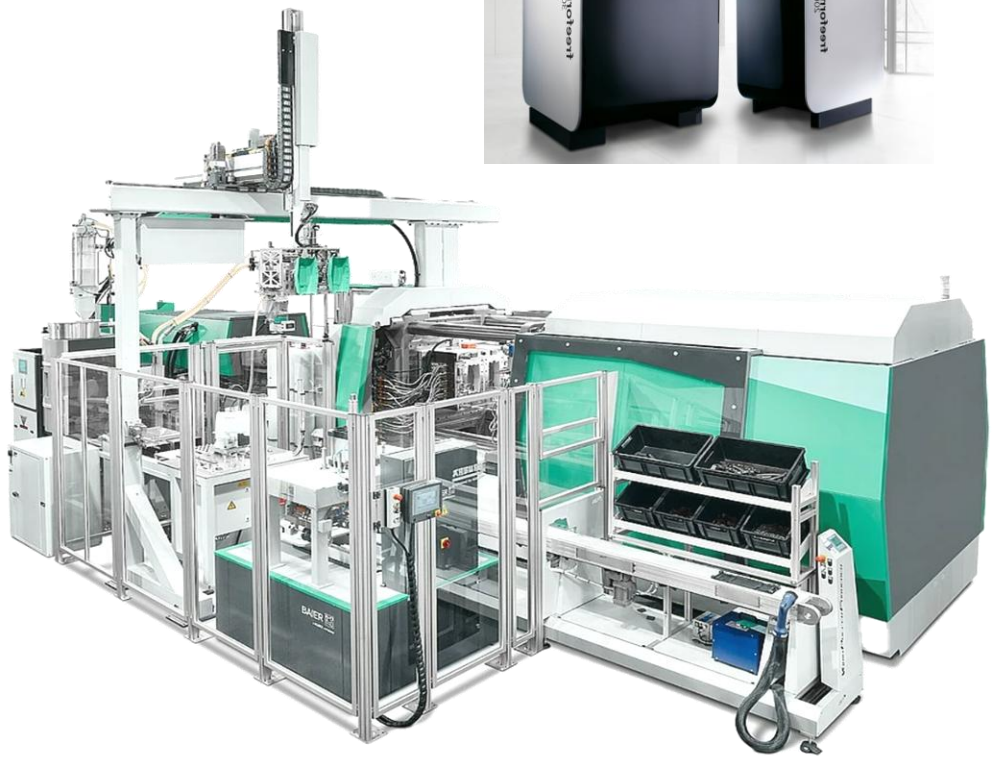
ARBURG additive

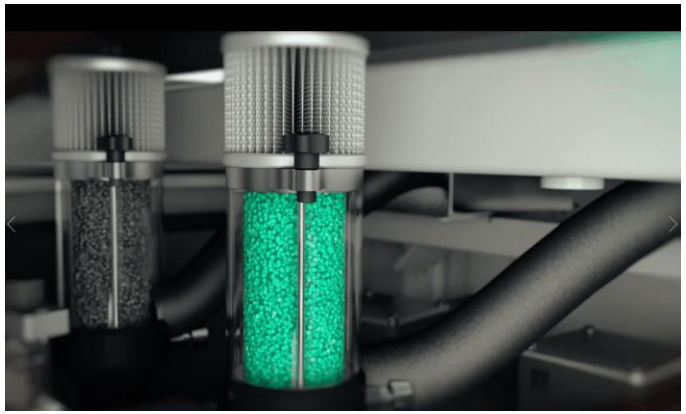
# Innovative Additive Multi-Material Gripper Solutions

# Agenda

- General Introduction
- Process and Machine technology for Multi Material processing
- Practical applications realized
  - Sensitive part removal
  - Replacement of grippers
  - Integration of functionality
- Summary  - Outlook



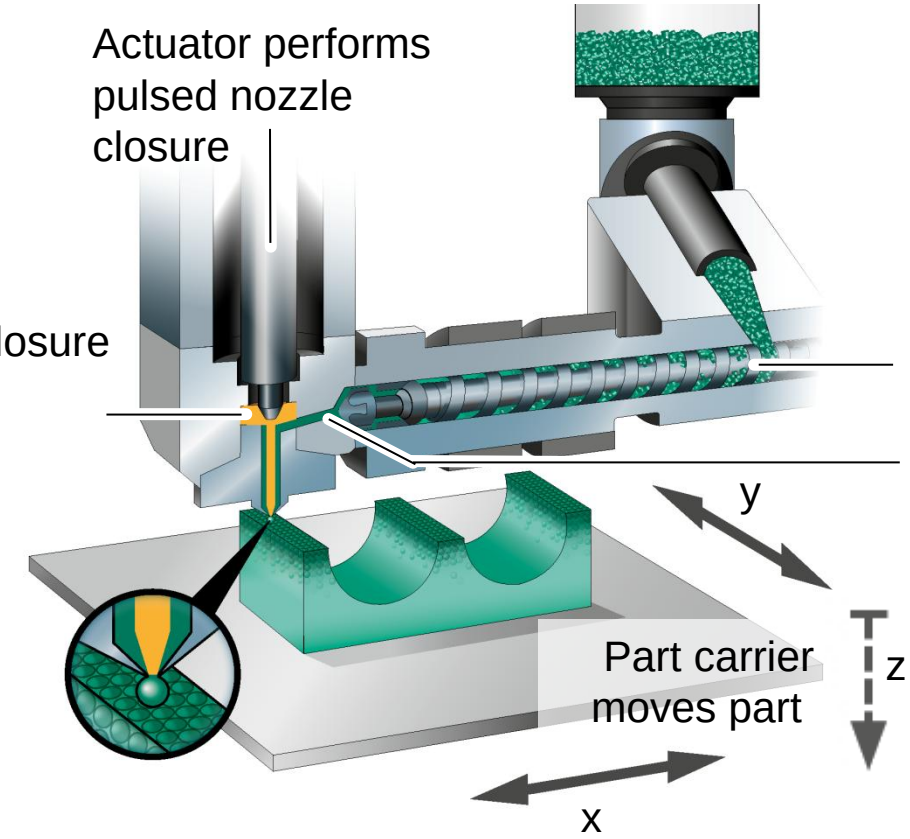
# Process principles in detail

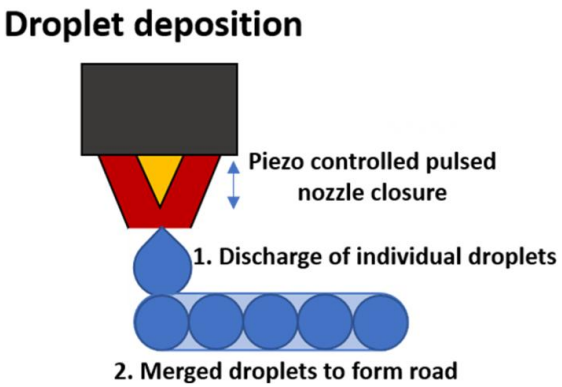


Use original material direct from the pellets

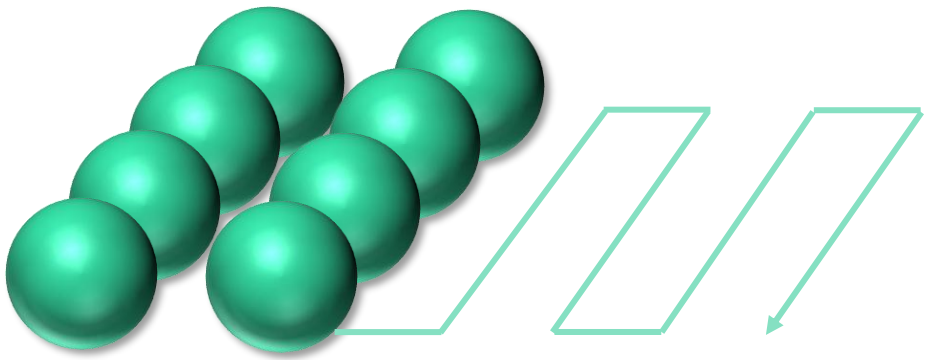
Coloring via masterbatch is possible

Material preparation via plasticising screw as with injection moulding.
Inline drying is possible

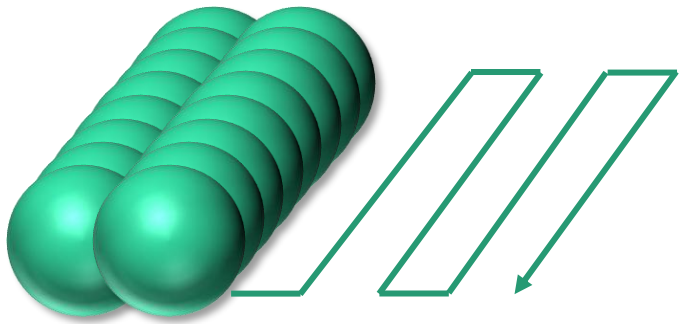


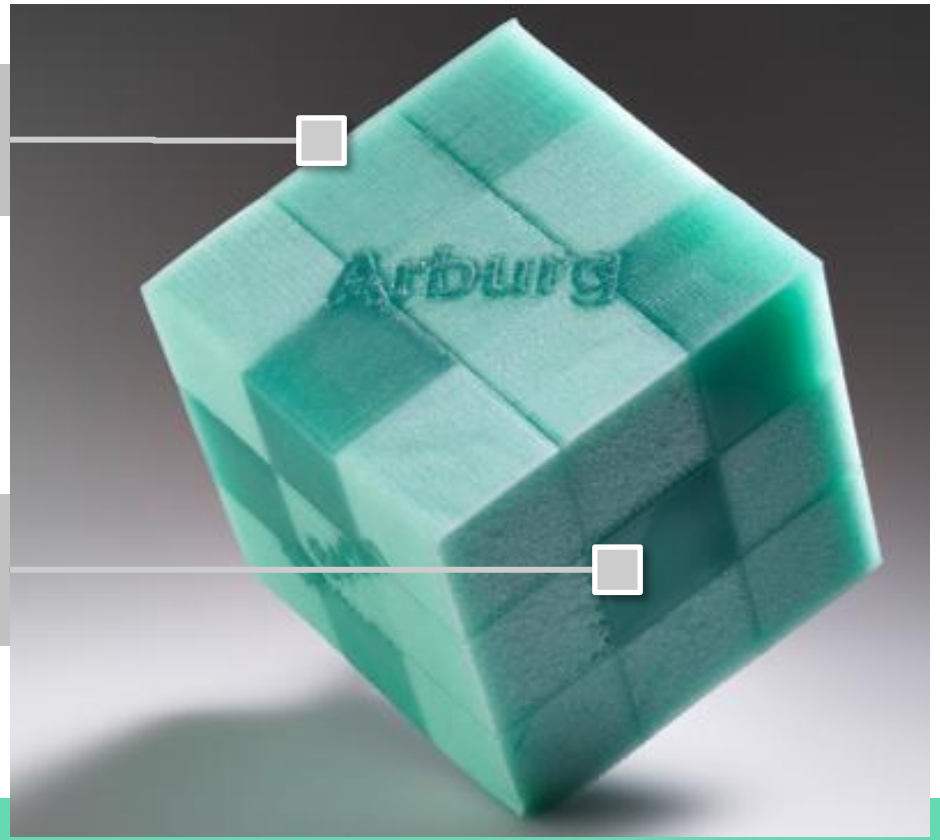
# Precise material discharge



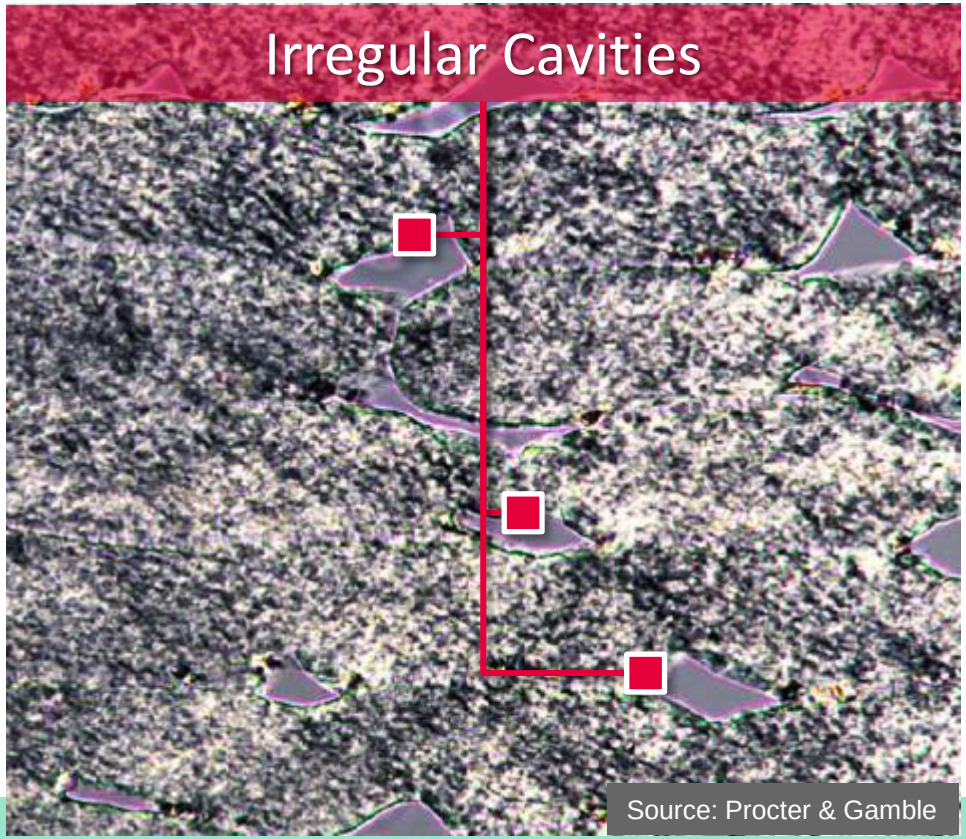
40 %



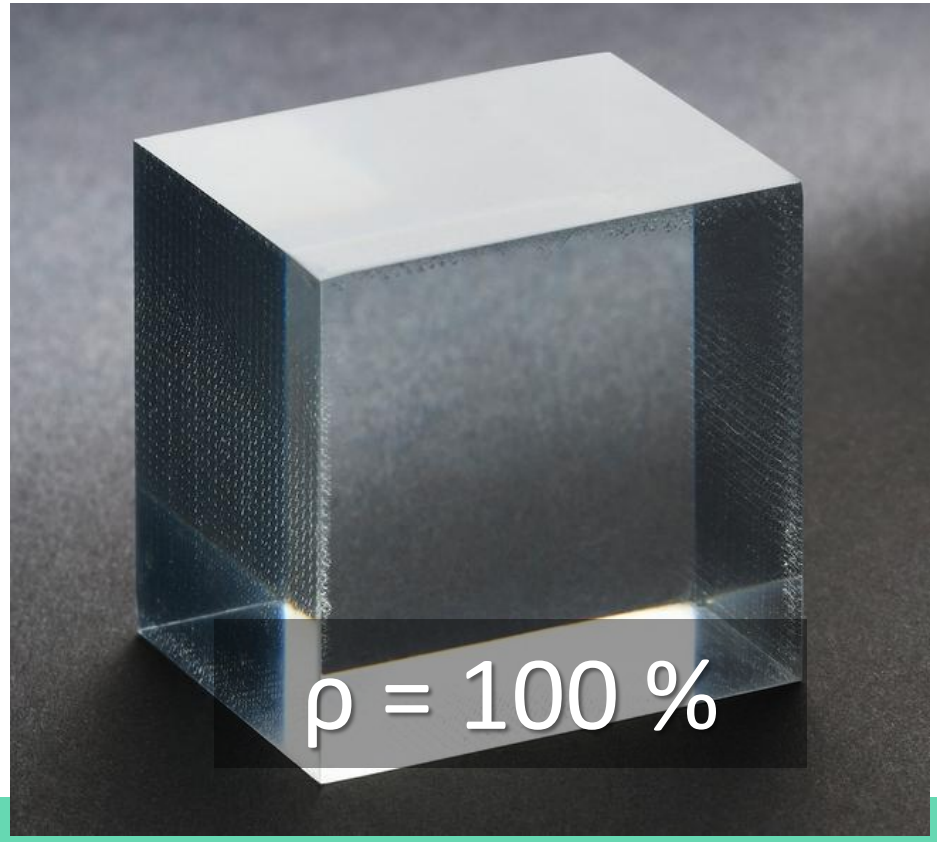
90 %



# Leads to a optimized density



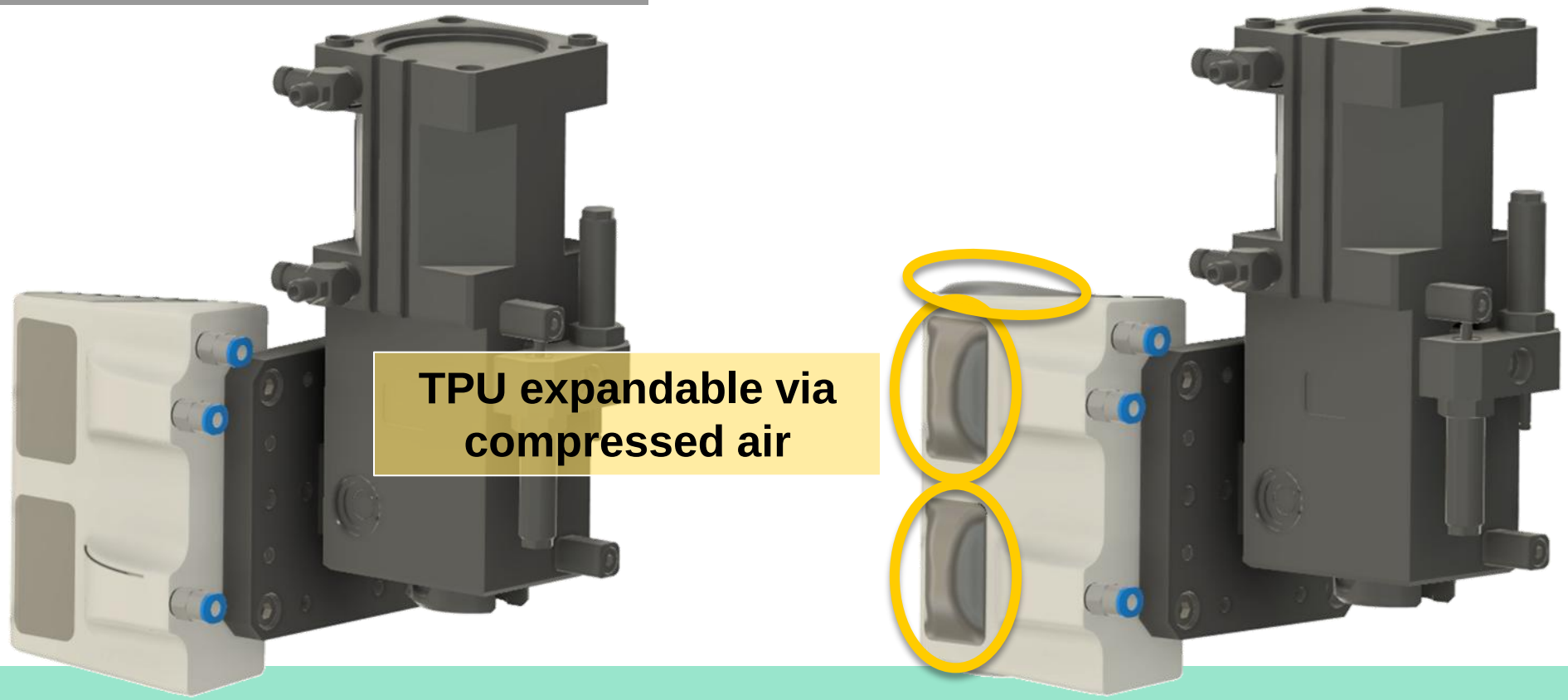

# Leads to Better part qualities

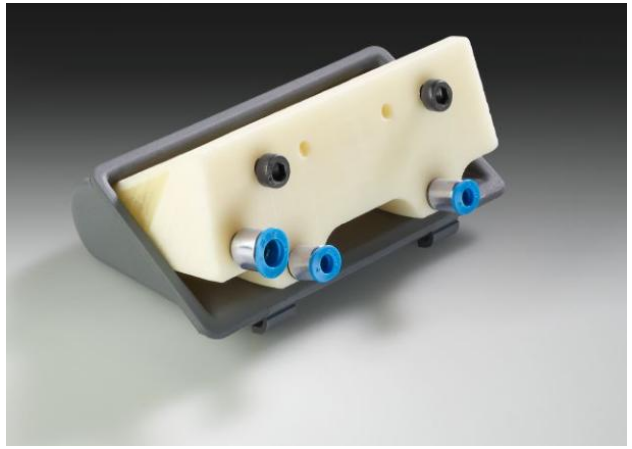
# Machine Technology for Multi-Material Parts

# EXAMPLE 2-COMPONENT GRIPPER

**PA10 + TPU (70 Shore AU)**



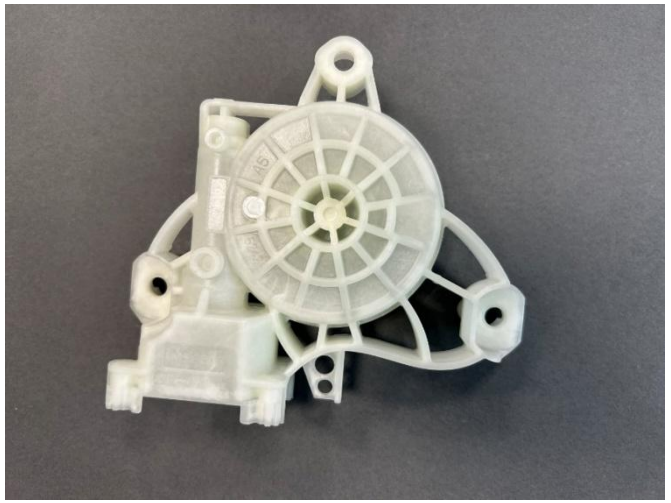
# EXAMPLE 2-COMPONENT GRIPPER

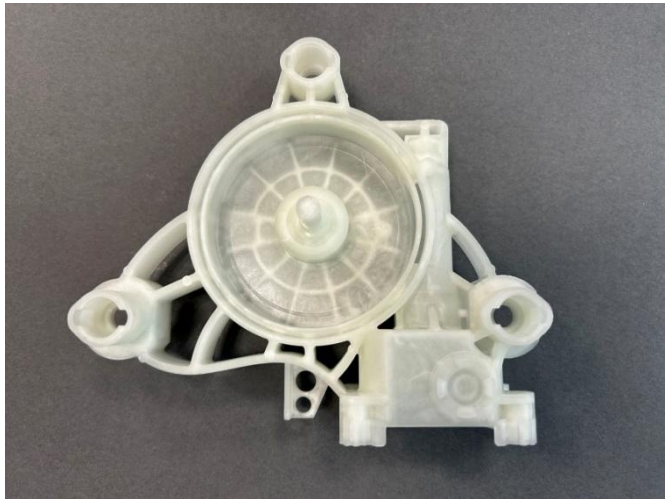


# Case study automotive

**Component**
Motor housing of an electric window regulator.

**Procedure**
The components are removed from the 6-cavity mold and placed on a scale. After the weighing process, the components must be picked up again and placed on a conveyor belt. The cycle time is approx. 35 sec.

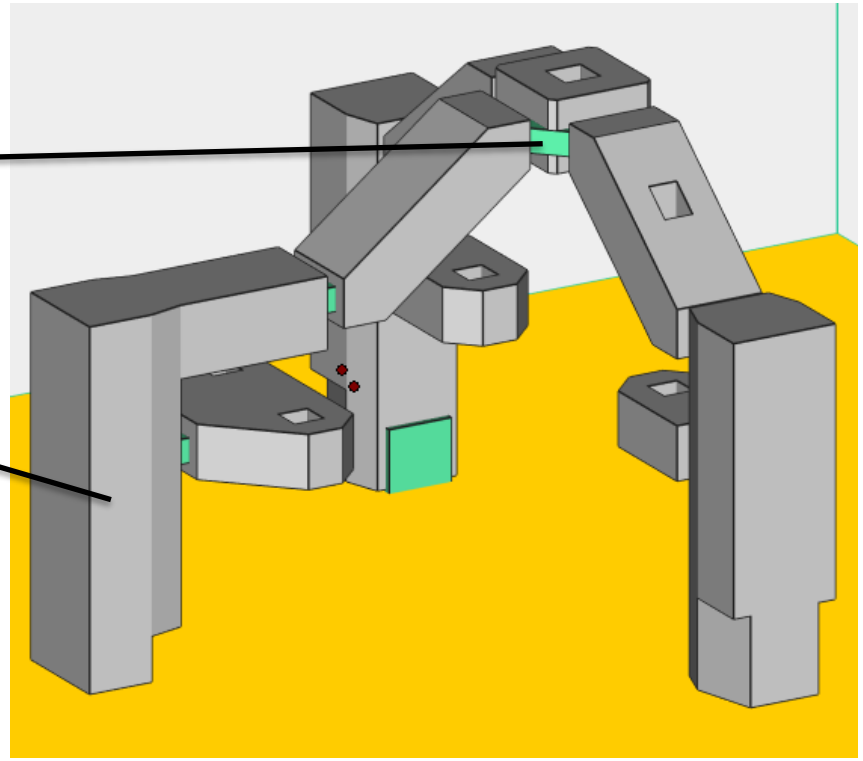




# Design of the gripper

Joints (in green) made of soft material
*Desmopan 9385A*

Hard component (in gray)
*PC/ABS Bayblend FR 3010*



# Endurance run result

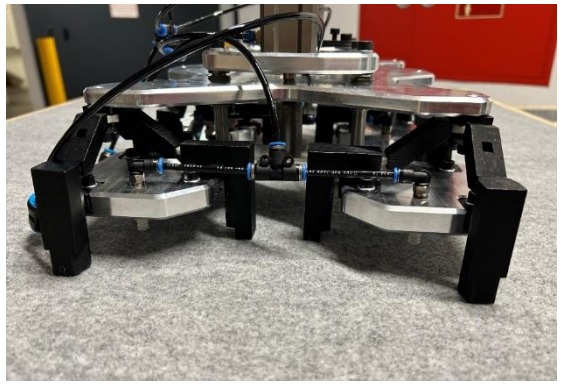
- Endurance run was completed after approx. 800,000 cycles
- Corresponds to machine running time of approx. 7,700 hours

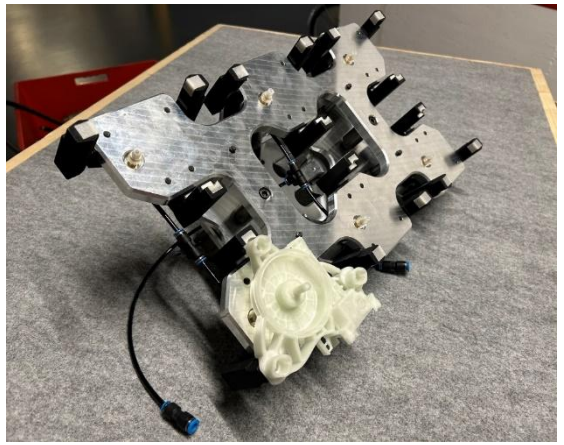
# Facts and figures

## Cost reduction with printed multi-component grippers

| Costs | Conventional | Additiv |
|---|---|---|
| Components | Gripper, etc. ca 8.500€<br>Al milled parts 2.500€ | Gripper printed 600€<br>Al milled parts 1.800€ |
| Time of production | 2.000€ | 1.000€ |
| **Total costs** | **13.000€** | **3.400€** |

**First solution**

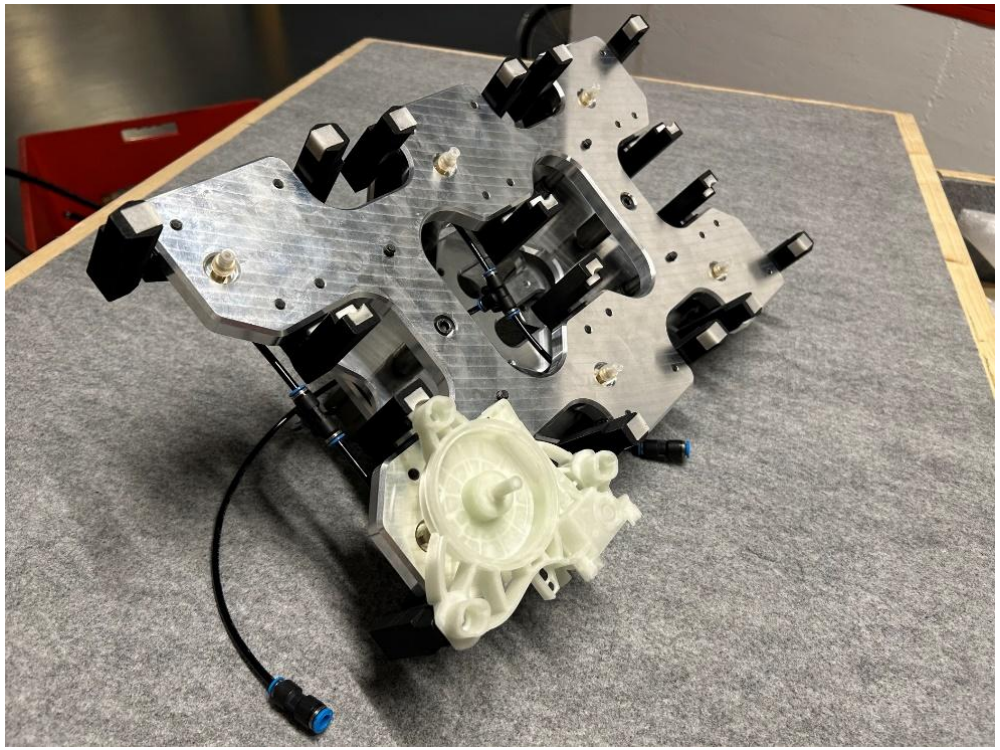


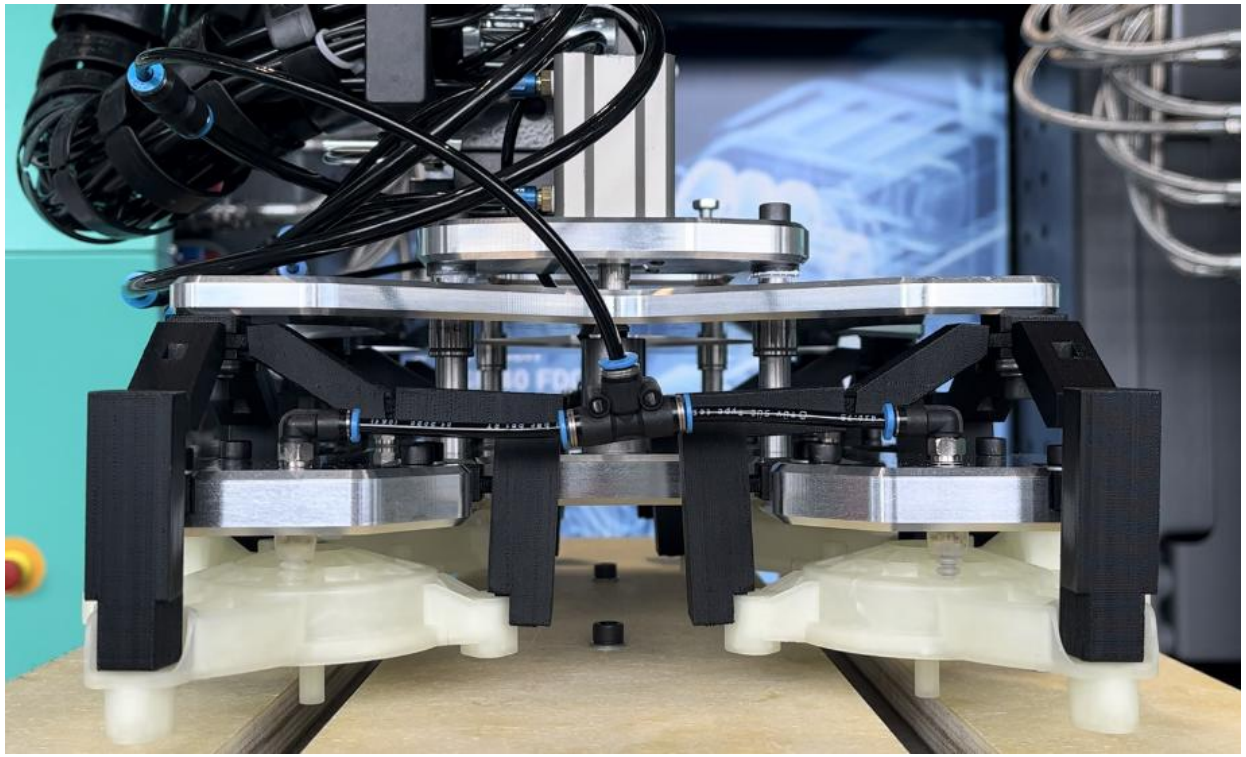


## Production time:

From the idea to the finished gripper approx. 10 days

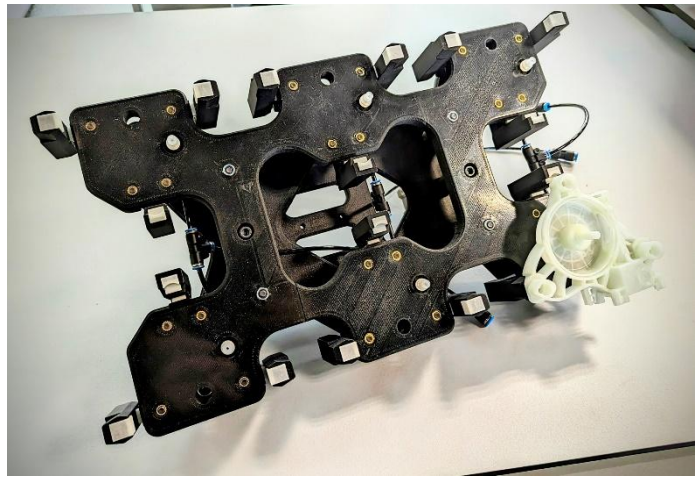
# EXAMPLE 2-COMPONENT GRIPPER





# Extension of the solution

- Replacing the milled aluminum pates with additively printed plates
- Printed plates are internally ribbed and therefore significantly lighter
- Machine: TiQ2 from innovatiQ
- Material: PA6-CF15



# Facts and figures on the additive solution

| Costs | Conventional | 1. Additiv | 2. Additiv (extended) |
|---|---|---|---|
| Components | Gripper, etc, ca. 8500€<br>Al milled parts 2.500€ | Gripper printed 600€<br>Al milled parts 1.800€ | Gripper and Al plates printed 800€<br>Al parts 0€ |
| Time of production | 2.000€ | 1.000€ | 1.000€ |
| **Total costs** | **13.000€** | **3.400€** | **1.800€** |

**Production time:**

6x multi-component 3-point grippers printed á 10 hrs. build time

Aluminum plates printed from PA6-CF15 total build time: 40 hours

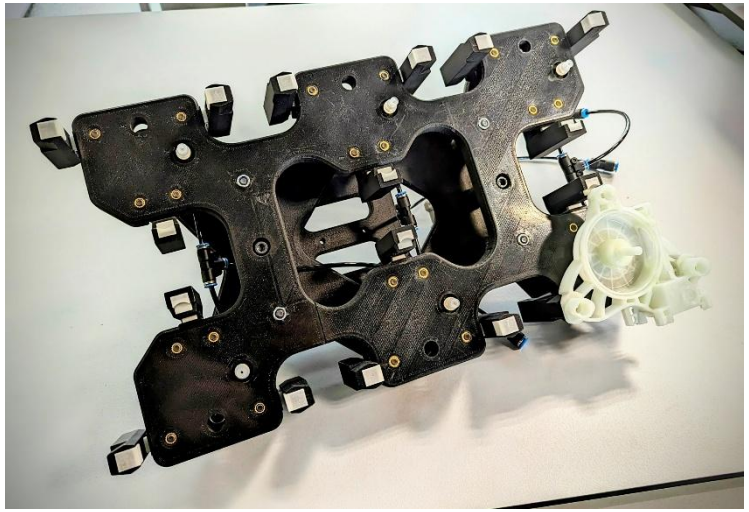
**Weight reduction of approx. 60%:**

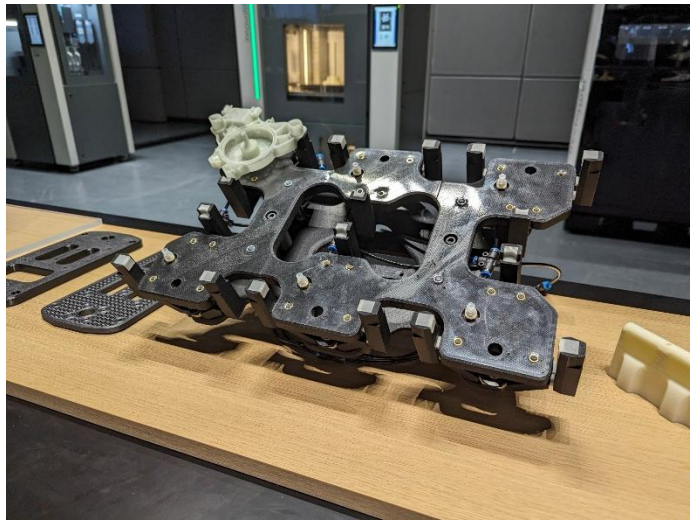
6-fold removal module with aluminum plates: 5891g

6-fold removal module with PA6-CF15 printed plates: 2432g

- ✓ Cost reduction of a further 1.600€
- ✓ Weight saving of approx. 60%

# Final solution of the printed EOAT





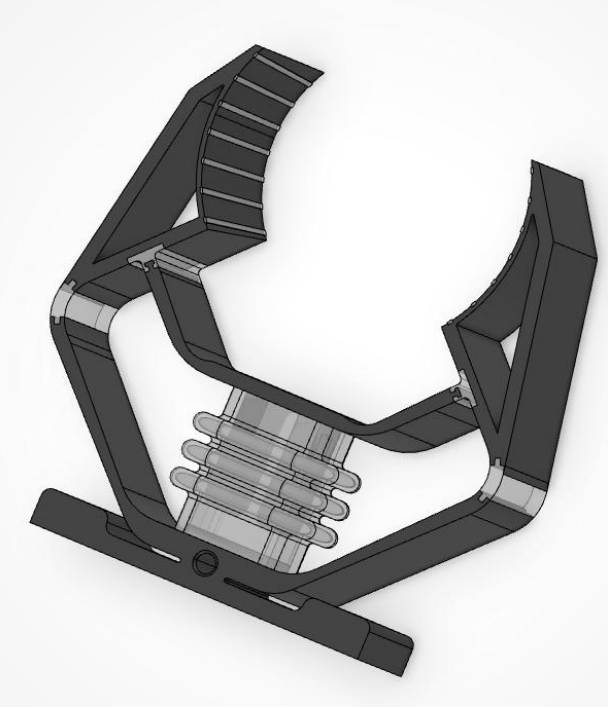
**Exchange of Al-plates**

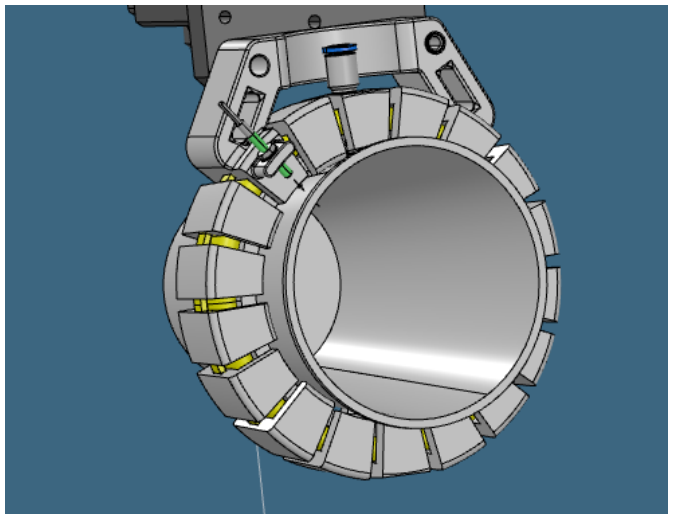
Machine: InnovatiQ TiQ2

Material: PA6-CF15

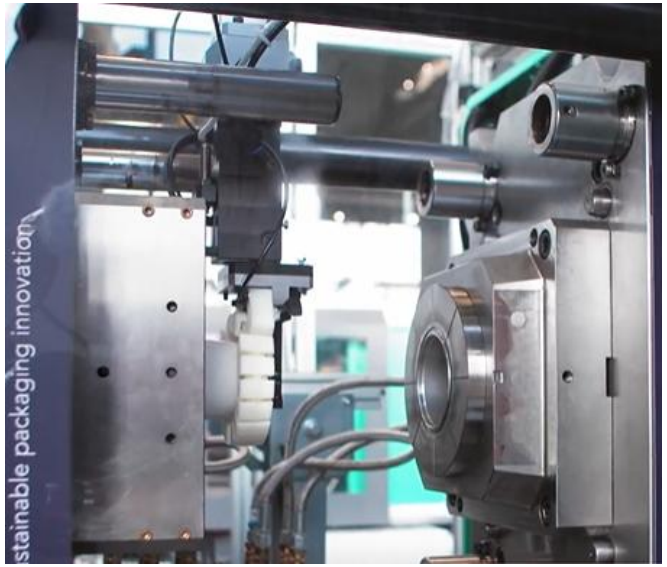
# Example 2-component gripper

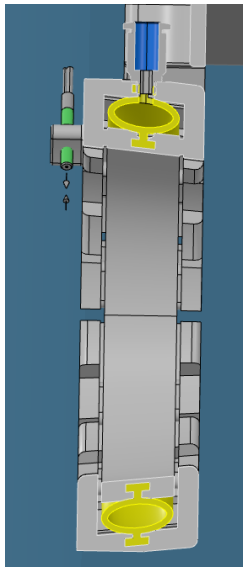
- Gripper with hard- and soft components
- Actuator integrated – reduction of components
- Materials ABS and TPU (Desmopan Shore90)
- One exemplar are produced with pp and TPU Shore30 (Medalist)
- Easier and cost attractive solution

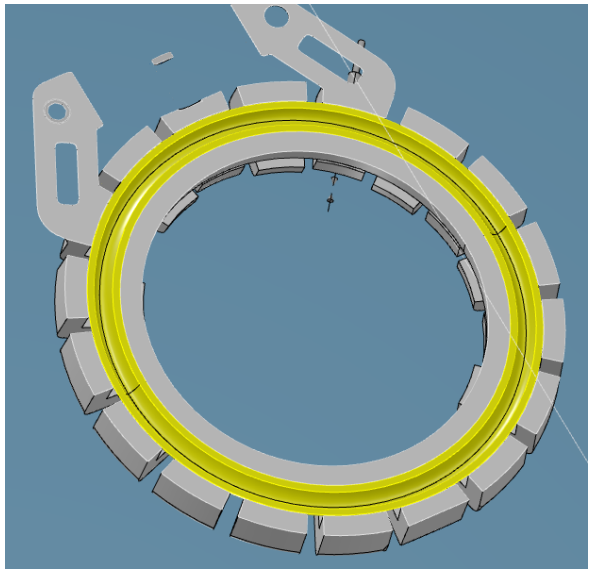




# Example 2-component gripper

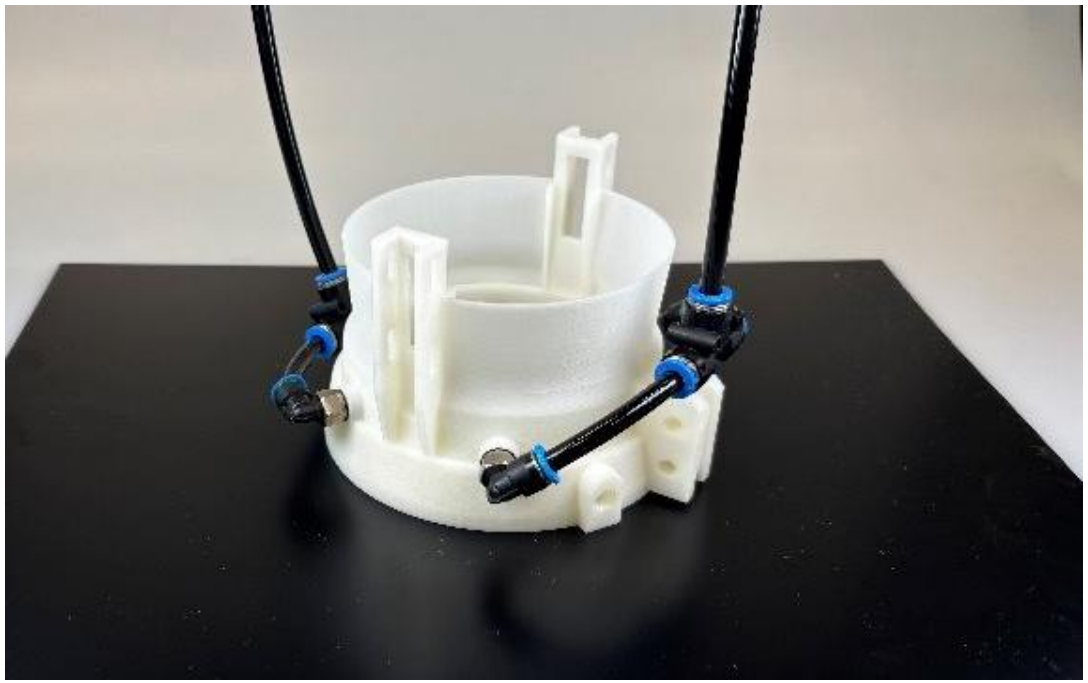


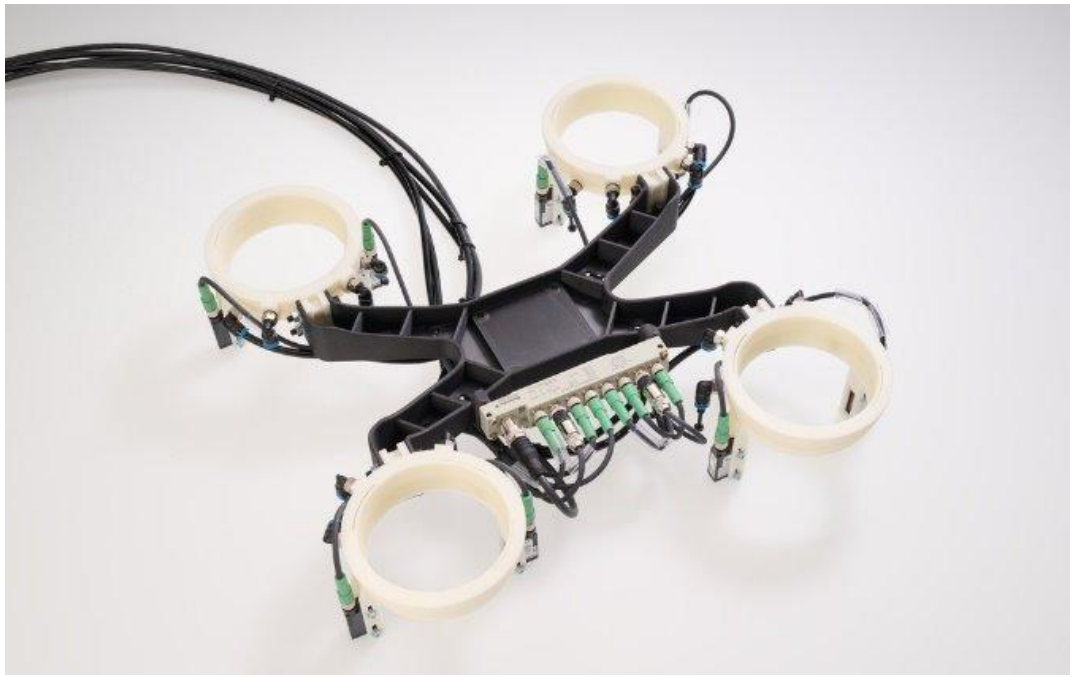




**Reduced cost by half !!**
**Think additive design – very easy to use**

# Example 2-component gripper – Project OSKO





**Automation cell for flower pots**

**- Easy part removal and stacking of finished parts**

# Summary – take home messages

- Due to right material use additive EOAT are durable
- Weight savings can lead to a lower robot payload
- Multi Material printing leads to
  - Integrated functionality
  - Easier general EOAT build up
- Manufacturing time savings due to additive EOAT
- In general costs savings

ARBURG

additive