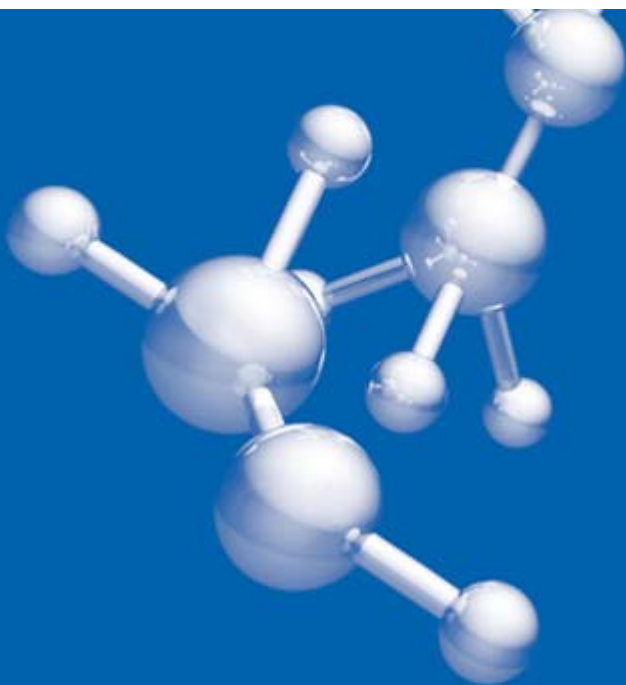




# Lurgi Zimmer



Lurgi Zimmer GmbH  
Your Polymer Company

CREON  
Moscow, February 17, 2009

*Speaker: Gerald Kriesche, Director Technologies*

# History



**Lurgi Zimmer**

- 1950 Founded by Hans J. Zimmer
- 1991 Affiliate of Lurgi Group, Germany
- 2000 Affiliate of MG Group, Germany
- 2005 Affiliate of GEA Group, Germany
- 2007 Lurgi Zimmer GmbH: affiliate of Lurgi AG  
(since 2007: Lurgi GmbH, member of Air Liquide Group)



*Hans J. Zimmer*



# Product Portfolio



## Zimmer® Polymer Technologies for Polyesters and Polyamides

### Packaging Resin

PET Bottle  
PET Film  
PA 6 Film



### Textile Filaments Staple Fibers

PET  
PA 6  
PTT



### Industrial Yarns

PET  
PA 6  
PA 6.6



### Engineering Plastics

PET  
PBT  
PA 6



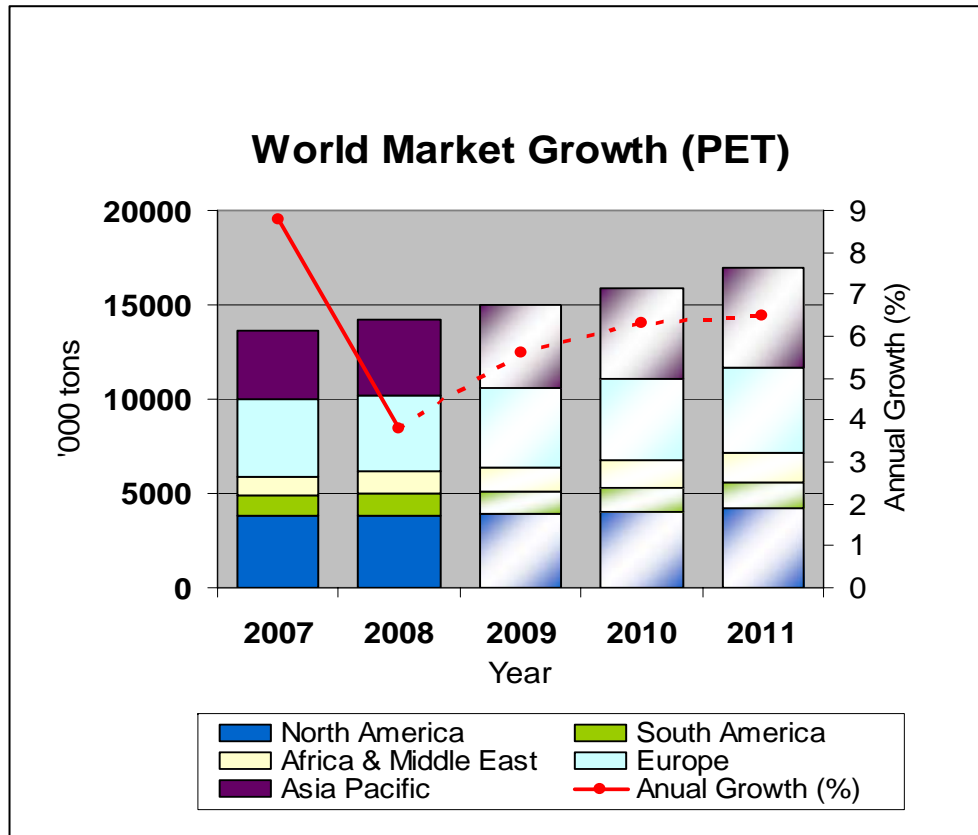


- PET Market
  
- PET Technology – Latest Development – Lurgi Zimmer’s Glycol Jet Improved Additives
  - Color Management for Bottle Grade (no Cobalt)
  - UV Absorption Technology
  
- PBT Technology Overview / PTA Route
  - PBT continuous 3 Reactor Process
  - PBT Batch Process – Disc Ring Autoclave with highest flexibility
  - Distillation of THF results in highest Purity
  
- Summary and View

# Polyester Market Development



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Source: PCI (Direct Information/email 11/29/08)

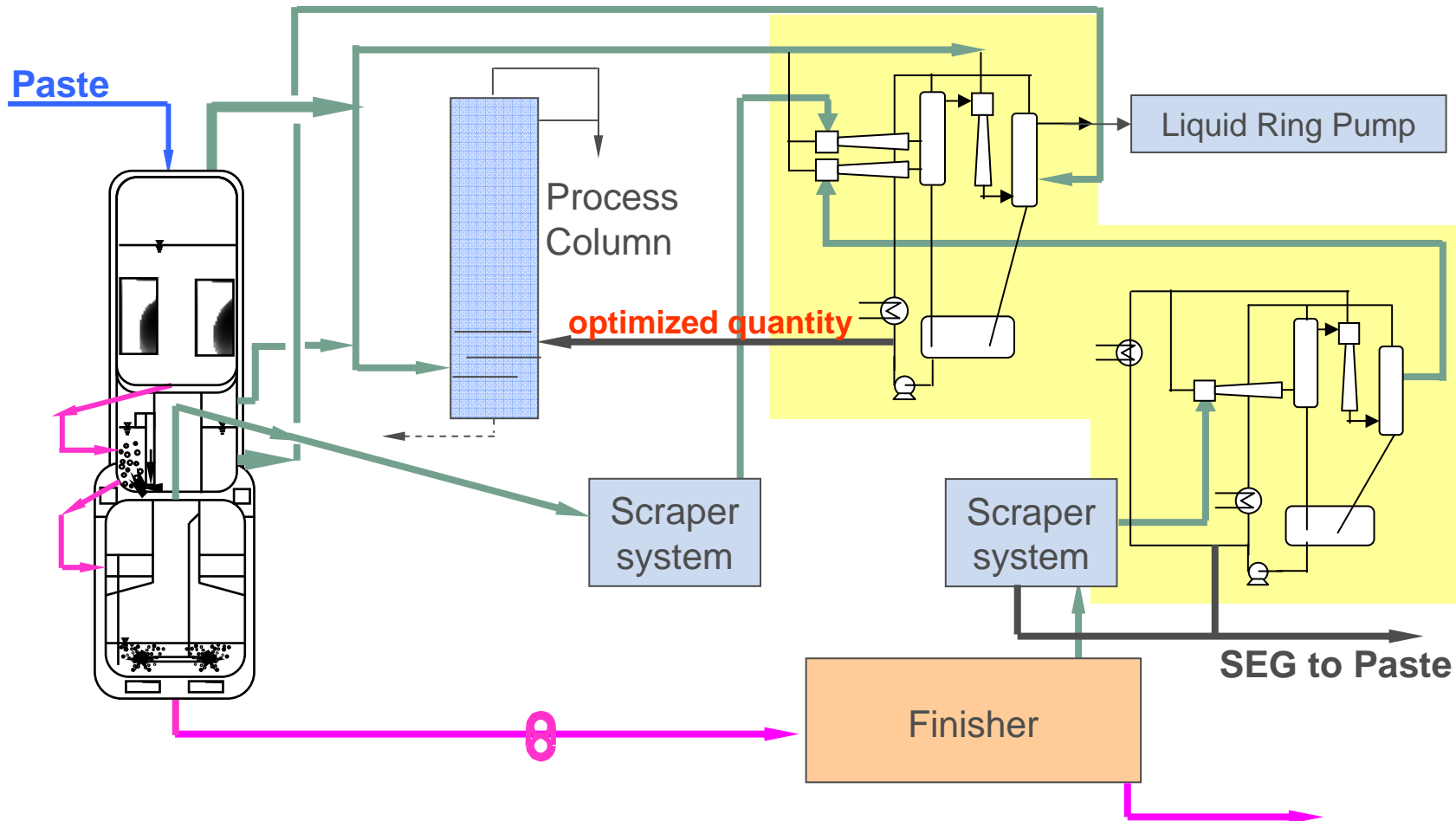
- China and India dominate textile market
- Significant overcapacities in China
- Substitution by new polymers

# PET Technology – Latest Development



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**Optimized EG Jet System reduces fuel oil consumption by using vapours from esterification directly to generate vacuum with optimized vapour condensation (fuel oil reduction by 3 – 6 kg/t) and 6 – 8 KWh/t electrical power reduction**





### **Advantages of the New Color Technology – Goodbye, Cobalt!**

- Reduced overall metal content in polymer
- Reduced stabilizer content
- New recipe: Maximum, 3 ppm dyestuff (1 ppm normal)
- All food contact regulations-friendly
- Coca-Cola approval available

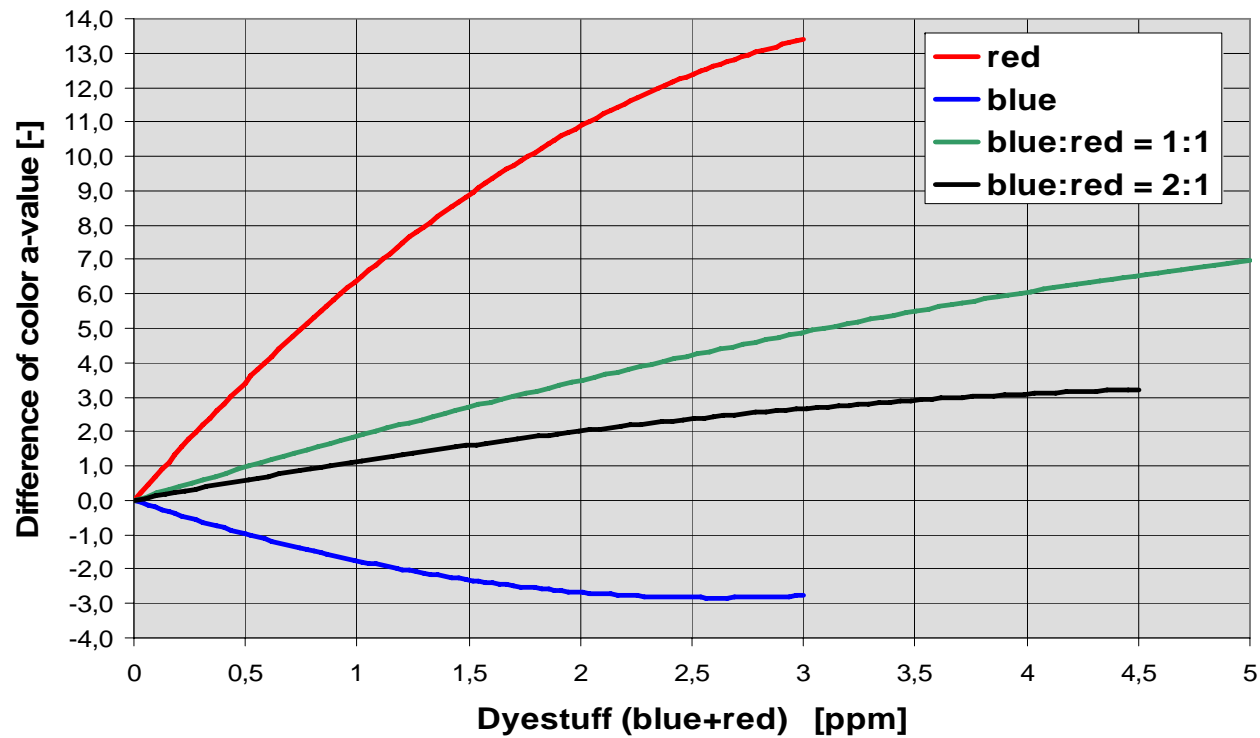
### **What's the impact?**

- Significant cost reduction
- Same color results achievable as with Co
- Independent correction of b- and a-color possible; L correction dependent
- Proven and well-known feeding system



## Now – Adjustment of a-Value possible

Difference of color a-value measured on crystallized pellets depending on the amount of dyestuff (blue+red)

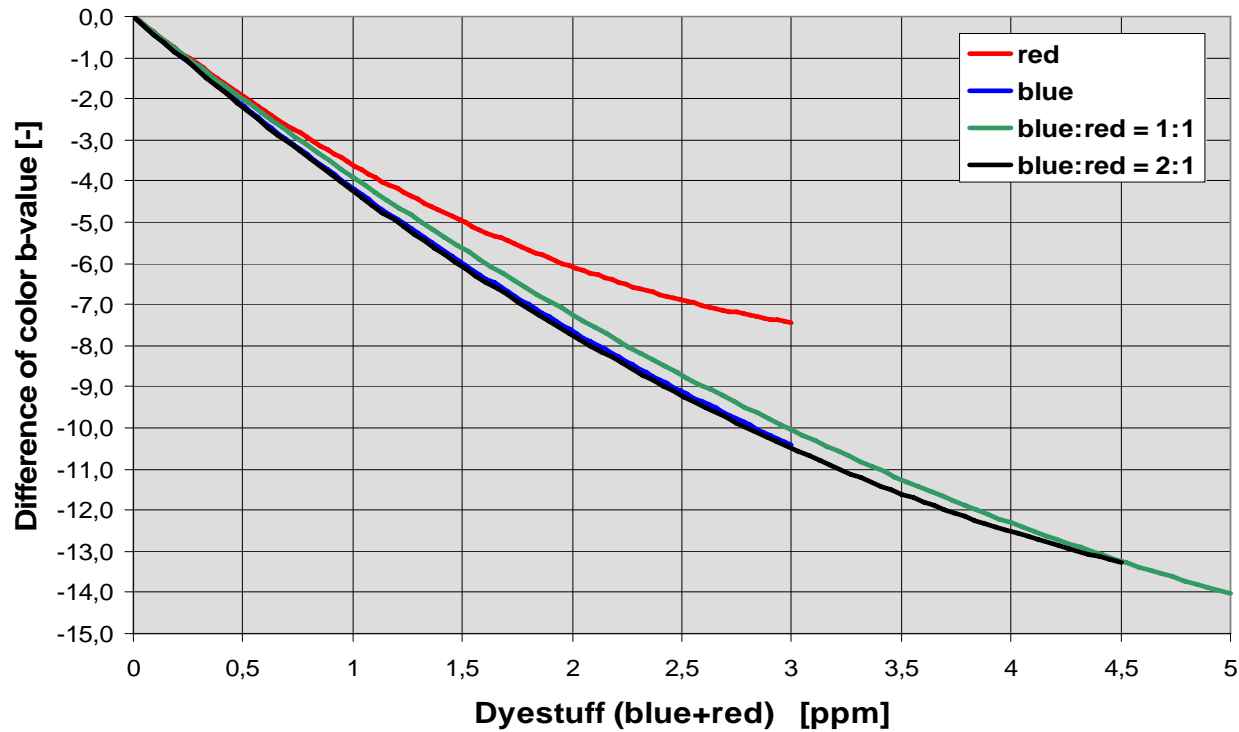






## Example – Adjustment of b-Value

Difference of color b-value measured on crystallized pellets depending on the amount of dyestuff (blue+red)





### **Advantages of the New UV Technology**

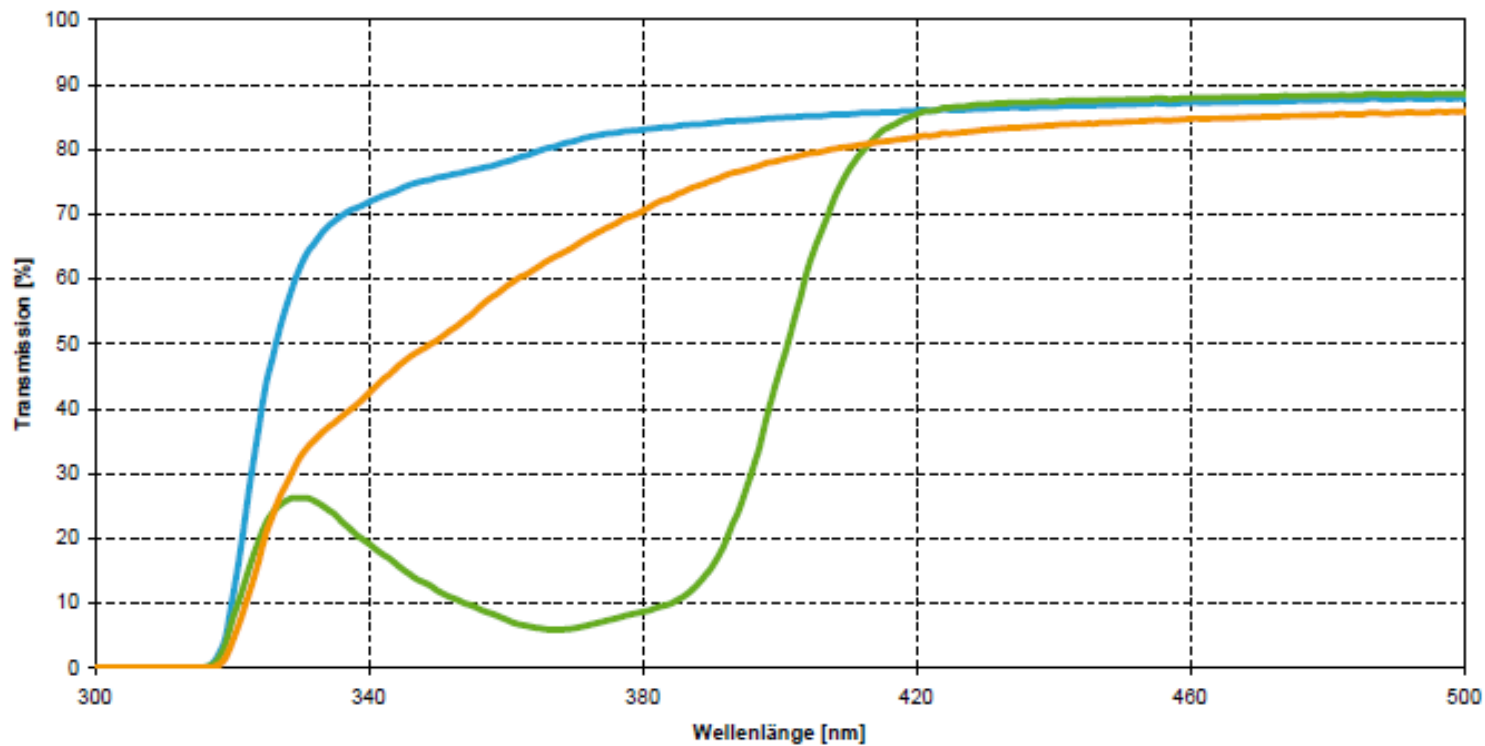
- Reduced UV stabilizer content in polymer
- No influence on polymer quality parameters
- New recipe recommended: max 3.000 ppm
- All food contact regulations-friendly

### **What's the impact?**

- Significant equipment cost reduction
- Same UV results achievable as with other high level market products (protection area 385 – 420 nm)
- No color correction necessary
- Proven and well-known feeding system



## UV-Spectrum of PET Film using the new UV-Technology



Blue: without    Green: 3.000 ppm UV-T    Orange: Market product

# Properties and Application

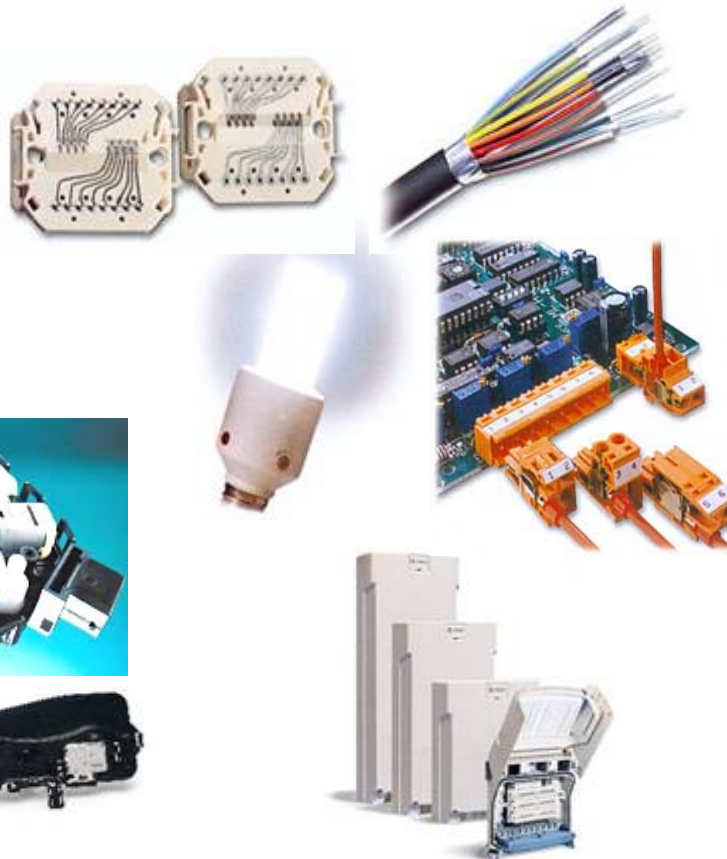


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## Automotives



## Telecommunication & Electronics



## Household



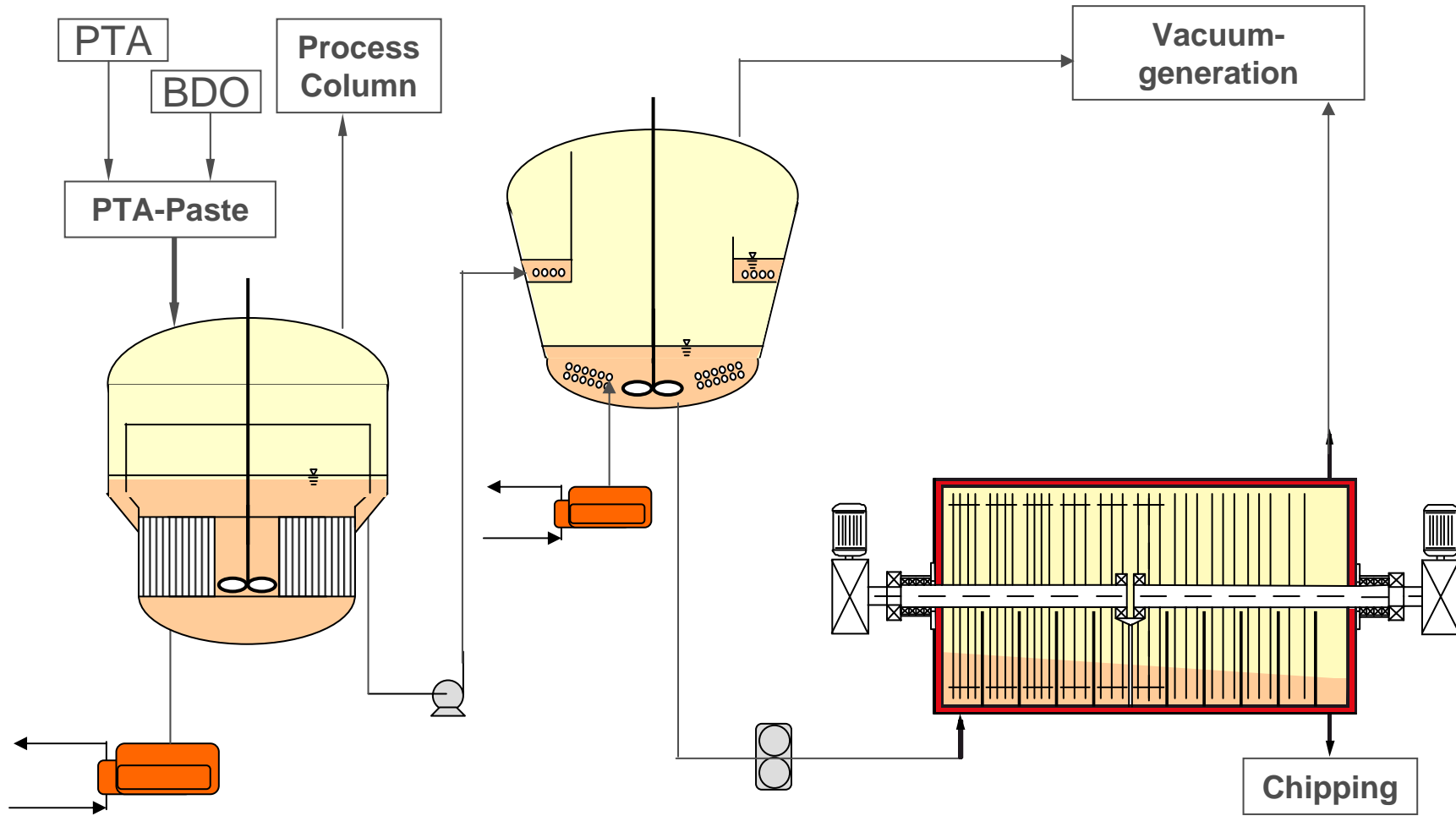
## Technical plastics



# PBT 3 Reactor Process



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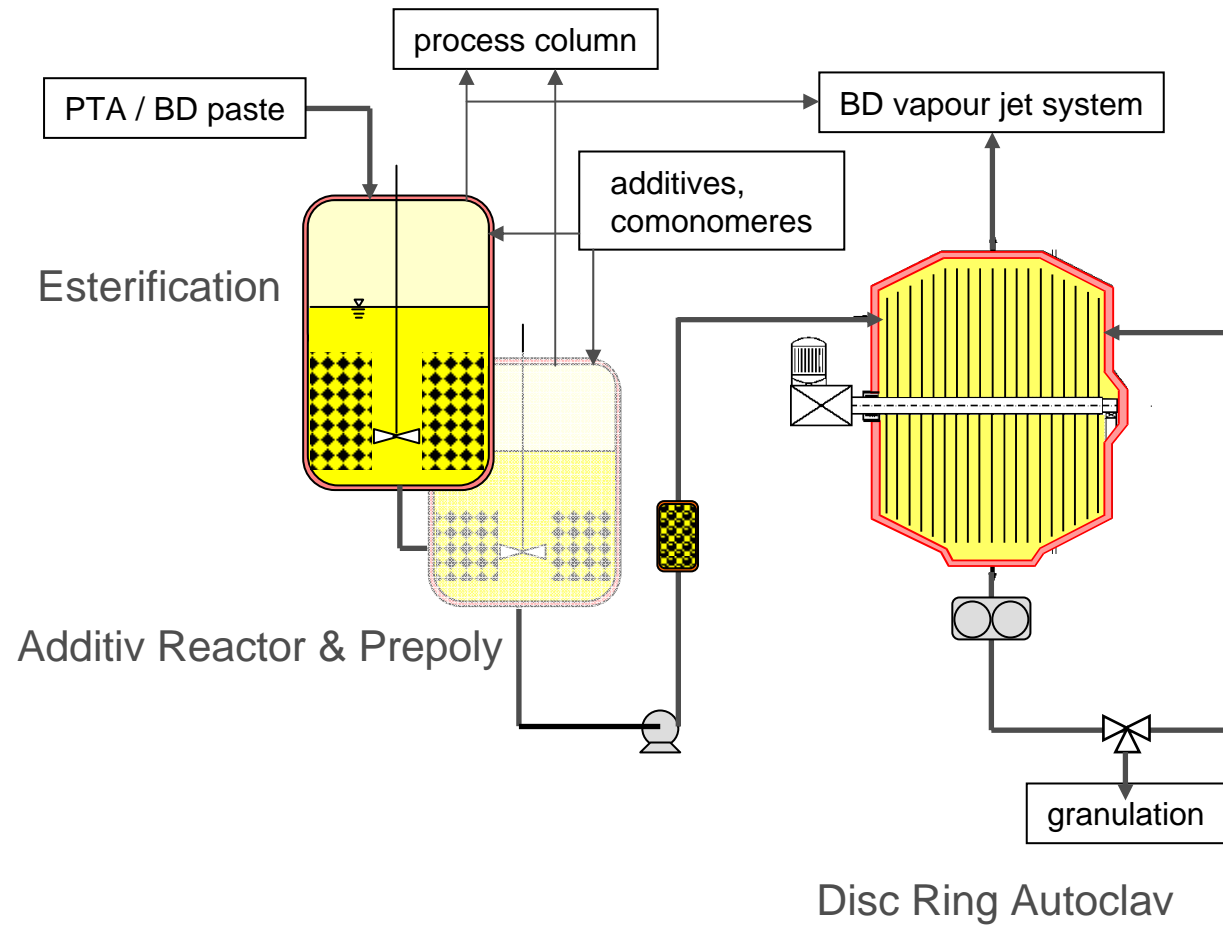
Well proven commercialized technology based on Raw Material PTA  
(DMT is expensive and availability limited)

- Four successfully started up since 2000
- Demonstrated capacities up to 200 t/d  
– design capacity up to 500 t/d available
- One additional line under execution (start-up 2009)

Advantages of this process

- IV easily adjustable between 0.7 and 1.2 dl/g
- Low catalyst content resulting in better color and lower costs
- Highly efficient esterification stage for best conversion
- Proven 2 stage THF recovery with > 99% purity

# PBT Batch Process



- Highly flexible
- Quick product change
- No viscosity drop





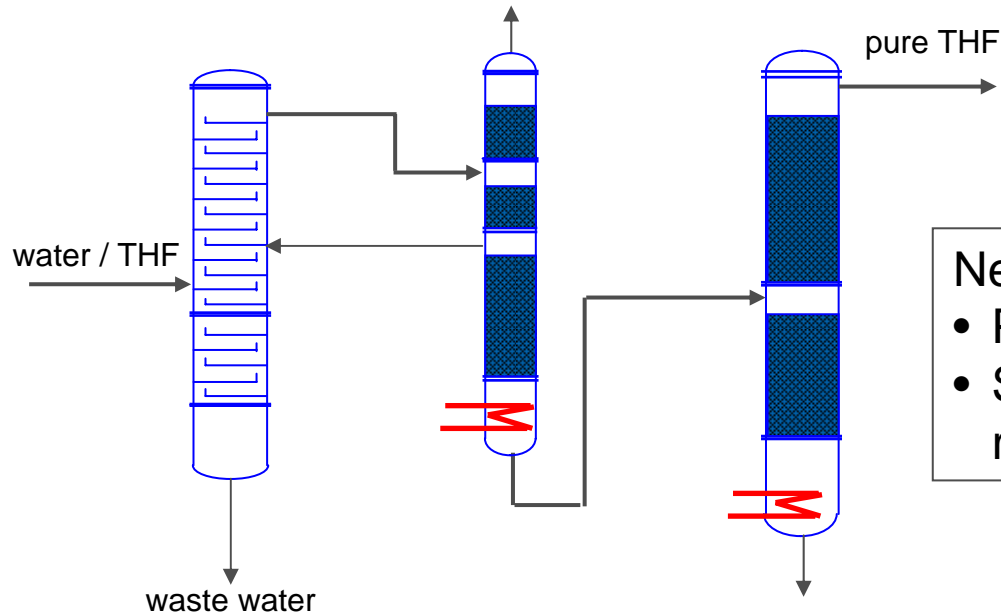
This is the right process for the production of specialities  
(high market products)

### Disc Ring Autoclave

- Capacities up to 120 t/day (single line) available with highest flexibility
- Very fast adjustment of different viscosities without any transition material
- Special designed Disc Ring Autoclave with polymer circulation  
(‘finisher’ based on same principles as for continuous process)
- Vacuum from max. 200 mbar to < 1 mbar
- Extrusion of the batch under vacuum like in the continuous process
  - 80 t/day Batch Line for PET (bottle grade and PET film) in operation
  - 90 t/day Batch Line for special polymer will be started-up by Lurgi Zimmer in II/2009



# THF Distillation – highest Purity



New 3 stage THF recovery

- Proven THF purity > 99.95%
- Satisfies latest market requirements

Suitable for polycondensation to polytetramethylene glycol

- ✓ Thermoplastic elastomers
- ✓ Thermoplastic polyetherester
- ✓ Usable for special fibres
- ✓ Thermoplastic polyetheramide



- Difficult market situation expected in this year
- Development of cost efficient technologies even more important
- Eco-friendly trend in the PET industry must also be factored into our thinking

### Résumé

- Future polyester plants having higher capacities will also need to be more compact, energy efficient and save space
- PBT is an excellent polymer and meets the high requirement of the industry (especially compounding – engineering plastics – etc.)

# Contact



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