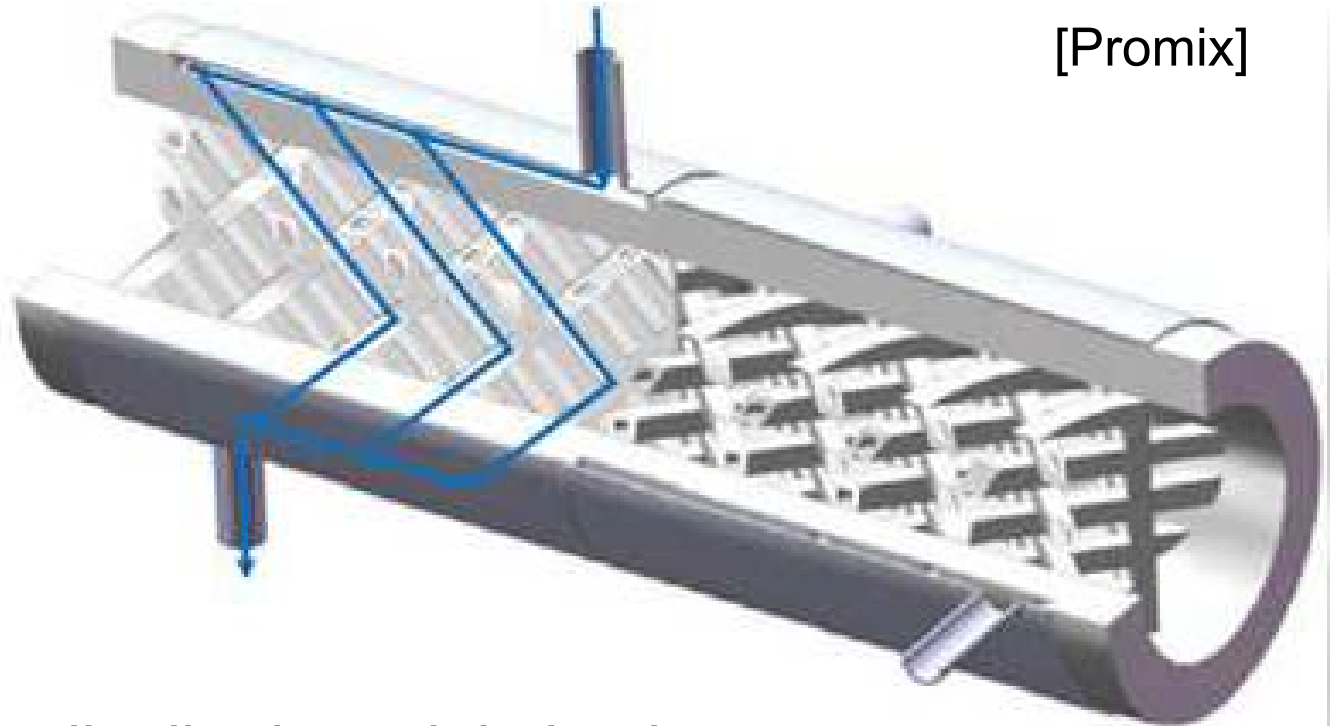
Cross Over

- + temperature control
- without mixer:
 - residence time distribution
- with mixer added:
 - significant pressure drop



[Sulzer, former aixfotec]

Cross Over



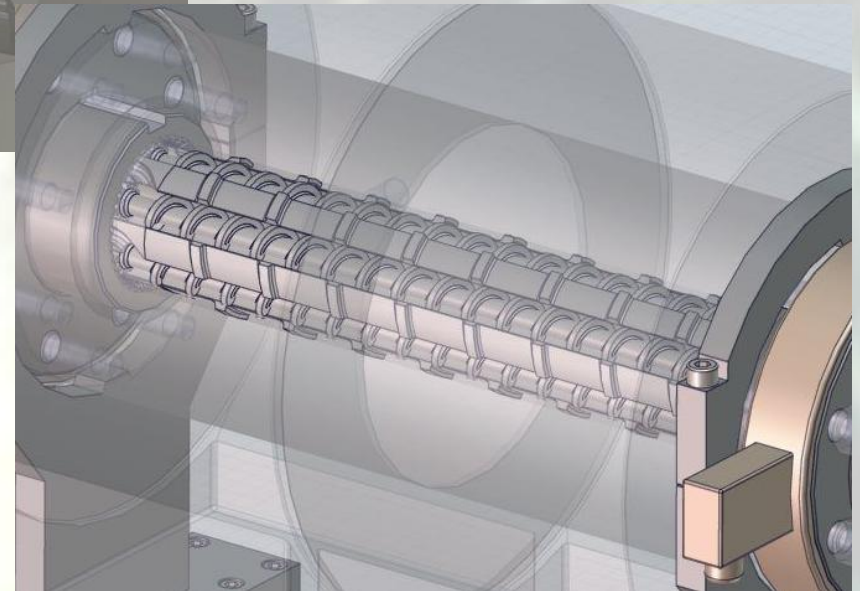
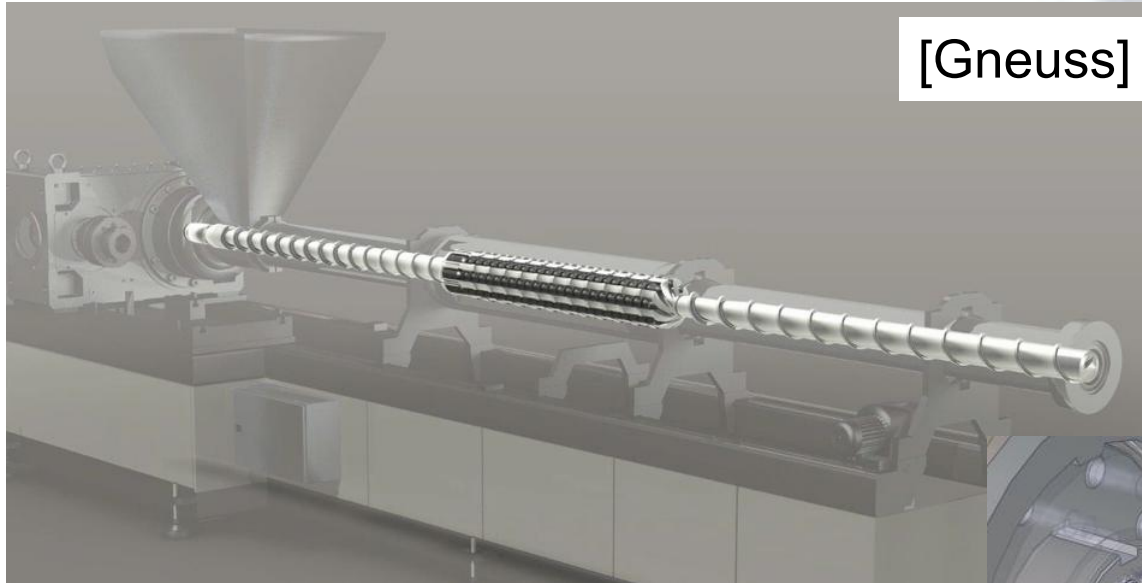
- + residence time distribution minimized
- + temperature control
- pressure drop

Gneuss MRS

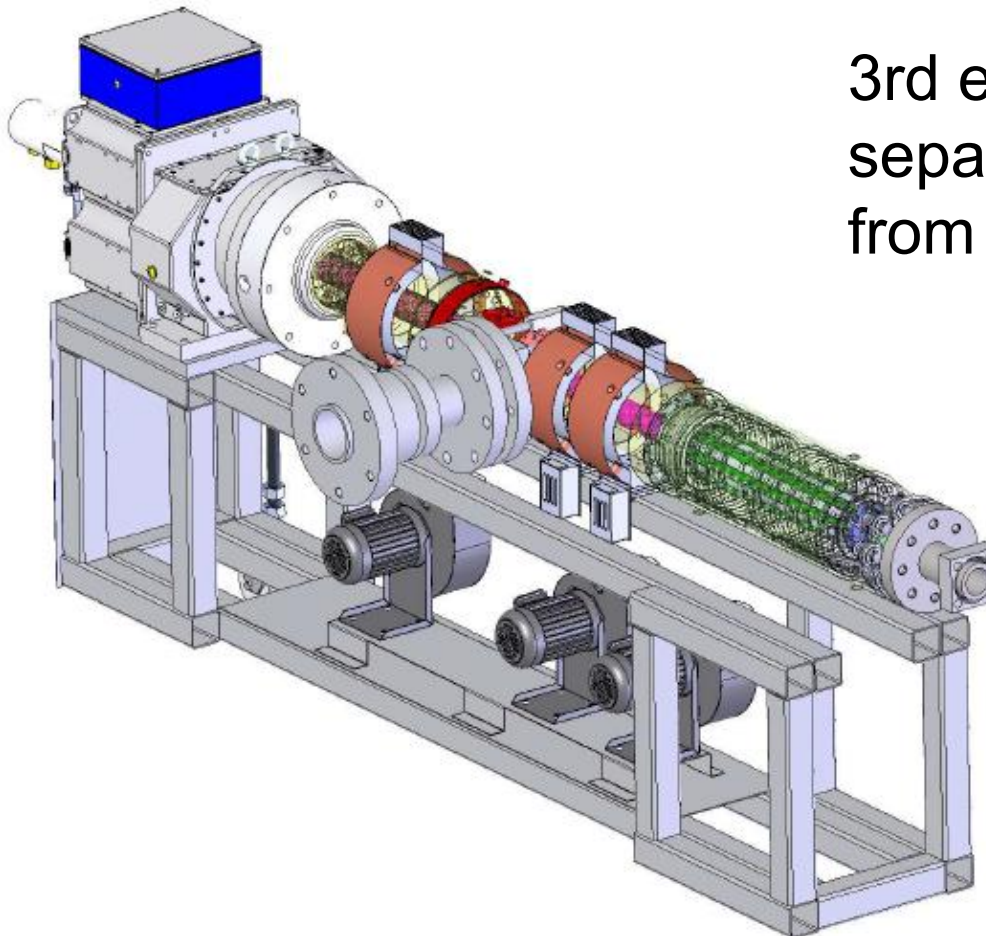


[Gneuss]

Gneuss MRS



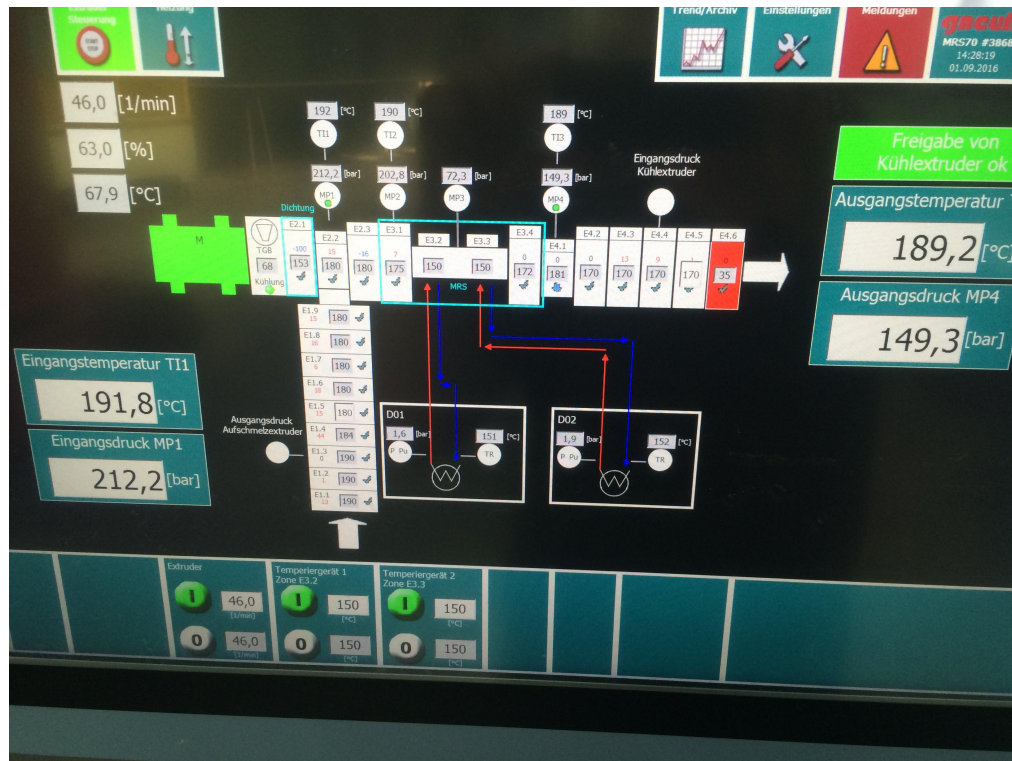
MRS for Cross Over



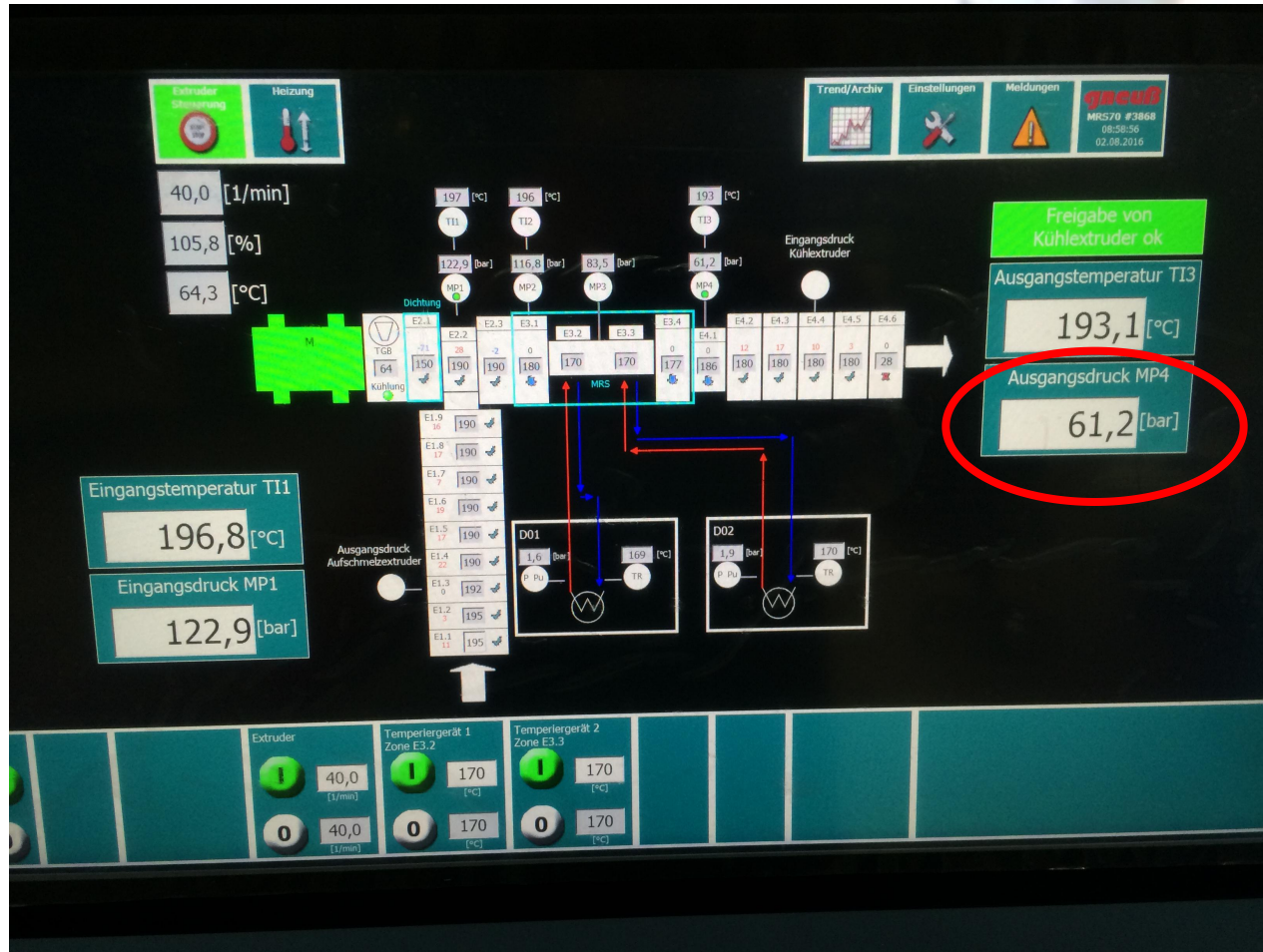
3rd extruder to
separate melting
from mixing!

[Gneuss]

“Foam MRS”



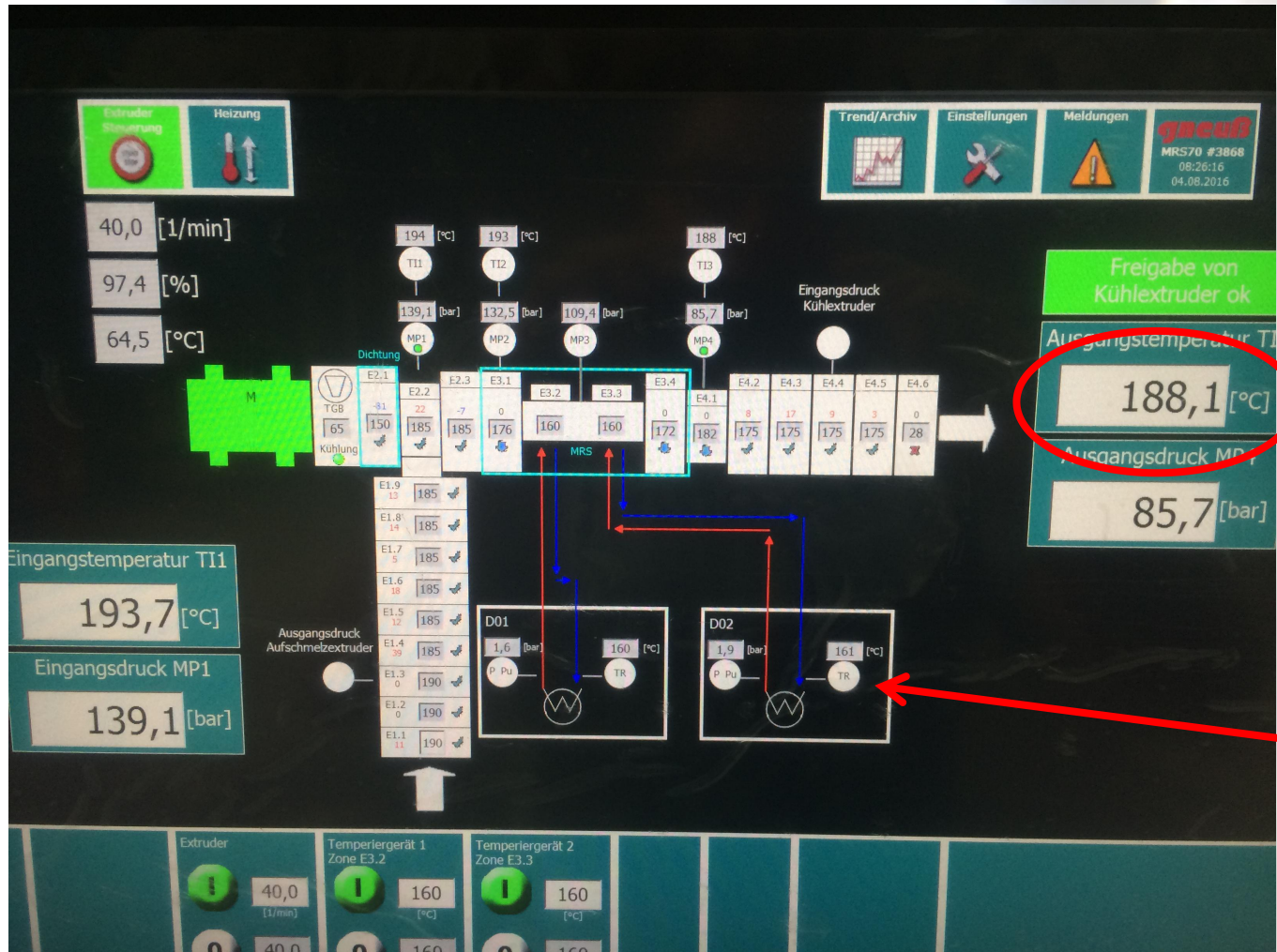
“Foam MRS”



Here: Blowing Agent 152a

Low pressures are possible now without degassing!

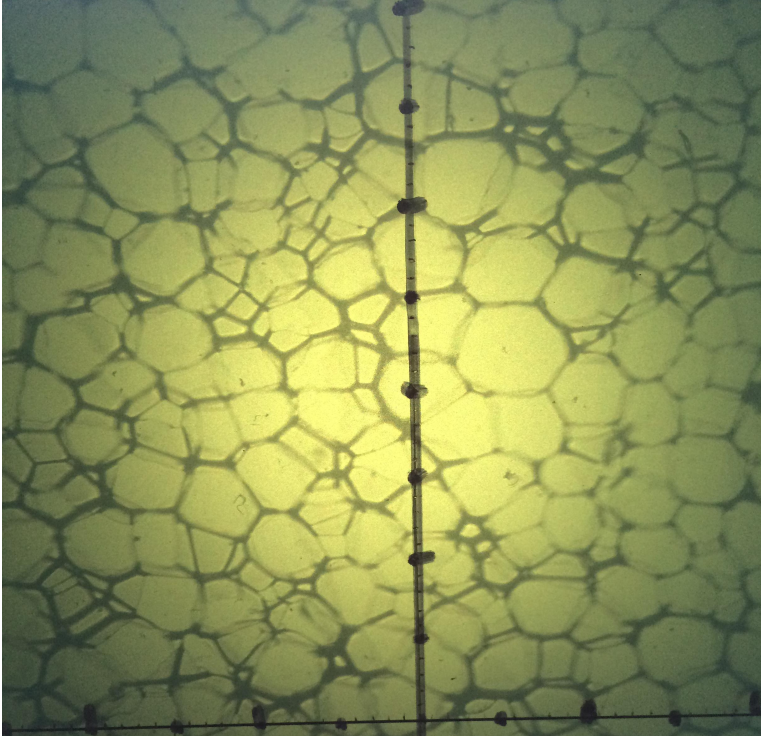
“Foam MRS”



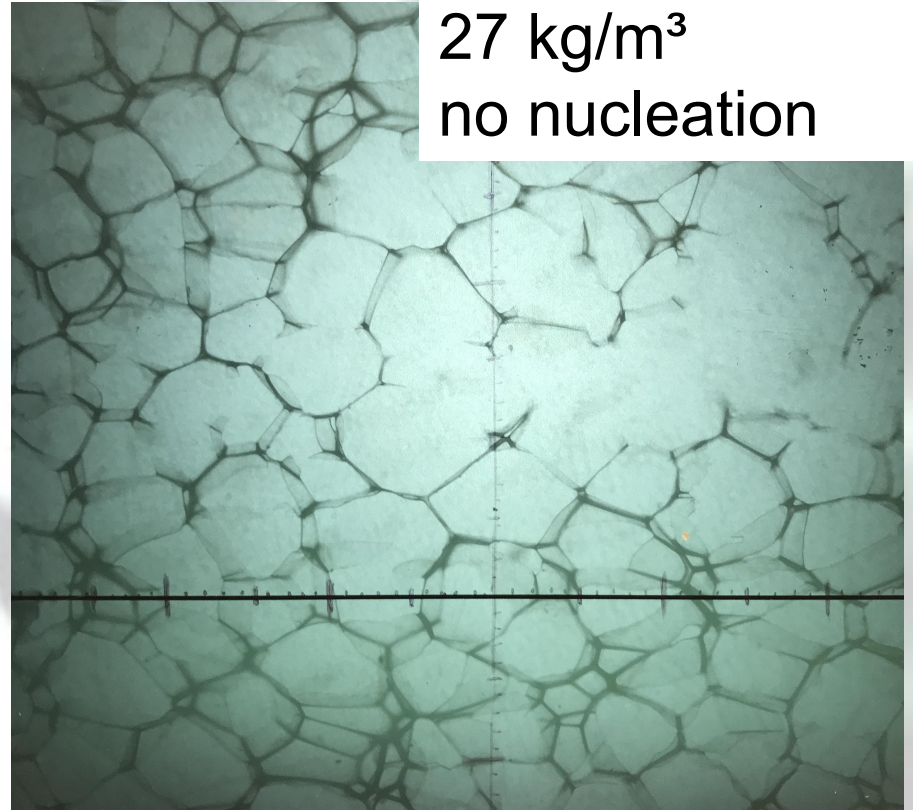
New Flame retardants start to decompose above 190°C

oil 160°C

“Foam MRS”



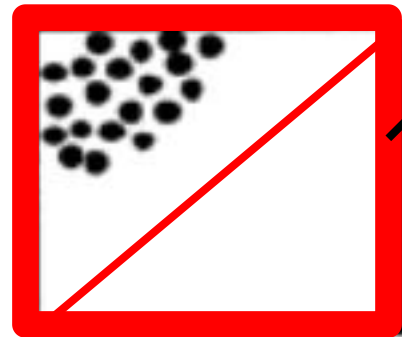
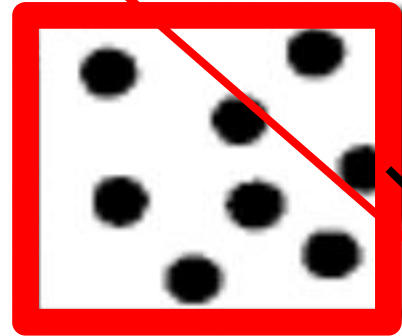
Gas Butane
28 kg/m³



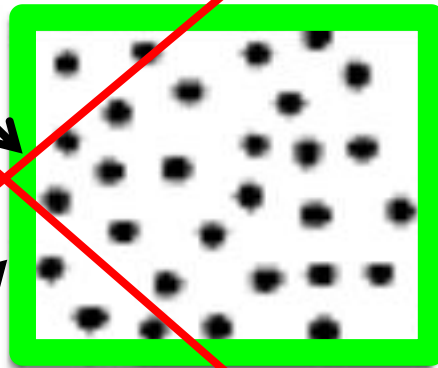
MRS; Gas 152a
27 kg/m³
no nucleation

“Foam MRS”

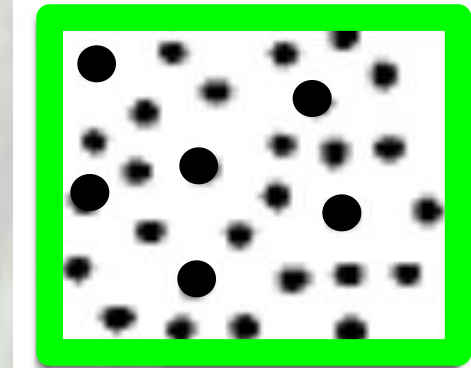
Theory:
Homogeneous mixing



e.g. Twin
screw
extruders



Reality:
Heterogeneous mixing

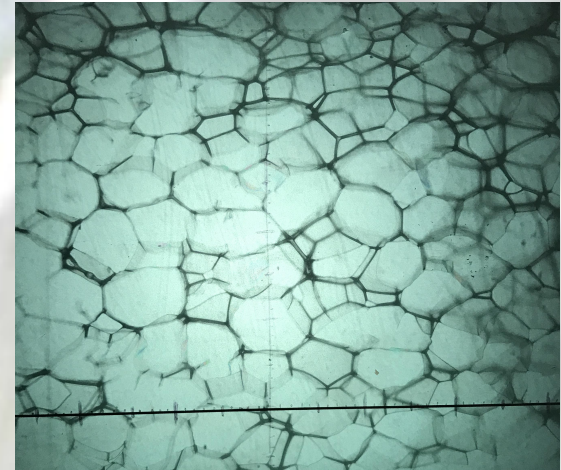
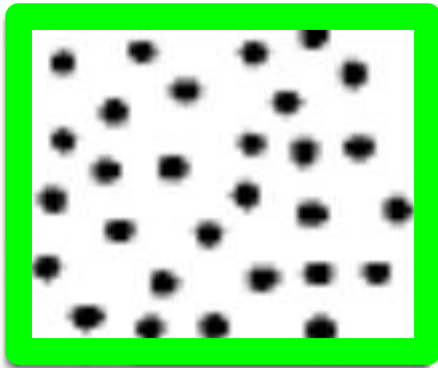


result of all extrusion
technologies!!!!

“Foam MRS”

Reality: Gneuss MRS

Very low densities possible

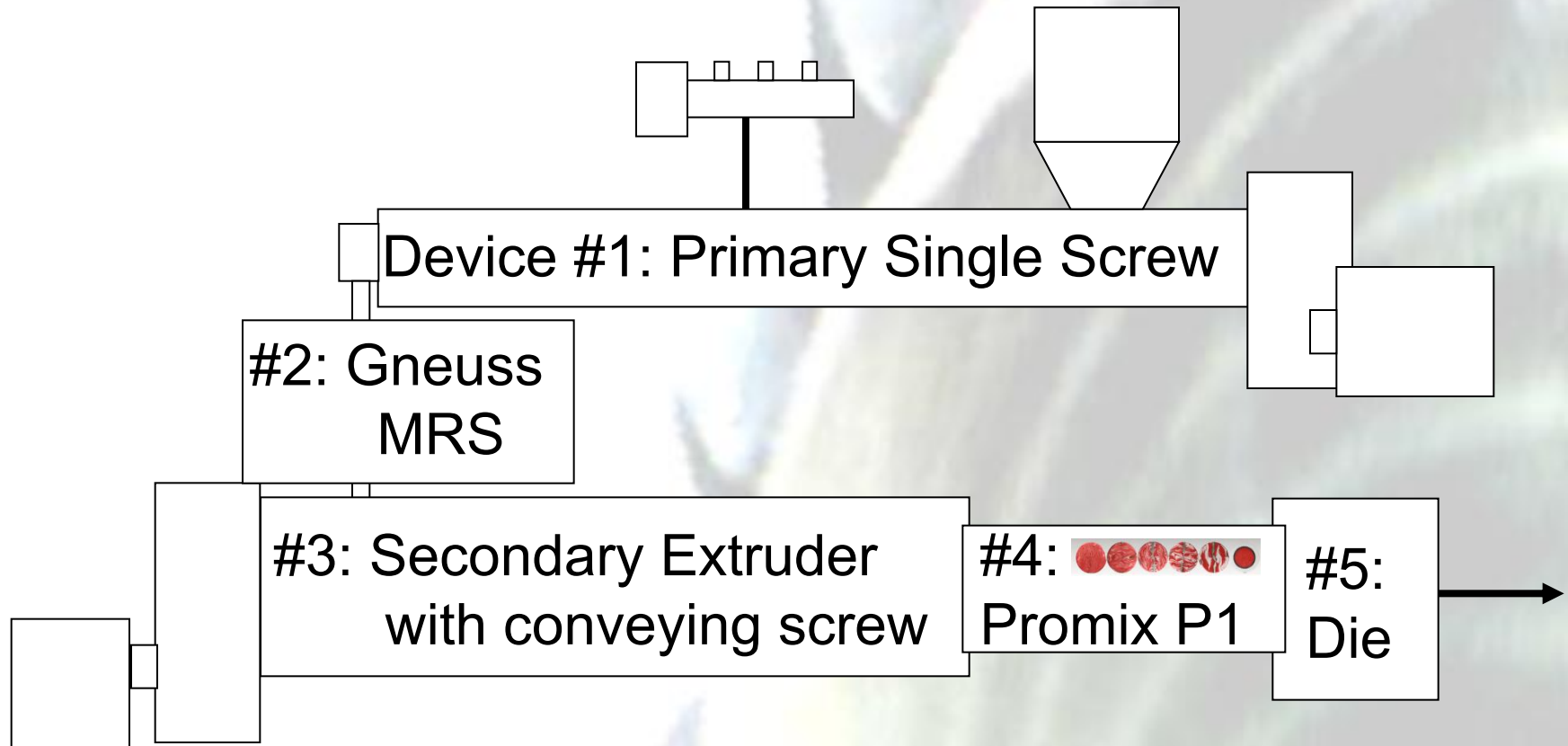


Density 27kg/m^3
Compression 300kPa
25mm; Gas: 152



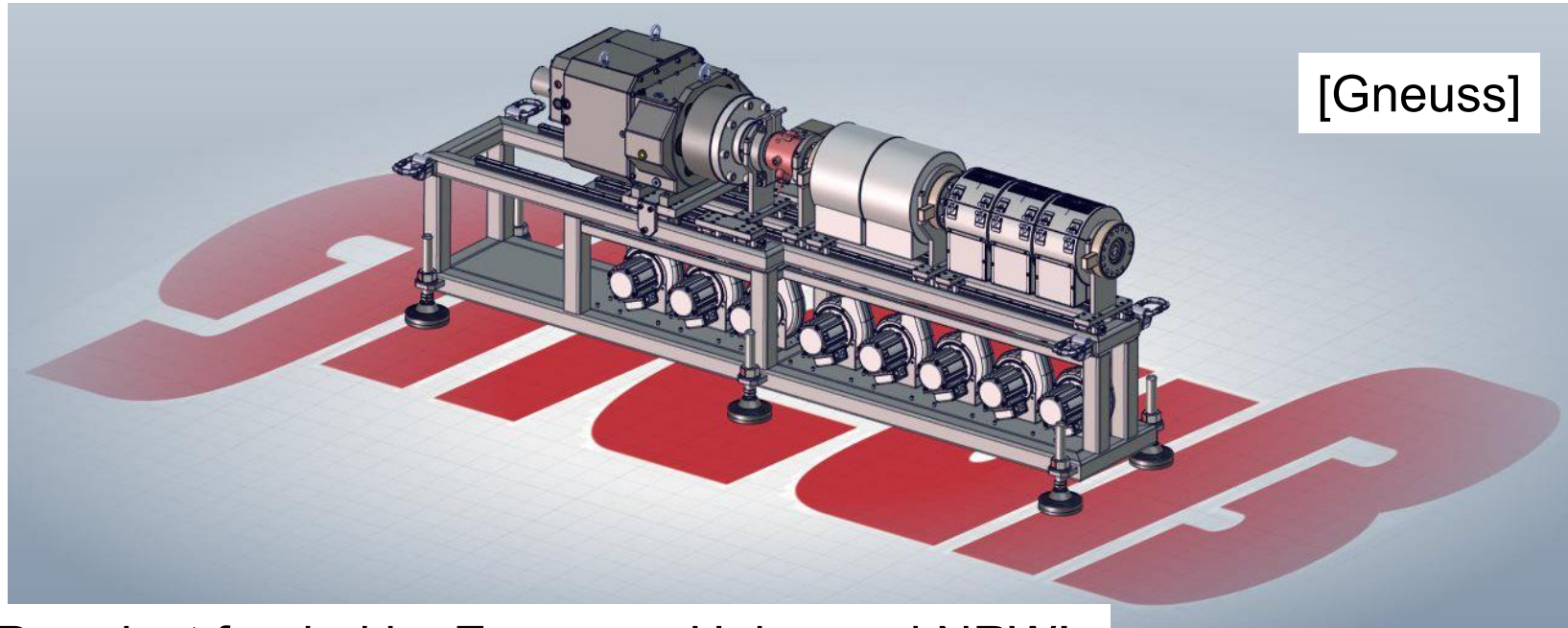
CO_2 , HFO, 134a much better to be used when homogeneous mixing!

Separating the process steps



R & D

Further development of the MRS to perform chemical reactions online (Chain extension; chemical binding,...)



R&D project funded by European Union and NRW!



EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds
für regionale Entwicklung



EFRE.NRW
Investitionen in Wachstum
und Beschäftigung

R & D

1990

1995

2000

2005

2010

2015

**grooved feed &
Barr primary**

Battenfeld

(Start twin screws)

Berstorff

Myung IL

**melt
pumps**

Battenfeld

Berstorff (KMB)

Chi Chang (CCM)

cross over

sulzer aixfotec

Promix P1

Gneuss MRS

**cooling
screws**

Battenfeld

Davis Standard

Berstorff (KMB)

- regular (old)

- conveying

Battenfeld

Sunwell

Turbo Screw

Davis

Standard

R & D

Market Securement & Expansion:

- Costs reduction by technical improvements
- product optimizations
- market share increase with new and/or further developed products

New Technologies:

- R & D (Machinery, Products, market)
- Technol. & Licence Fees

Company Analysis:

- Training (people, foam theory & praxis, work procedures)
- Process analysis
- Future Strategies