



BOREALIS

oerlikon
hrsflow



Schneider Form

Kunststoffspritzguss – nach vorn gedacht

SPRITZGIESSEN
next



**Innovation und Kostenreduzierung
durch FLEXflow HRS
& neue Lösungen für den
Multikavitätenwerkzeugbau (Digital Twin)**

**DI Stephan Berz / Oerlikon HRSflow
DI Markus Kralicek / Borealis**

05. Mai 2025

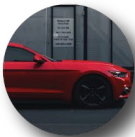
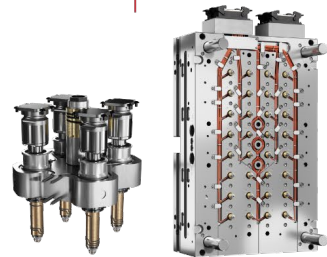
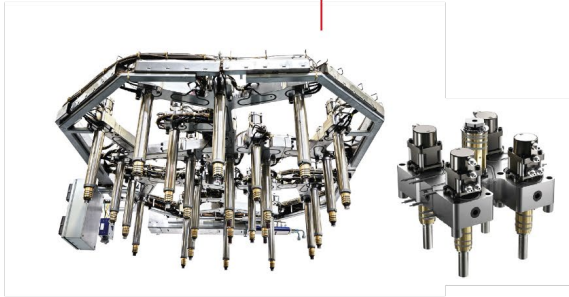
Who we are



Our market activities

oerlikon
hrsflow

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hrsflow



Automotive Exterior



Automotive Interior



Automotive Lighting



Gardening



Domestic Appliances



Thinwall Packaging



Beverage & Home



Beauty & Personal Care



Automotive Underhood



Autonomous & Electric Vehicles



Mobility



Logistic & Environmental



Houseware



Medical & Healthcare



Technical & Electronics

Our worldwide presence

oerlikon
hrsflow



3 production plants (Europe, America, Asia)

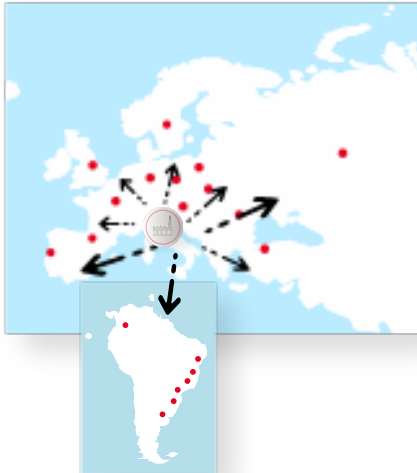
1,035 employees worldwide

52 branches worldwide

3 Production plants with identical global standards



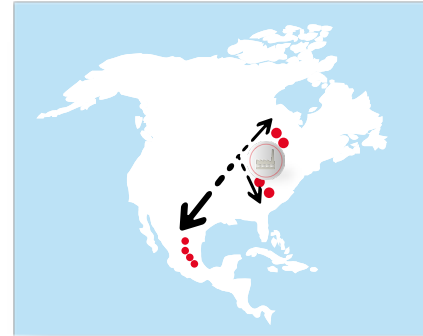
ITALY production plant



CHINA production plant

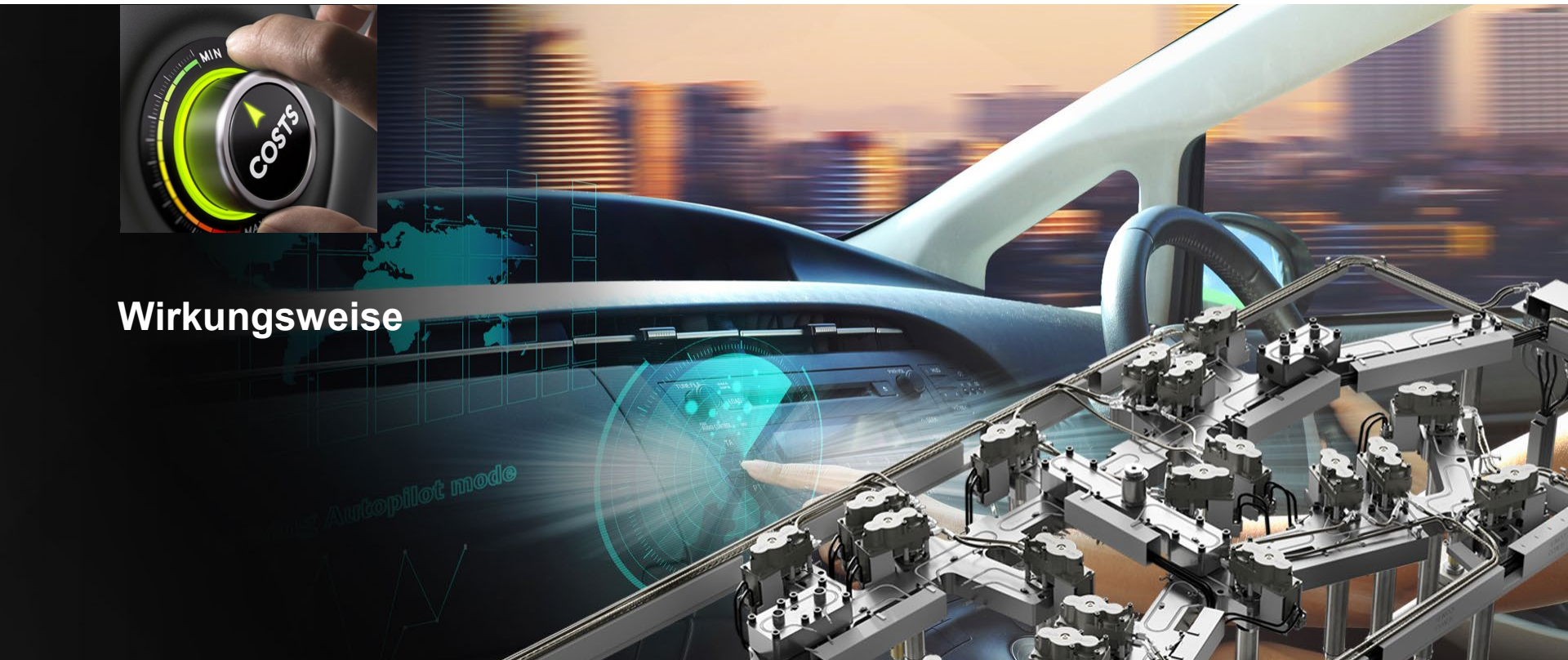


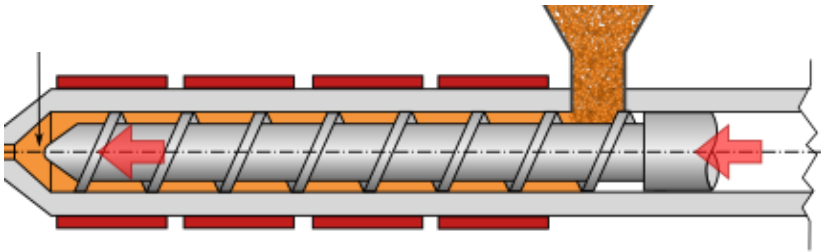
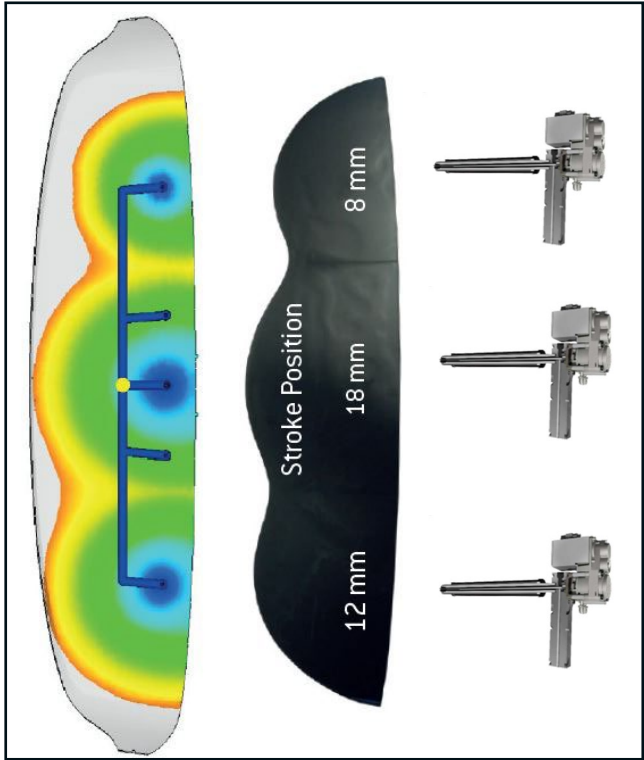
USA production plant





Wirkungsweise

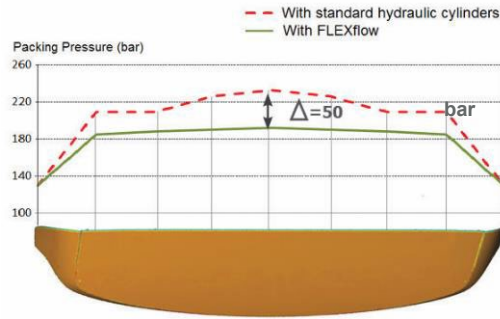




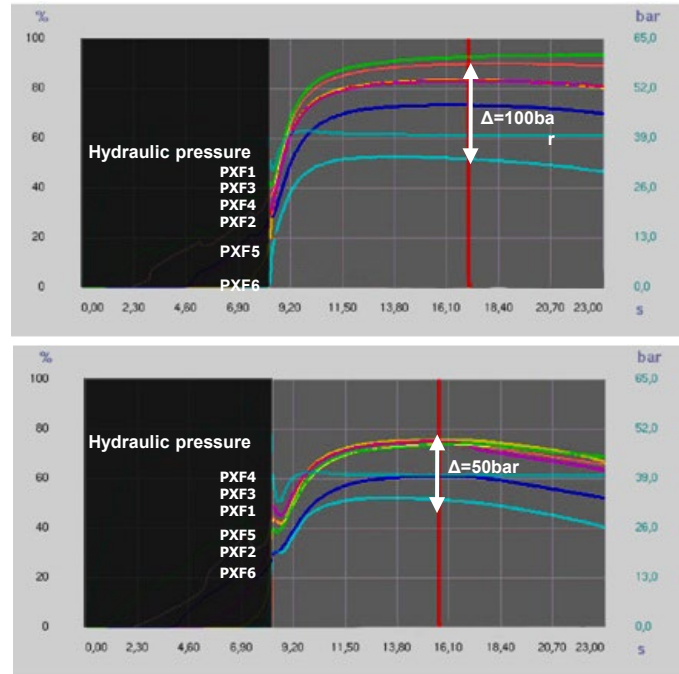
FLEXflow HRS inhouse test mold: Roof spoiler tool

- Pressures are more uniform using FLEXflow HRS
- Delta pressures in the part reduced from 100 bar to 50 bar
- The pressure peak reduced by 50 bar

Holding phase



Exterior



Ohne
FLEXflow HRS

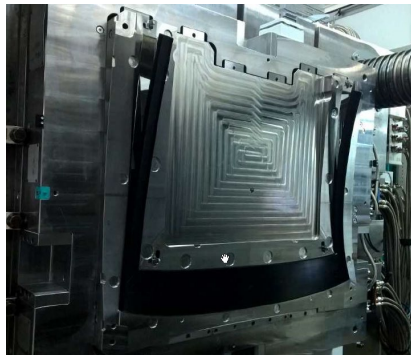


Mit
FLEXflow HRS



Direktanspritzung

U-blende for sun roof



for



oerlikon
hrsflow



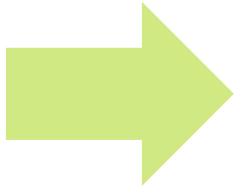
oerlikon
hrsflow



Wandstärkenreduzierung



Wandstärkenreduzierung → Bauteildefekte erhöhen sich → Prozessfenster werden enger



Unsere Lösung FLEXflow HRS macht das Prozessfenster größer
(gleiche Bauteilqualität bei reduzierter Wandstärke)



Verzugsreduzierung



Case study: FLEXflow HRS for sunroof frame for Webasto



by courtesy of

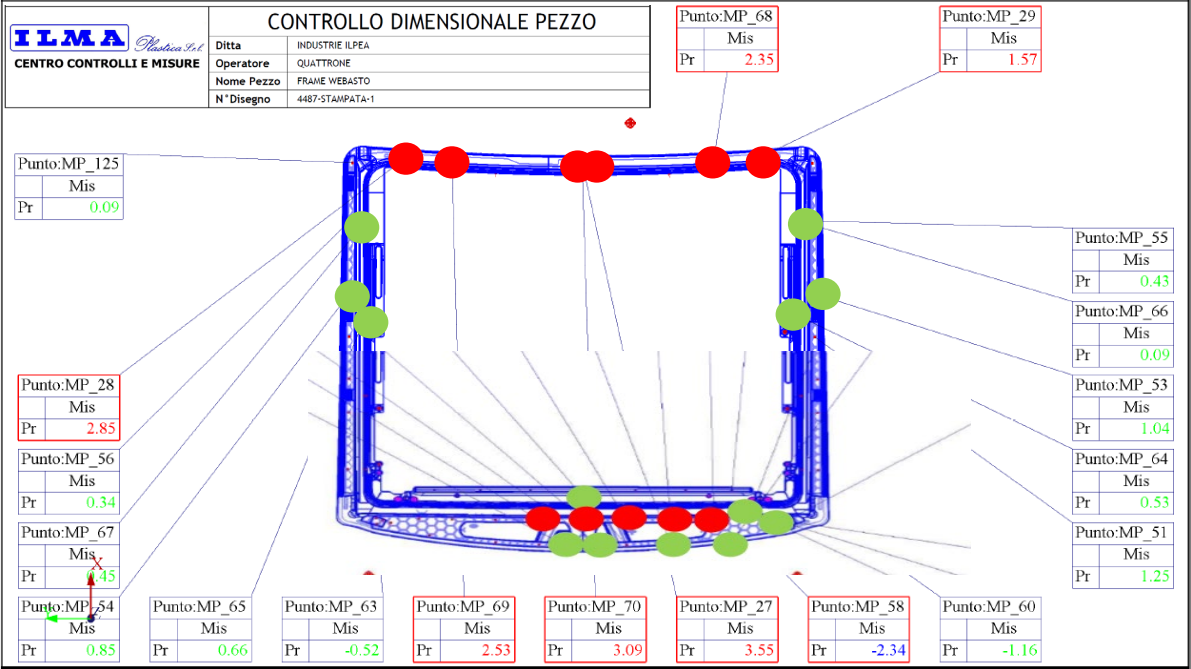


with special thanks to



Glazing

Case study: FLEXflow HRS for sunroof frame for Webasto



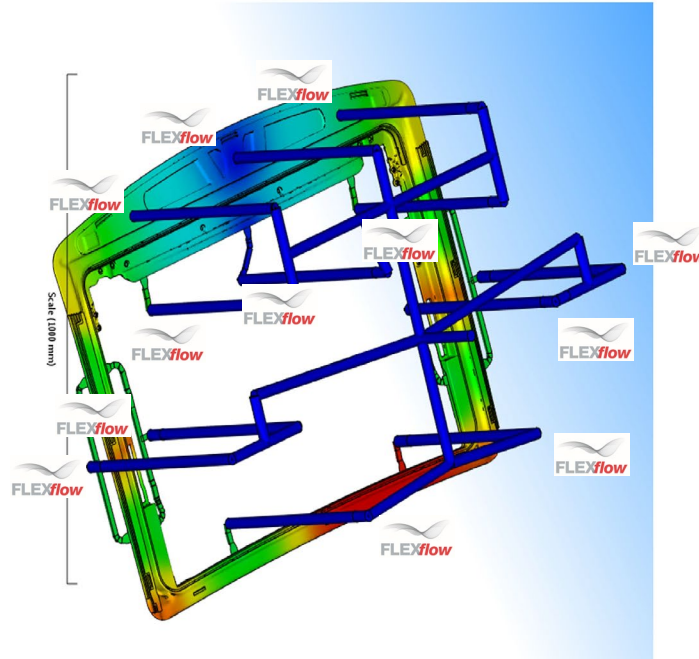
by courtesy of
Webasto

with special thanks to



Glazing

Case study: FLEXflow HRS for sunroof frame for Webasto – Pin settings



by courtesy of
Webasto

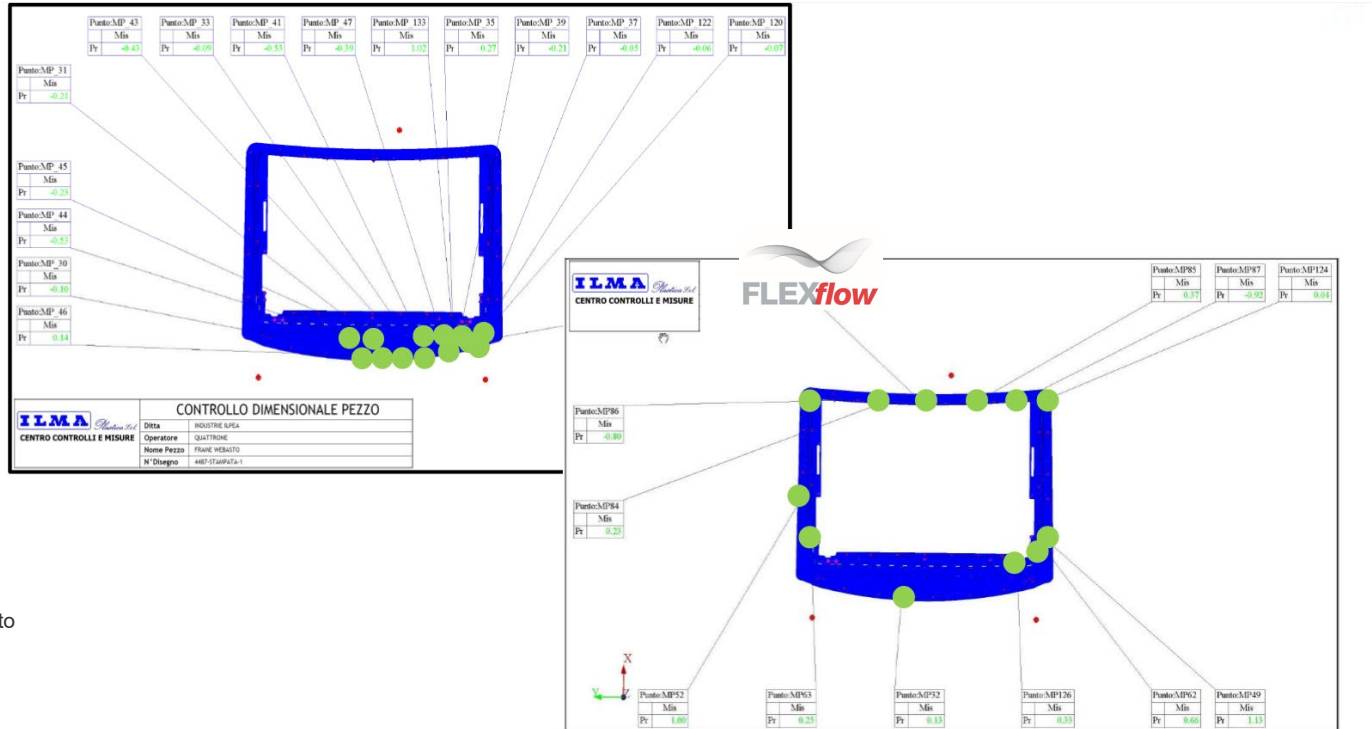
with special thanks to



Glazing

Case study: FLEXflow HRS for sunroof frame for Webasto

Standard deviation following optimization with FLEXflow HRS



by courtesy of
Webasto

with special thanks to



Glazing

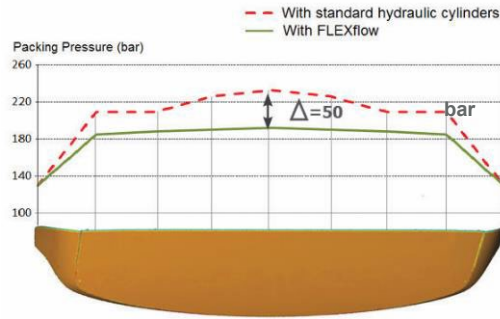


Schließkraftreduzierung

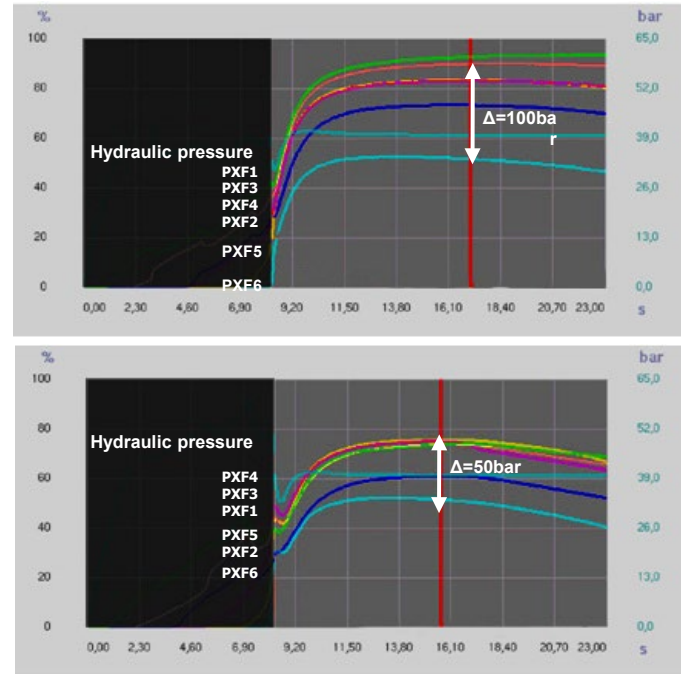
FLEXflow HRS inhouse test mold: Roof spoiler tool

- Pressures are more uniform using FLEXflow HRS
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- The pressure peak reduced by 50 bar

Holding phase



Exterior



Ohne
FLEXflow HRS



Mit
FLEXflow HRS

Benefits of FLEXflow HRS use: Sample roof spoiler

- **Clamping force reduction of injection machine**
- The reduction of the peak pressure in the part brings to a reduction of the required clamping force of injection machine **by 20 %**:

800 t  650 t with the same tool bending



Case study: Lower back skid



GENERAL INFORMATION

- | | |
|--------------------|------------------------------------|
| ▪ Sector | Automotive Exterior |
| ▪ System | 4 drops system Ga series, prewired |
| ▪ Injection type | Conical valve gate |
| ▪ Molding material | PP |
| ▪ No. of cavities | 1 |
| ▪ Part weight | 825 g |
| ▪ Part thickness | 2.5 mm |

FEATURES

- FLEXflow HRS system
- Silver molded-in-color
- Technology application

Who we are

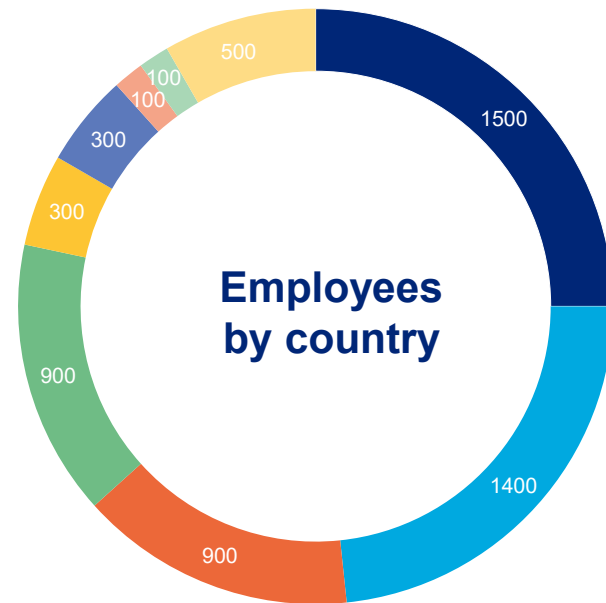


Who we are

We are run by a skilled and diverse workforce

~ 6,000 employees

120 countries

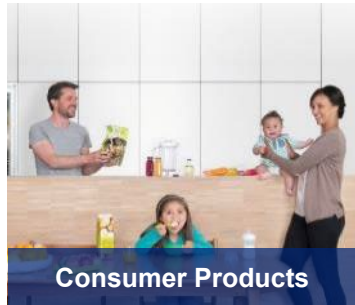


■ Austria ■ Belgium ■ Sweden ■ Finland ■ Germany
■ NA&SA ■ Netherlands ■ Bulgaria ■ Others

Industries served by Borealis' polyolefins applications

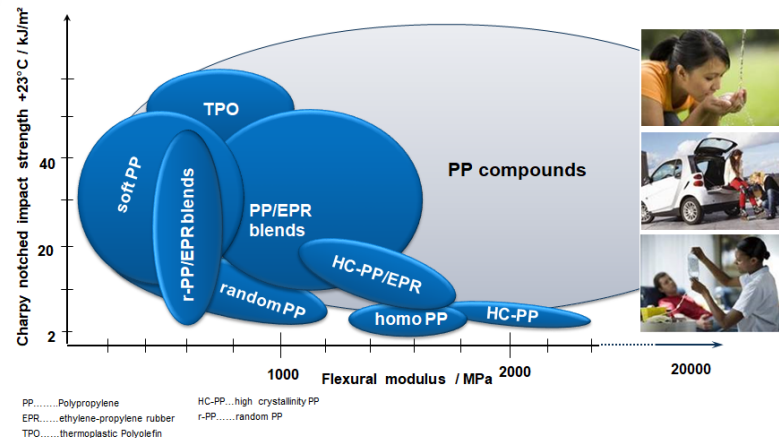
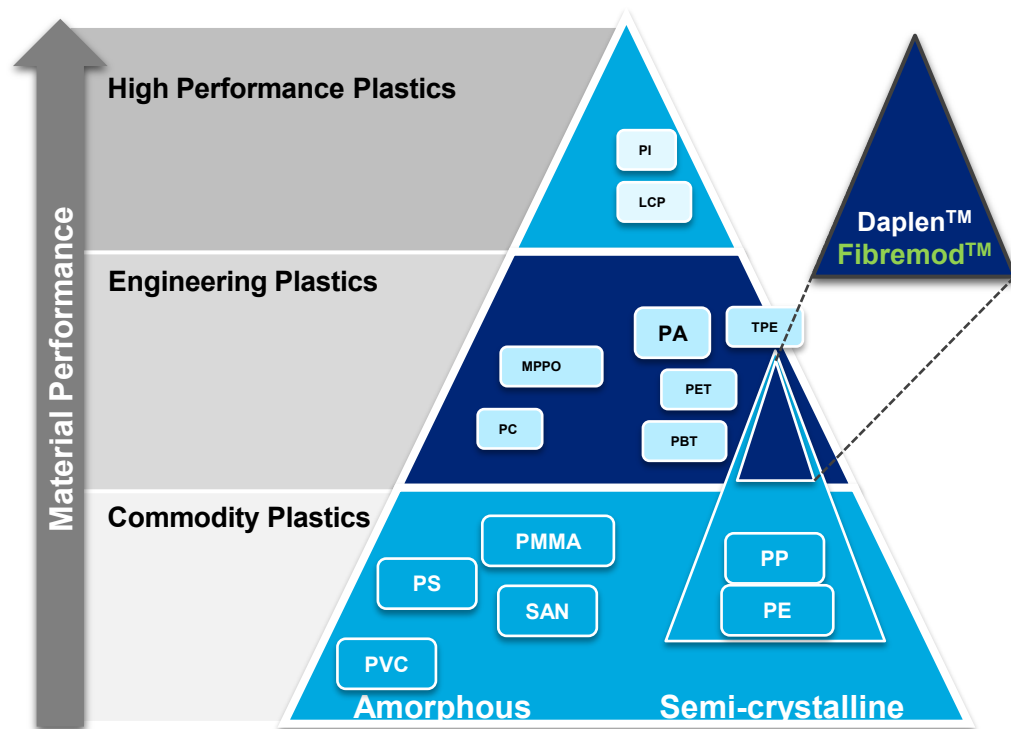


With our advanced polyolefins for virgin and circular economy solutions we serve these industries:



Customize PP

Borealis position polyolefin as the Engineering Plastic of the future!



On the way to the digital process twin

Shared competencies
match simulation & reality



Plastics Engineering – Advanced Workflow

Study done by: Borealis, Oerlikon HRSflow, ENGEL



The speakers

Markus Kralicek | Borealis

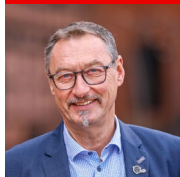


Business Development Manager

markus.kralicek@borealisgroup.com



Stephan Berz | Oerlikon HRSflow



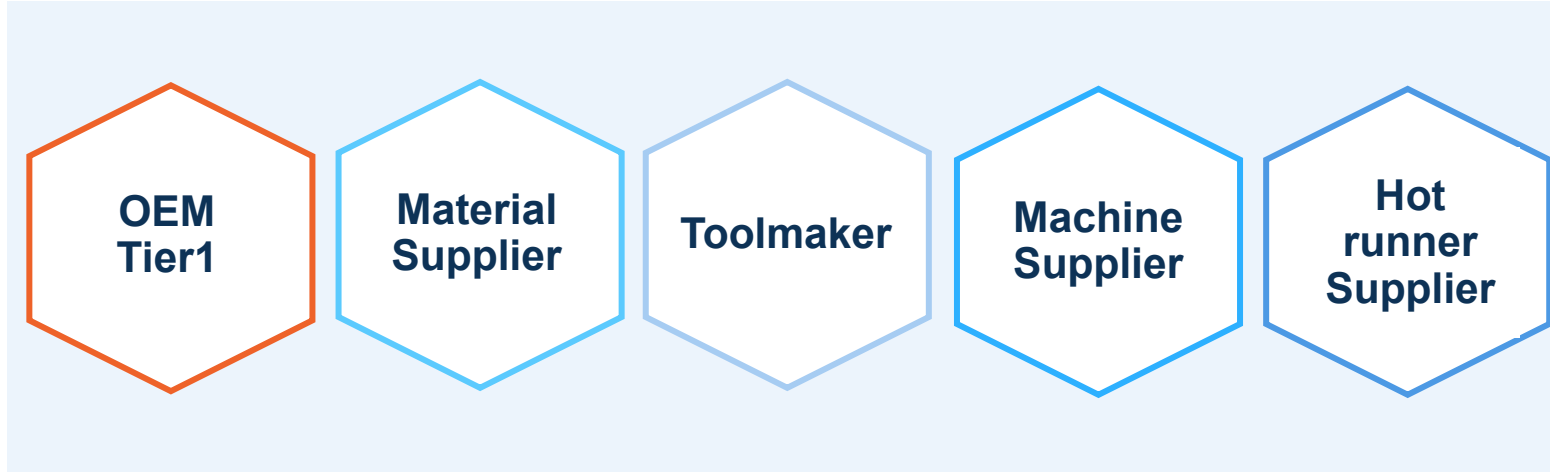
Strategic Consultant of Board + Vice President

stephan.berz@oerlikon.com

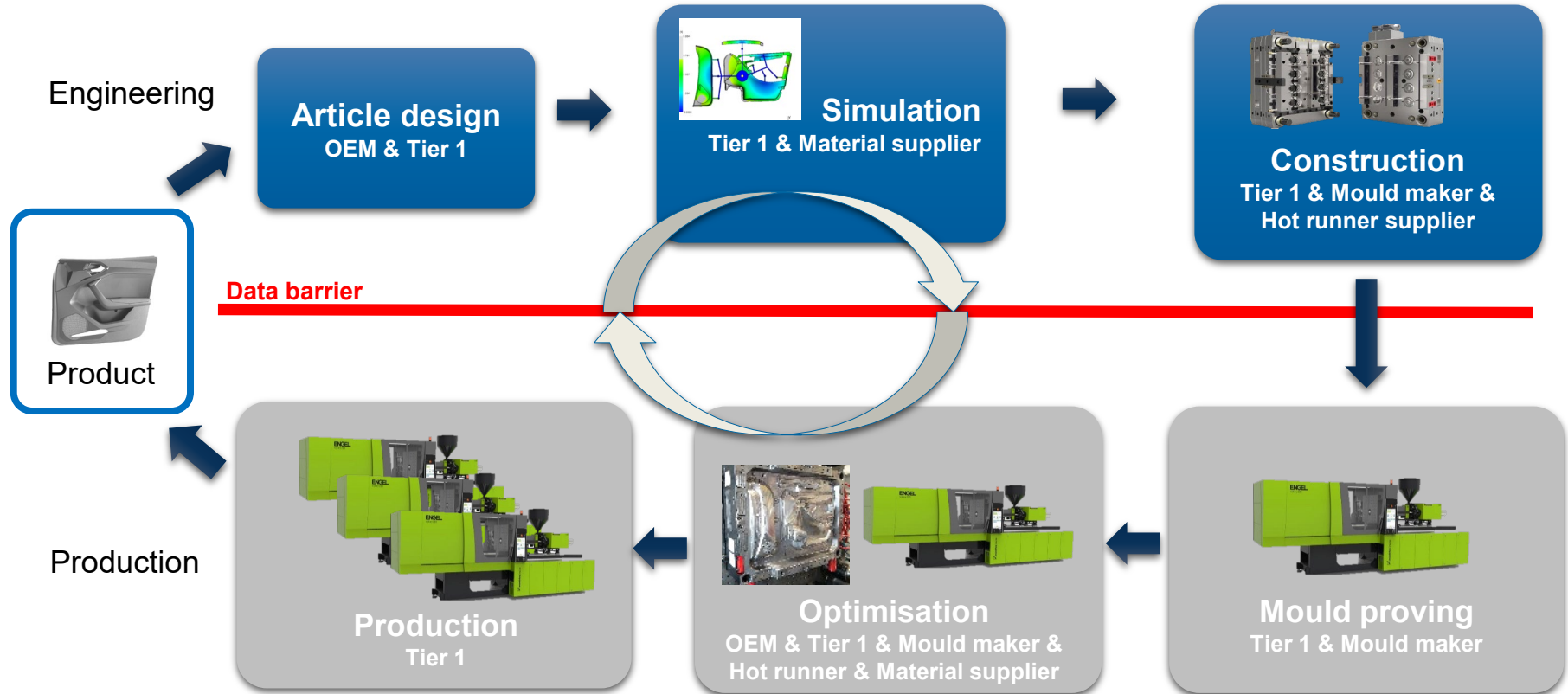


Project partners and change of approach during the project process

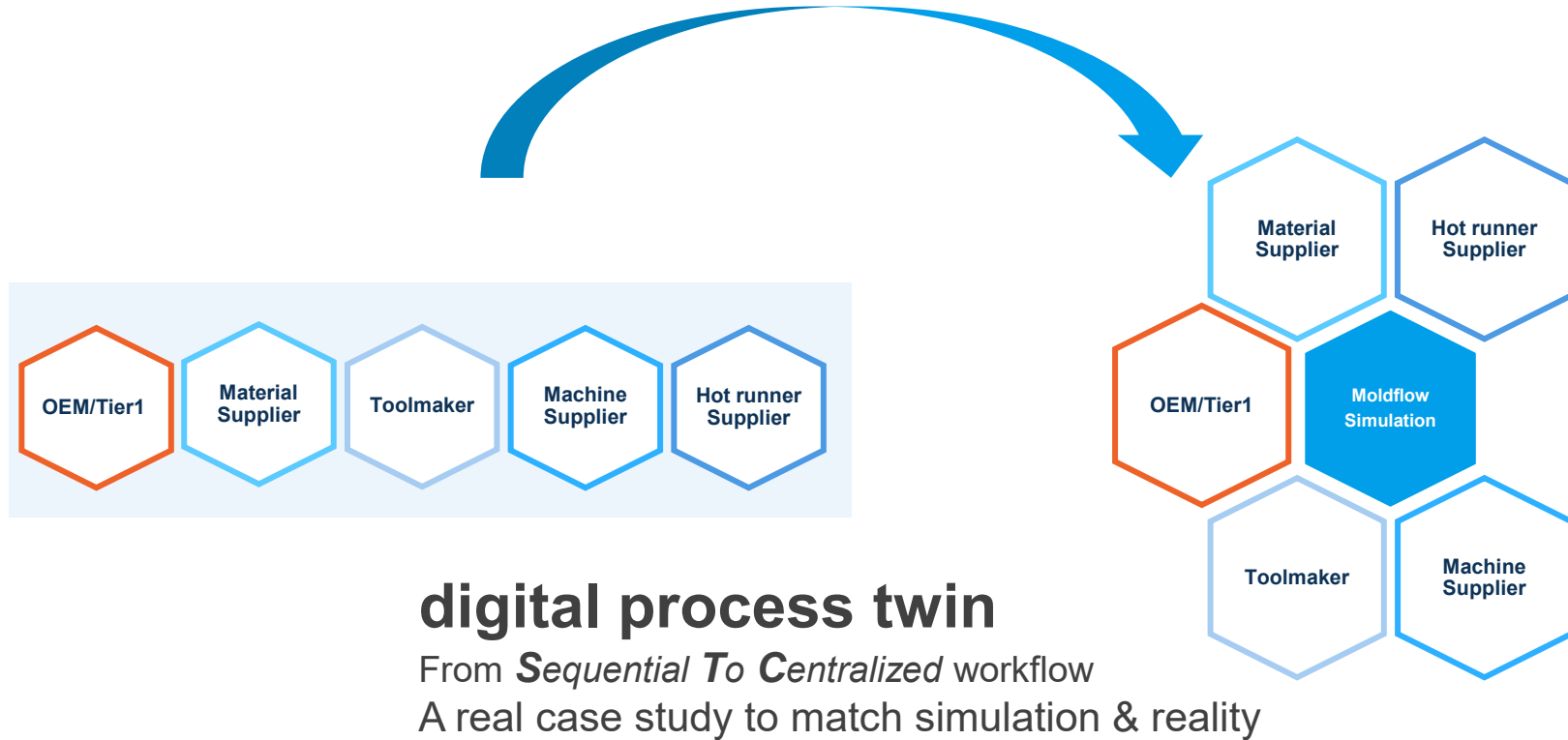
Actual workflow – in many cases



Status Quo: situation at injection moulding productions



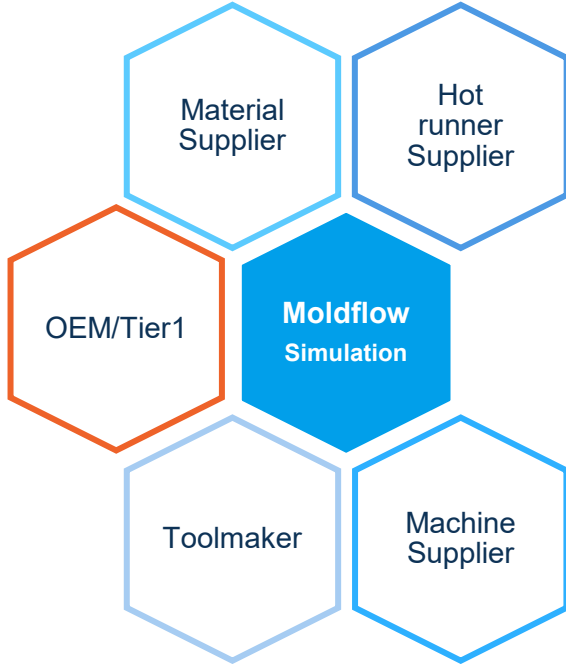
Project partners and change of approach during the project process



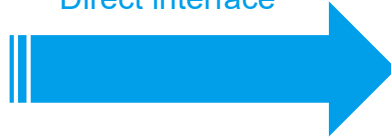
New working approach

Connect all competences to the simulation

Development stage



Direct interface



Tool/machine setup



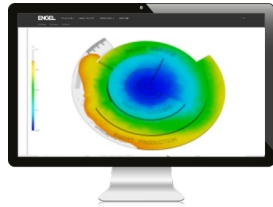
Process optimization ⇔ is done virtually & centrally
Process parameters ⇔ are covered by Moldflow®
Tool setup ⇔ takes place virtually long before...
Actual machine capabilities ⇔ **Basis for simulation**
All data are automatically transferred to machine

How does it work?

Architecture

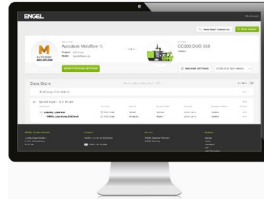


Material card



Simulation
PC

ENGEL
IMM- producer



ENGEL machine
database

ENGEL sim link

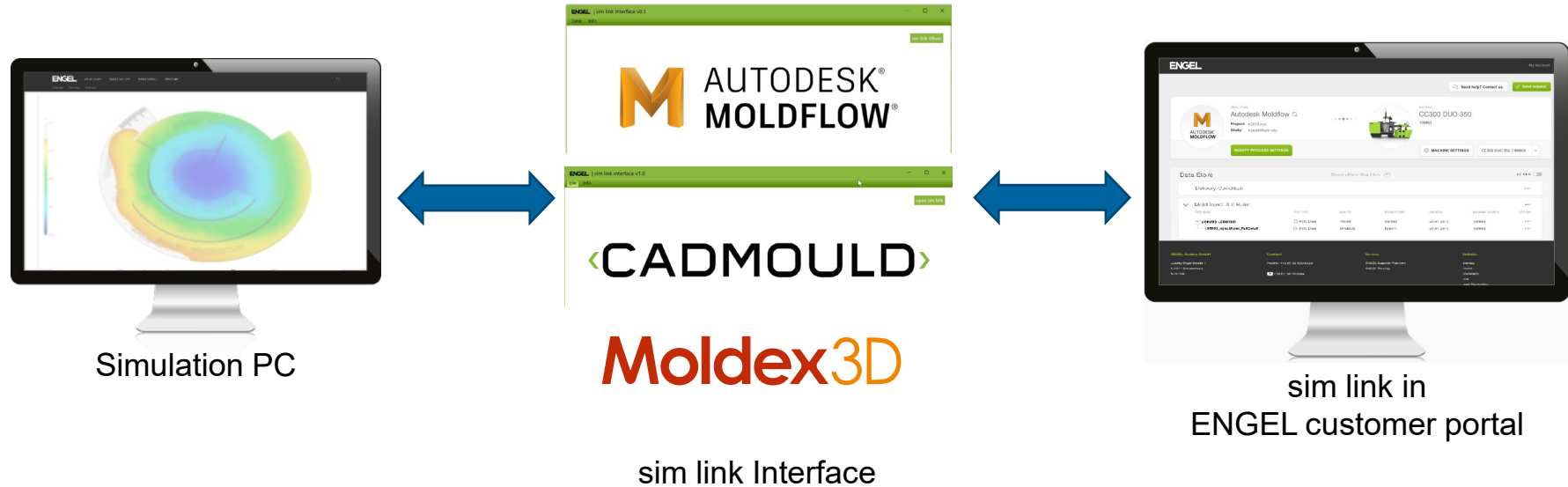
ENGEL customer portal



Hot runner **FLEXflow HRS**

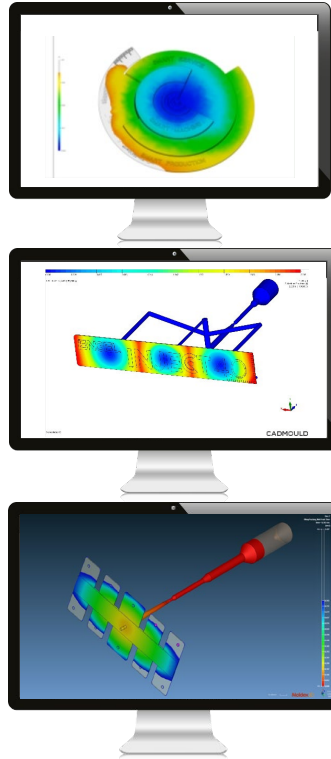
ENGEL machine

Data exchange between simulation and sim link



ENGEL sim link

At a glance



MODIFICATION of process profiles and limits
on basis of chosen ENGEL machine

EXPORT of simulation data to an ENGEL machine

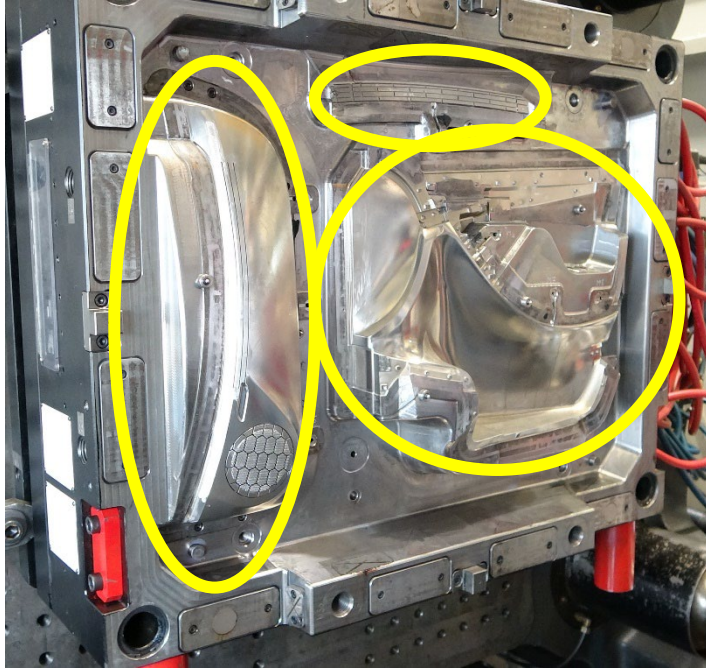
IMPORT of real production data into Moldflow



ENGEL machines

Achieved qualities Experiment vs. simulation

Result – Optimized cooling system Differentiated setup for each cavity



Tool functionalities

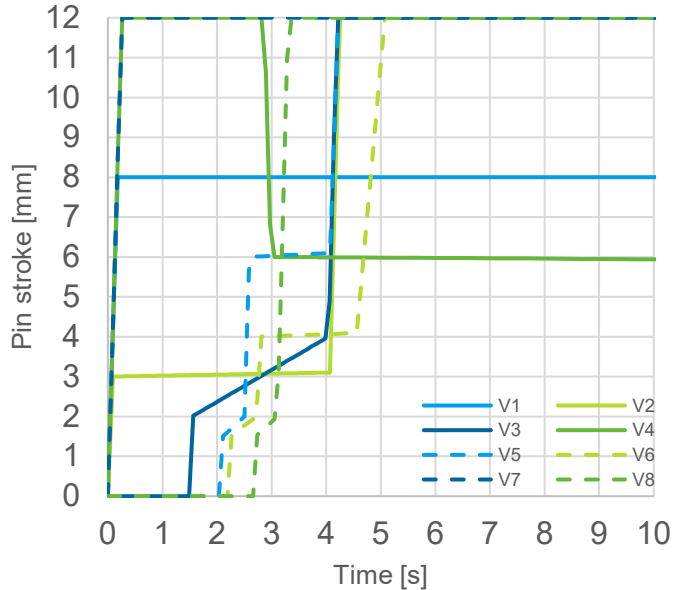
- Mold concept > Family mold
- Quality requirements
- Surface treatment
- Functionalities
- Mechanics/ejection
- Cooling system
- Dimension stability/shrinkage
- Injection concept

Tool maker ↔ Tool functionalities & their qualities,...

Pin settings

Comparison simulation vs. IMM

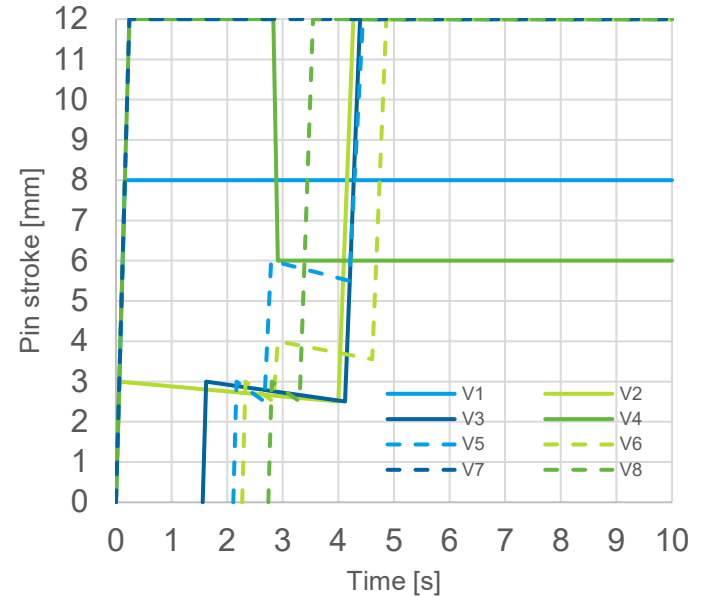
Moldflow® simulation



Needle complete open

Needle closed

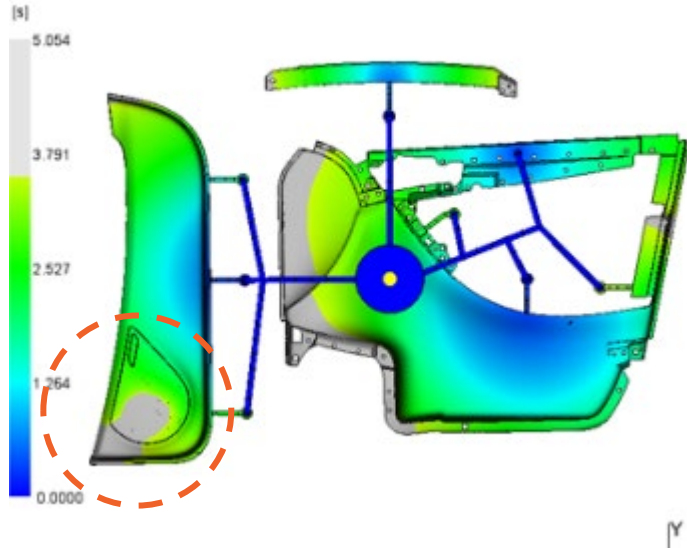
Oerlikon HRSflow FLEXflow unit



Profiled pin setting ⇔ Optimum process window
Pin settings ⇔ Matching reality

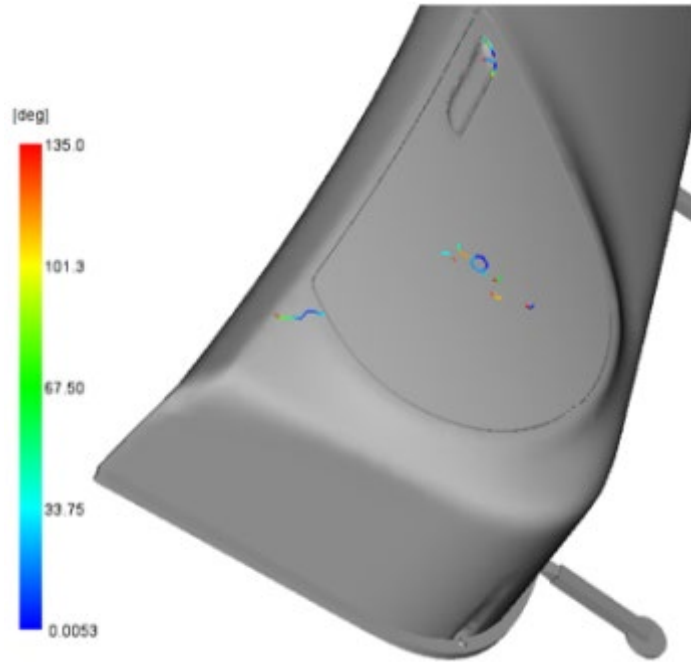
Filling characteristics

Filling time is 3.5 sec



Filling details (loudspeaker area) ⇔ Filling details exactly predicted

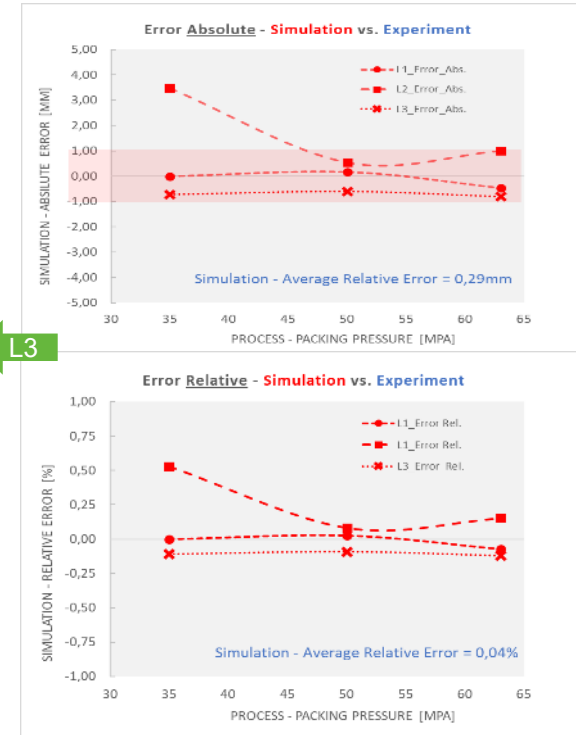
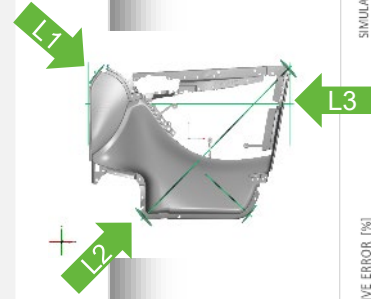
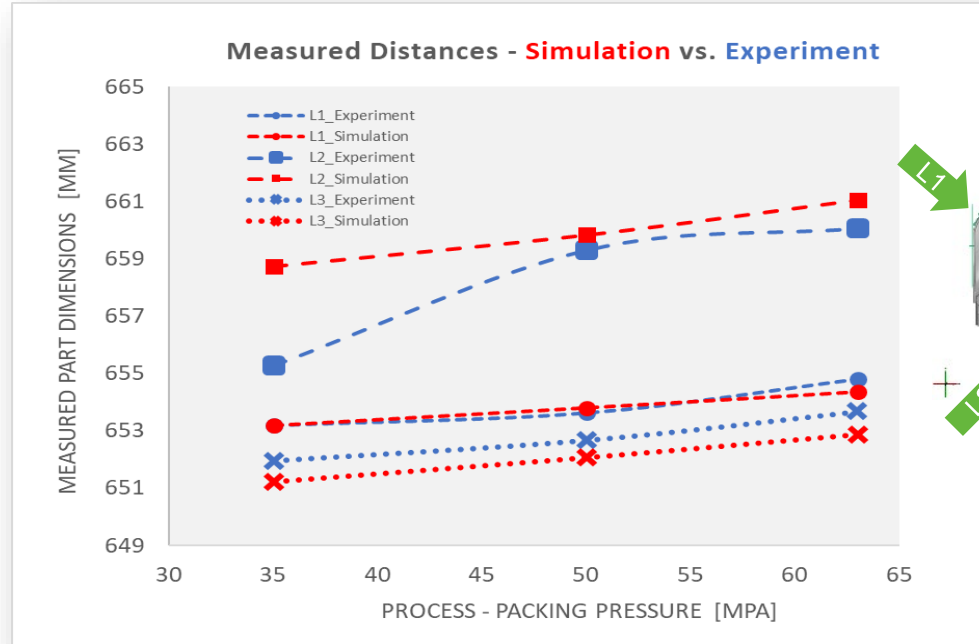
Surface defects Weldline position



Weld line loudspeaker area ⇔ Fits exactly the Moldflow® prediction

Dimension stability

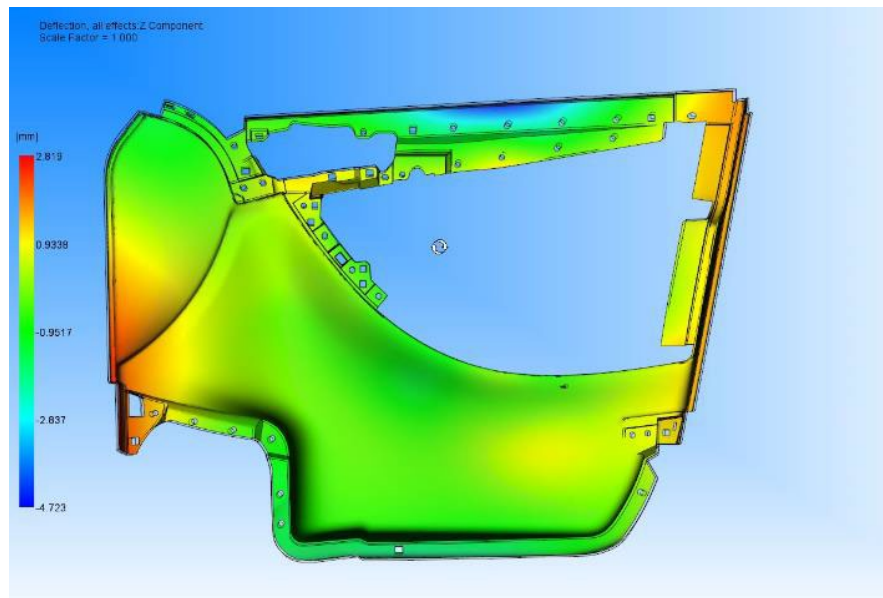
Predicted accuracy – selected part dimensions



Experiment vs. simulation ⇔ Dimension accuracy = 0.04 %

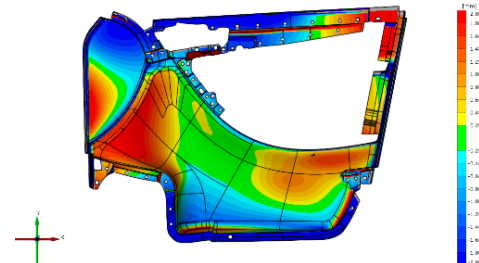
Warpage effects

Predicted accuracy

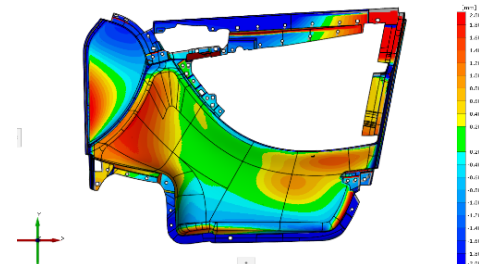


Packing Pressure

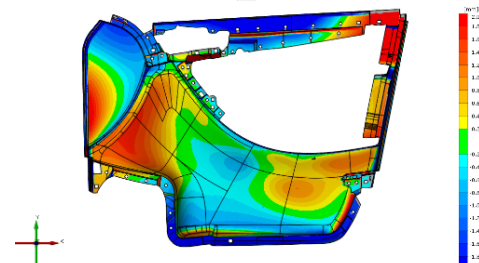
350 bar



500 bar



630 bar



Experiment vs. simulation ⇔ Warpage accuracy +/- 2 mm

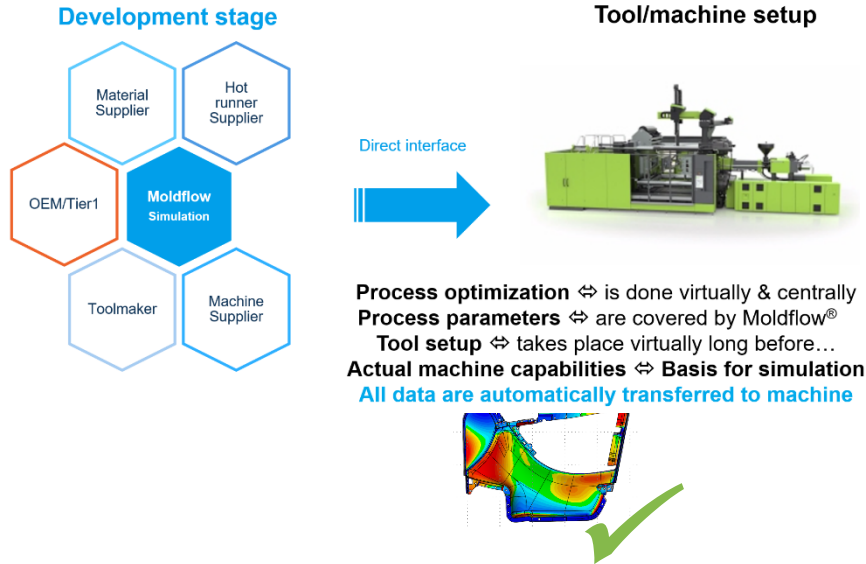
Consistent across all applied packing pressure levels, part dimensions approx. 650 mm

Summary & outlook

Conclusion for further project work

New working approach

Connect all competences to the simulation



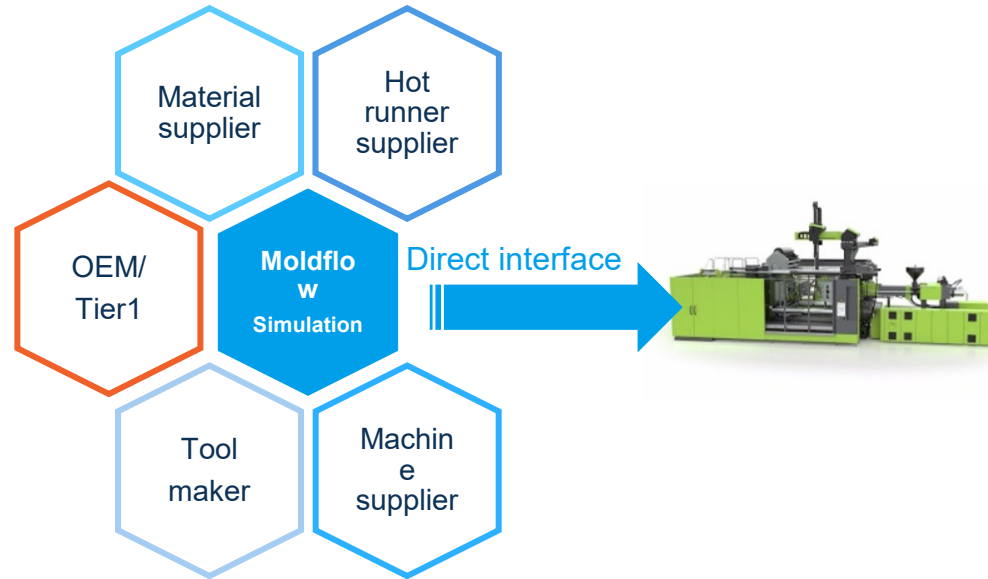
Project results

- Quality specification met
- Efficient project documentation
- Efficient tool setup
- Less iterations in development stage
- Less communication failures
- Cost reduction: try-out, tool, machine
- Faster time to market

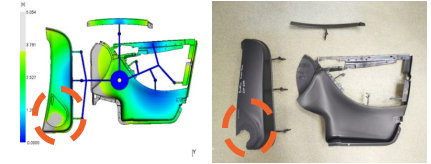
Digital centralized workflow ⇔ Faster, cheaper, accurate

All results at a glance

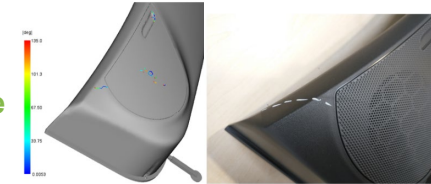
Expectations exceeded



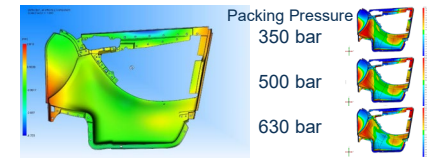
100 % match in filling



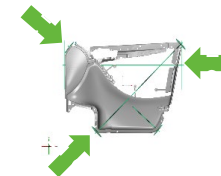
100 % match in weld line management



+/- 2 % accuracy in warpage



0.04 % accuracy in final dimension



On the way to digital process twin

Shared competencies match simulation & reality



Thank you!

Let's re-invent!

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