

**ENGEL**

# **Company Presentation**

## Welcome

# Our vision

## Our mission

### Our vision

- be the first – World market leader in creating customer benefit in injection moulding solutions

### Our mission

- Customer proximity: individual solutions to meet the needs of our customers
- High innovation strength: trend-setting technologies
- Traditional values: family-owned company with highly qualified and committed employees

### Our strategy

- Globally uniform quality
- Sustainability
- Innovation

# Facts and figures

**Turnover** ENGEL worldwide (FY 16/17)

1,36 Mrd Euro

**Breakdown of turnover** by continents

55% Europe | 24% America | 20% Asia

**Staff** ENGEL worldwide (FY 16/17)

5,900 employees

**Staff** ENGEL AUSTRIA (FY 16/17)

3,500 employees

**Average growth** since FY 07/08

10%

**Target for growth** per year until FY 18/19

5%

# Facts and figures

## Foundation

1945 by Ludwig Engel

## Ownership

The company is 100% family owned

## Board of directors

Stefan Engleder (CEO)  
Christoph Steger (CSO)  
Markus Richter (CFO)  
Joachim Metzmacher (CPO)

## Investment volume (FY 17/18)

50 Mio. Euro

## R&D investment per year

70 Mio. Euro

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**combimelt**

# combimelt

## Why combimelt ?

### Potentials

- Improvement of design
  - Variants of colour, haptik, etc.
- Improvement of product properties
- Reduction of process steps
  - Assambly, painting etc.



# combimelt

Which market areas for combimelt?

## Bussiness Units

- Automotive
- Technical Moulding
- Medical
- Teletronics
- Packaging



# combimelt

## Applications

### Process variations

- multicolour parts
- rigid-soft bonds
- thermoplastic – rubber bonds
- thermoplastic – LSR bonds
- assembling moulding



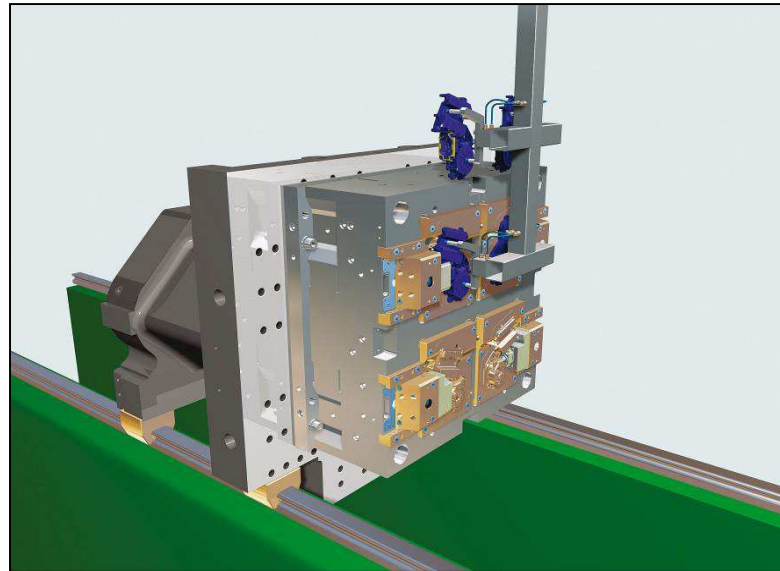


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## Mould concepts

### Transfer moulding

- Max. design freedom
- No costs for rotary unit
- Difficult mould adjustment
  - Finding the value of not finished shrinkage
- Robot necessary

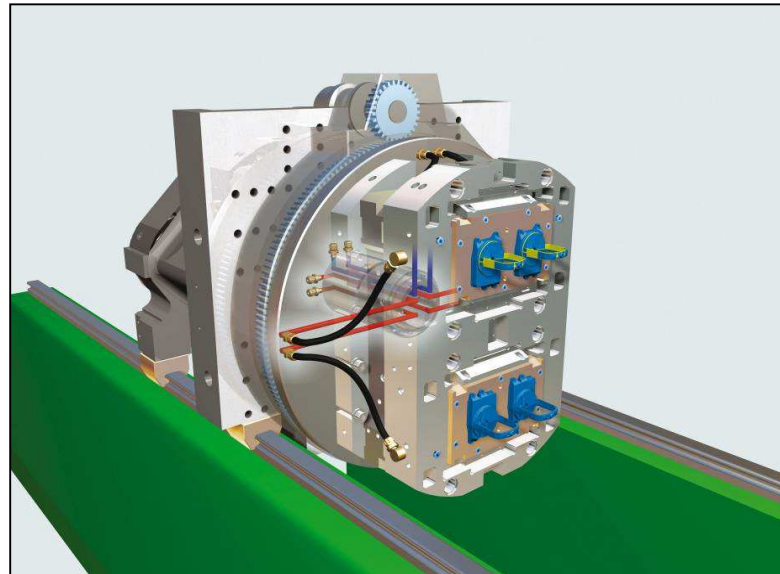


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## Mould concepts

### Rotary table technology

- Traditional standard technology
- Robust and compact
- Limited design freedom
  - Ejectorside equal in each station
- Rotary unit as a part of the machine
- Media manifold and plate ejector necessary
- Ejector clutch not recommended

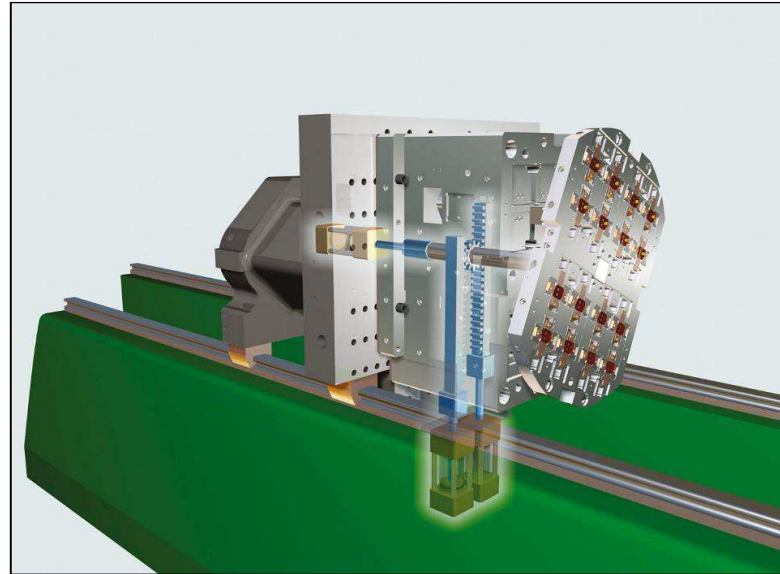


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## Mould concepts

### Indexplate technology

- Increased design freedom
- Rotary unit most times element of the mould
- Higher danger of wear
  - Lift off and thread back of the index plate
- Machine ejector used for the axial move of the indexplate
- Ejector in the mould necessary

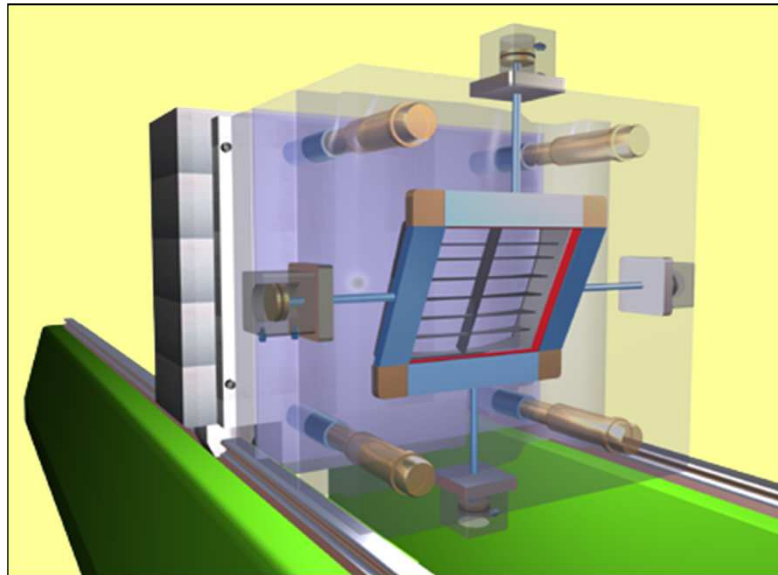


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## Mould concepts

### Coreback technology

- Smaller machine possible
- More compact mould
- Alongated cycletime because of sequential process
- Special software necessary



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## Mould concepts

### Rotary plate technology

- Same technology as rotary table
- Optimal for Combi-M machines
- Clamp force reduction possible
  - Stack mould technology
  - No force eccentricity

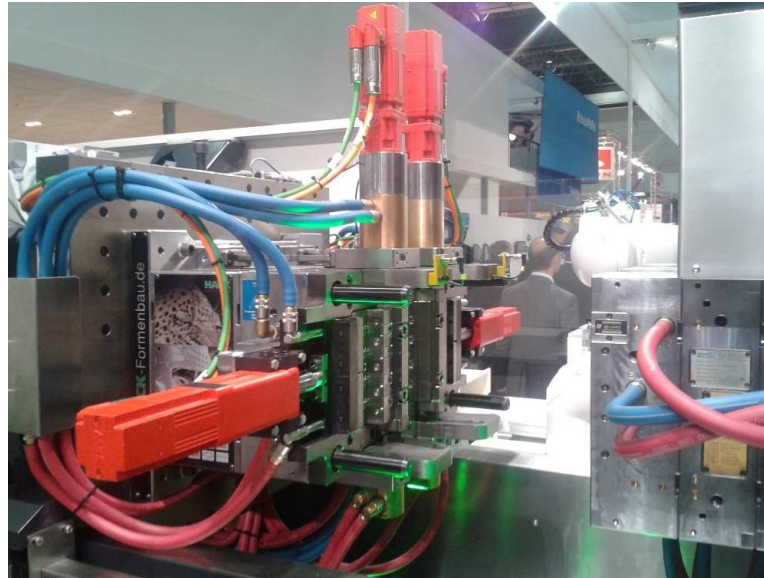


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## Mould concepts

### Spin-stack technology

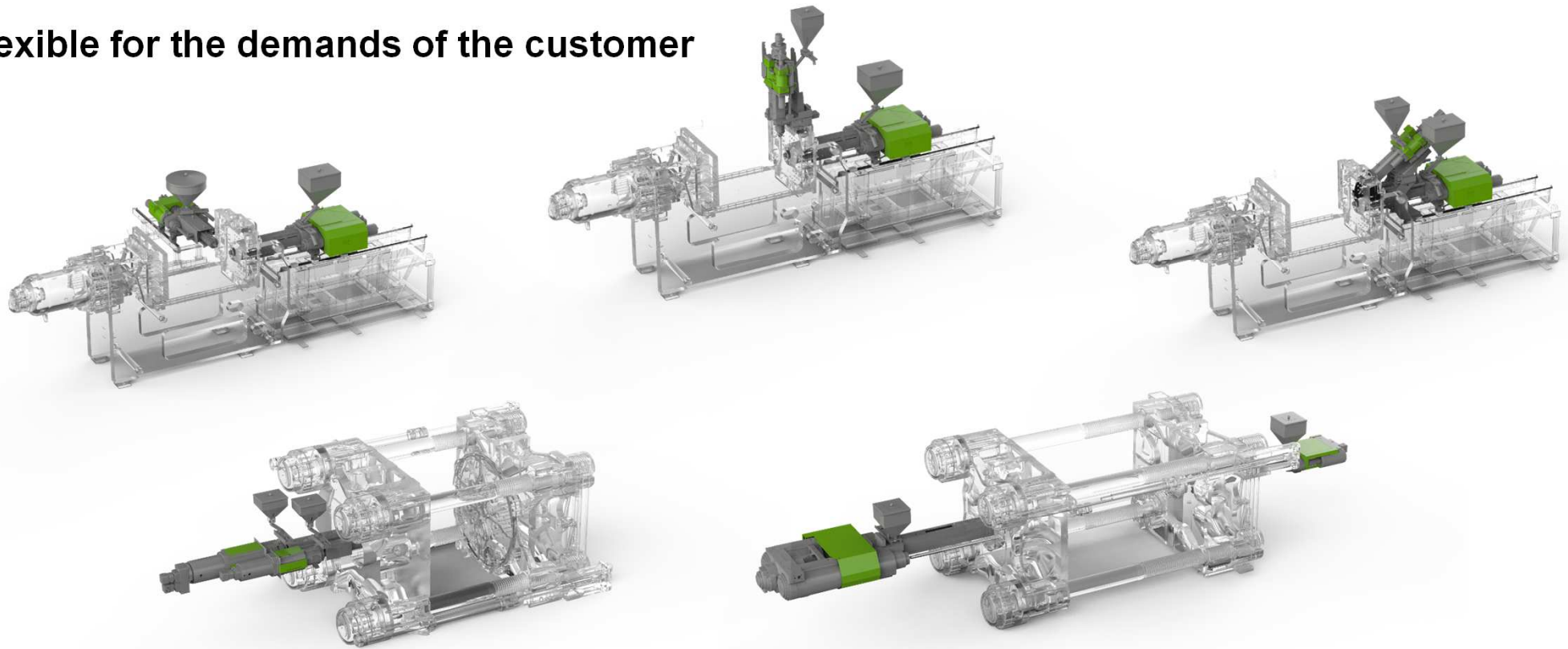
- Same technology as index plate
- Reduction of moved masses
- Reduction of rotary times possible



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## Machine concepts

Flexible for the demands of the customer



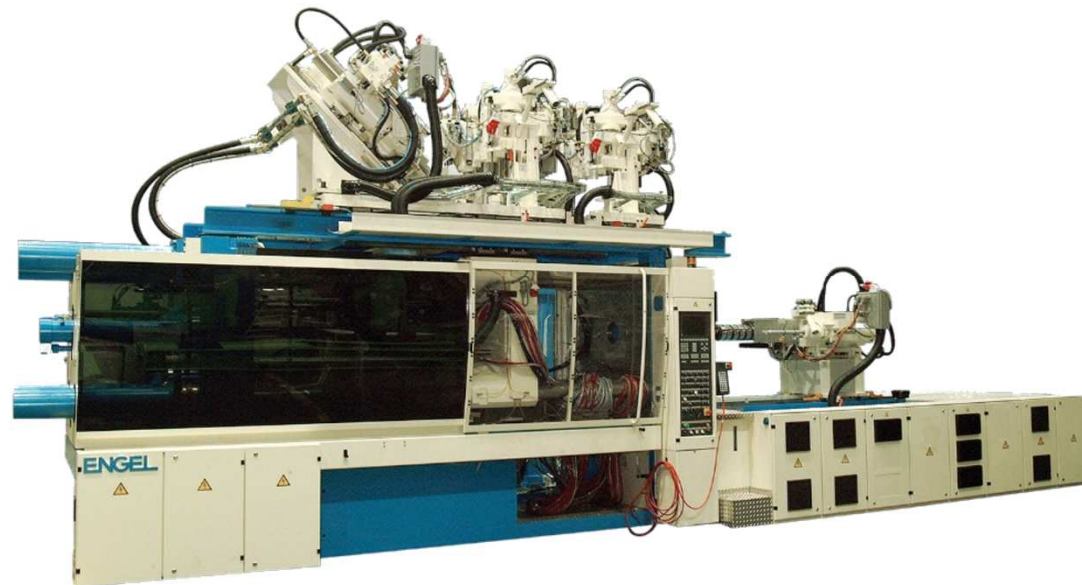


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## Machine concepts

### Spezial solutions

- Up to six injection units possible





## duo 4400H/2500H/700 combi

- **seat shells** for office chairs produced with the help of co-injection technology
- stiffness in the backrest and flexibility in subzones of the seating area combined in one unit



## **duo 4400H/2500H/700 combi**

- core material: polyamide glass-fibre reinforced – skin material: polyamide unreinforced
- class-A surface in the visible areas of the backrest
- greater wall thickness without sink marks through chemical foaming in the core component

## duo 4400H/2500H/700 combi

- stiff and flexible at the same time → highest comfort
- **co-injection technology**  
combined with chemical foaming



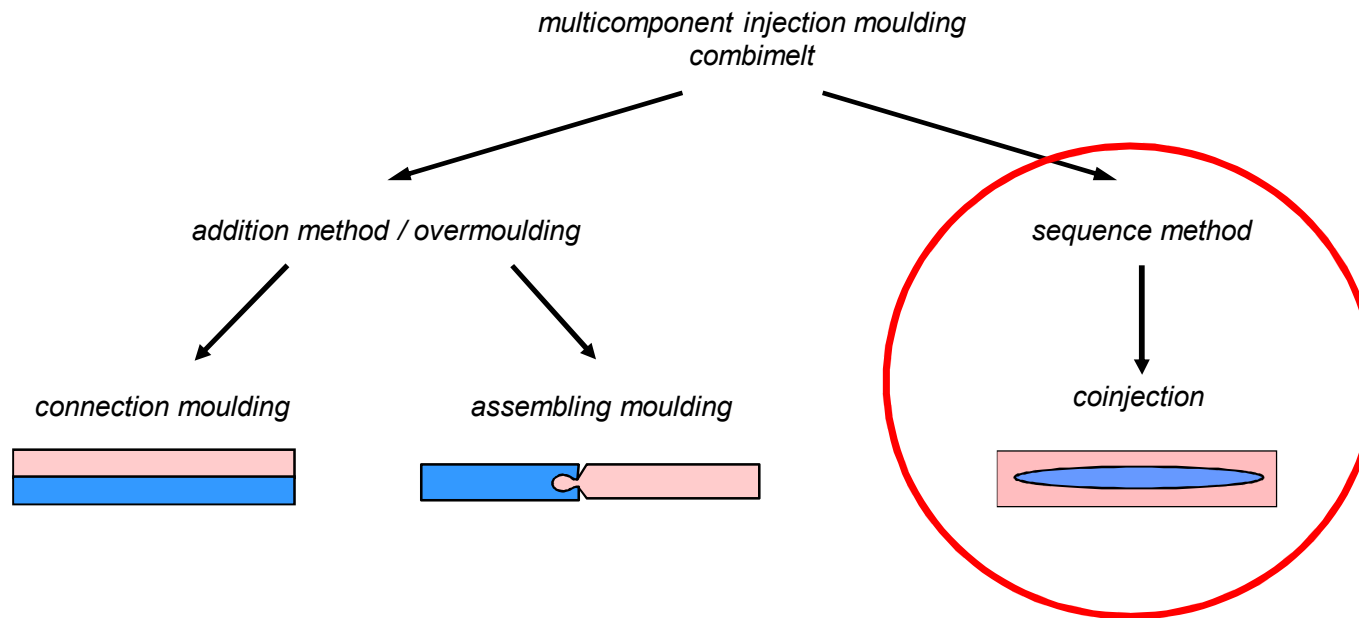
office chair „IN“  
company Wilkhahn

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**coinjection**

# coinjection

Coinjection is a special part of the multi-component technology



# coinjection

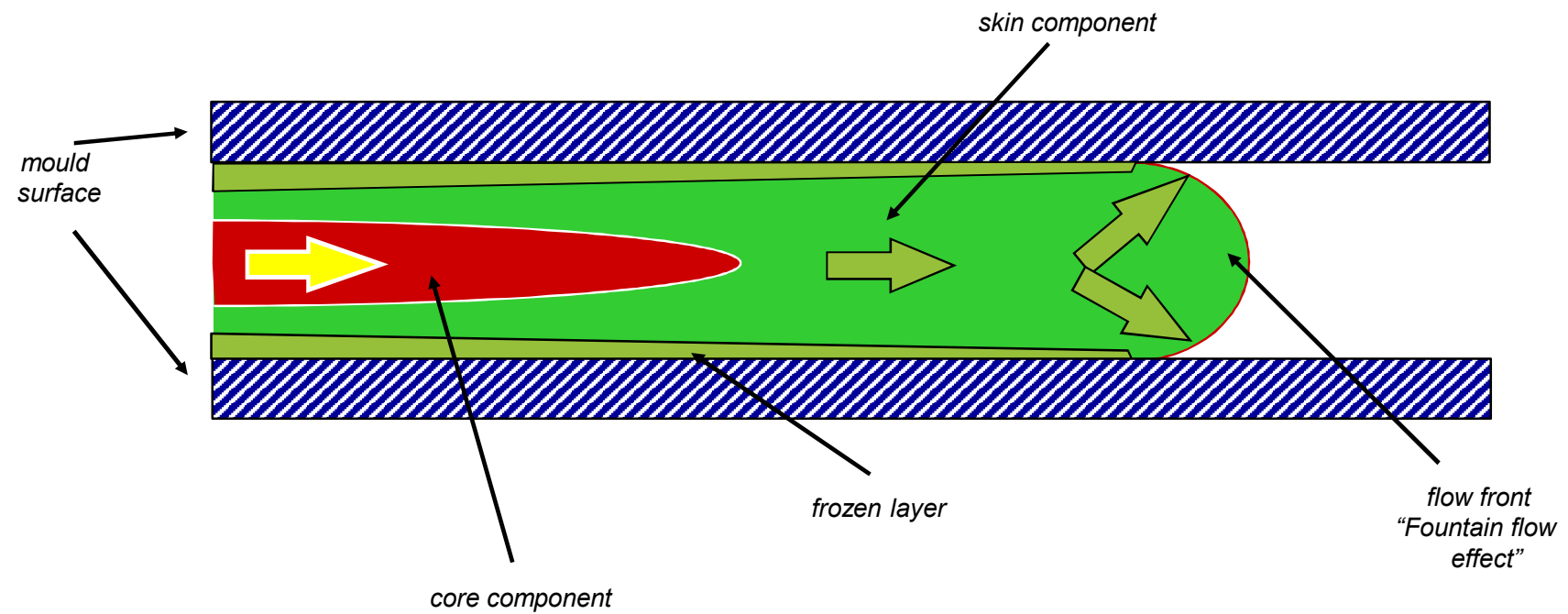
## Why coinjection?

### Application field

- Cost reduction
  - Cheeper material for the core component
  - Using of recycled material
  - Foamed core material
- Increase of part properties
  - Higher mechanical strenght in spite of high surface quality
  - Combination of galvanize skin- with reinforces core component
  - Avoid of sinkmarks with foamed corecomponent
  - Etc.
- Marbeling

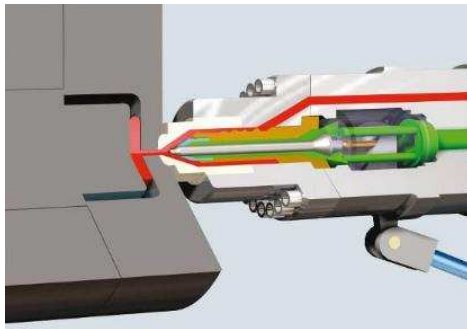
# coinjection

## Physical basic

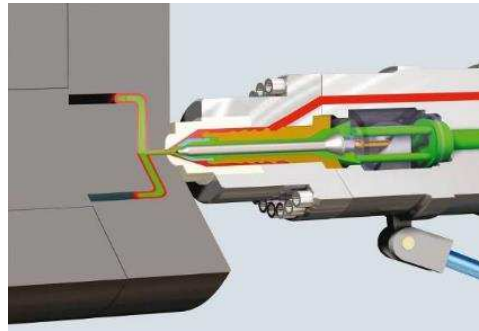


# coinjection

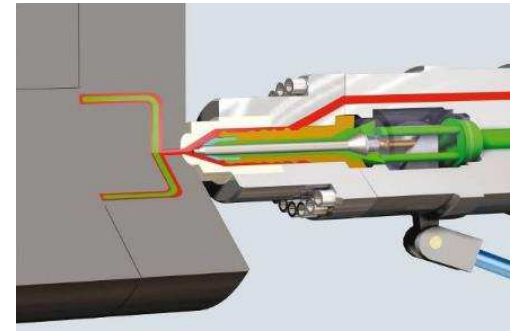
## Process sequences



*1. injection skin material*



*2. injection core material*



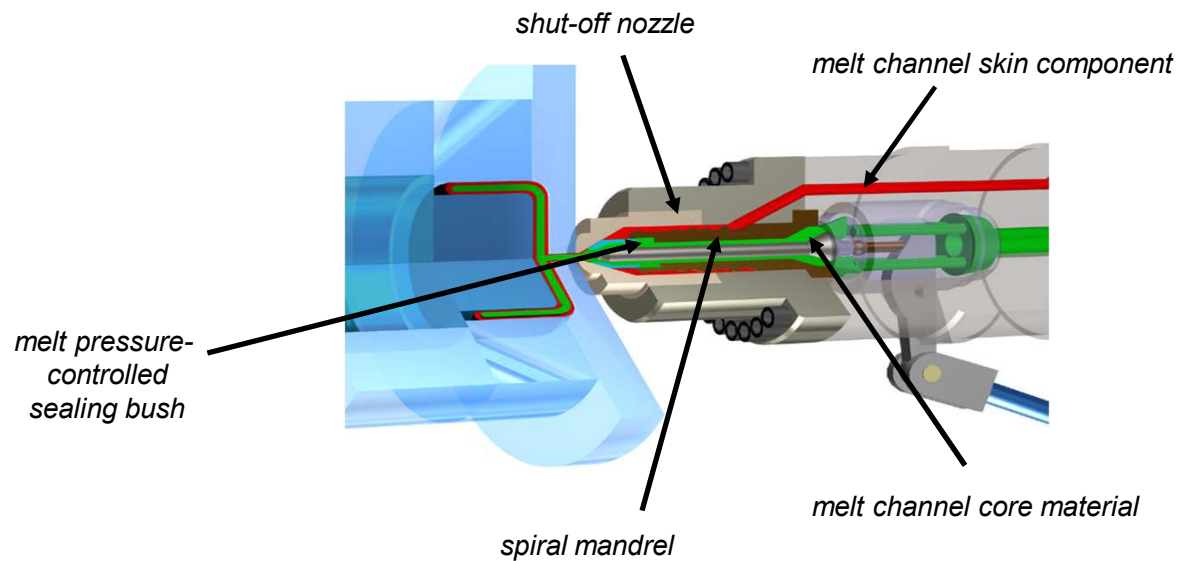
*3. seal off with skin material*



# coinjection

Machine concepts

## Coinjection Nozzle with hydraulic shut-off and meltpressure controlled sealing bush



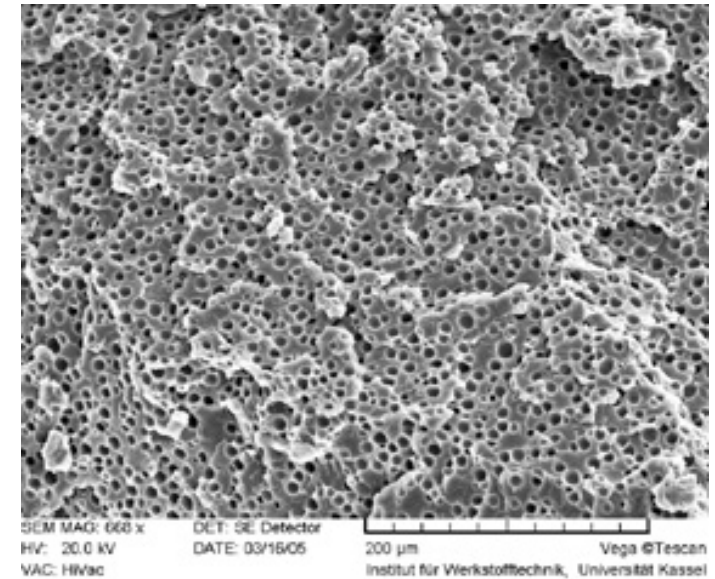
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**foammelt - MuCell®**

# foammelt - MuCell®

## Why foaming of thermoplastics?

- lighter
- more accurate
- more economic



# foammelt - MuCell®

how the gas gets into the part

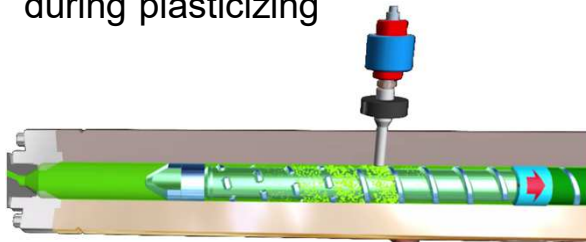
**Plasticizing unit**  
incl. injector  
controlling of N<sub>2</sub> or CO<sub>2</sub>



**Gas supply unit**  
**New T-series**  
Compression and  
controlling of N<sub>2</sub> or CO<sub>2</sub>

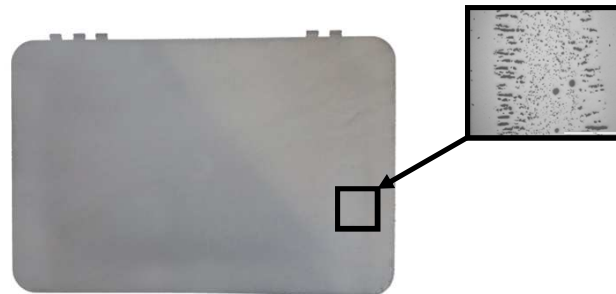


**Dosing of „Super Critical Fluid“**  
during plasticizing



**Injection process**  
and foaming in the cavity

**Foamed part with**  
sandwich structure



# MuCell®

## Execution | overview

MuCell basic package

Higher drive execution

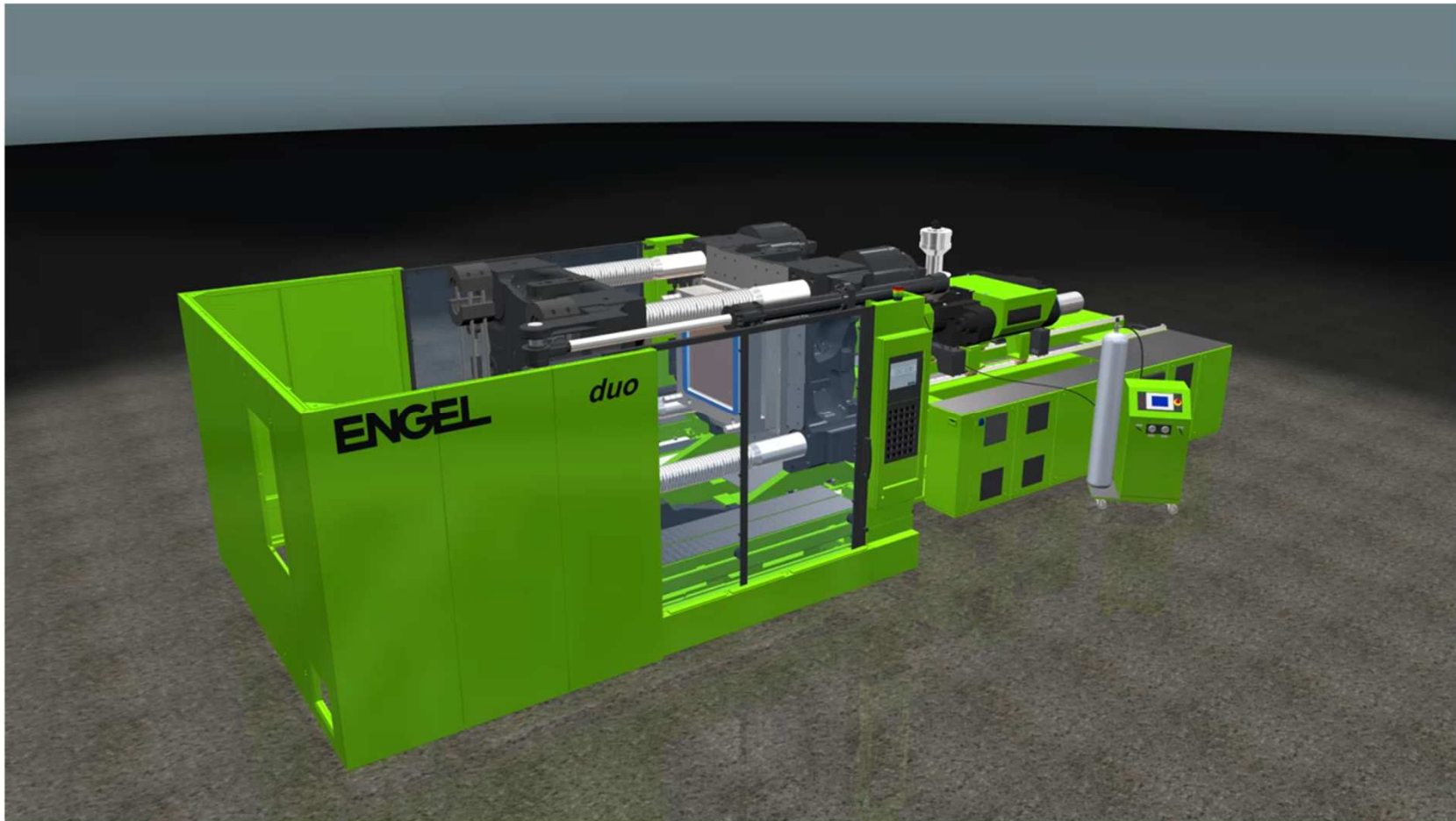
MuCell – gas supply unit





# foammelt - MuCell®

with decompression stroke



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**Thank you**