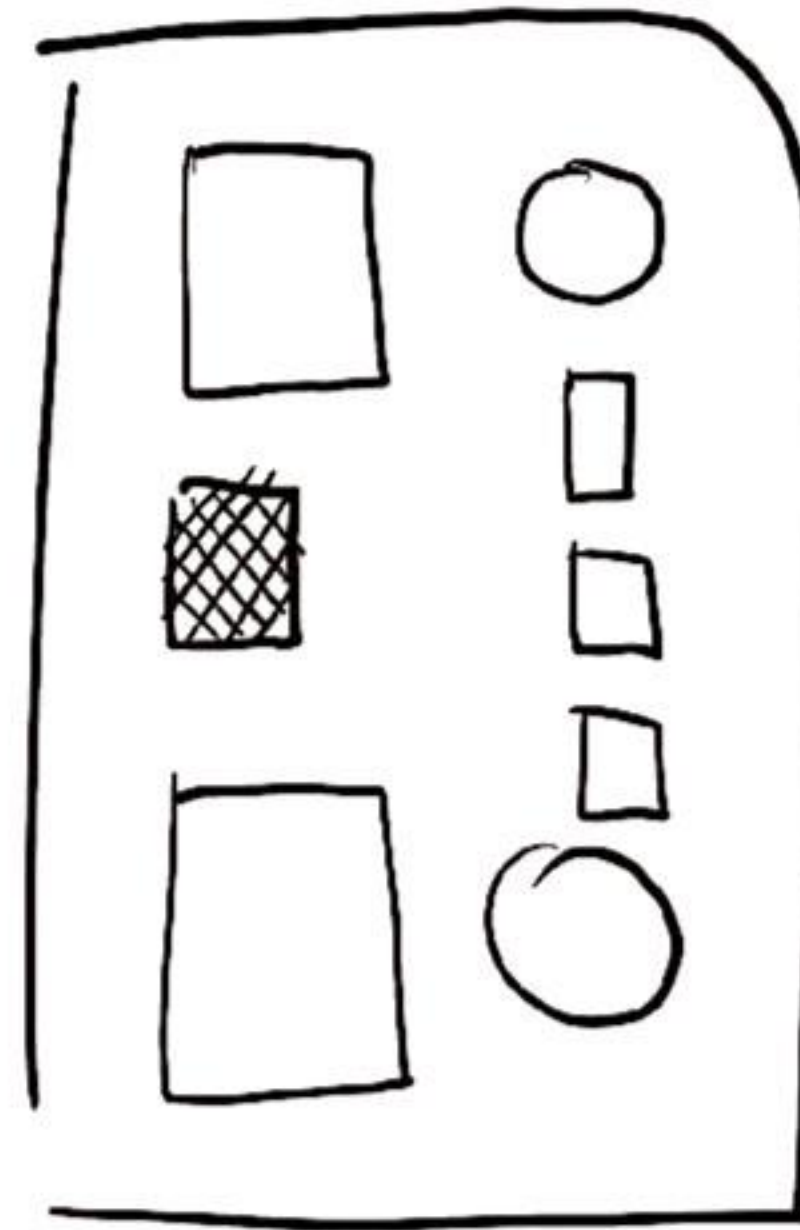




**CONTURA**<sup>®</sup>  
MOLD TEMPERATURE CONTROL

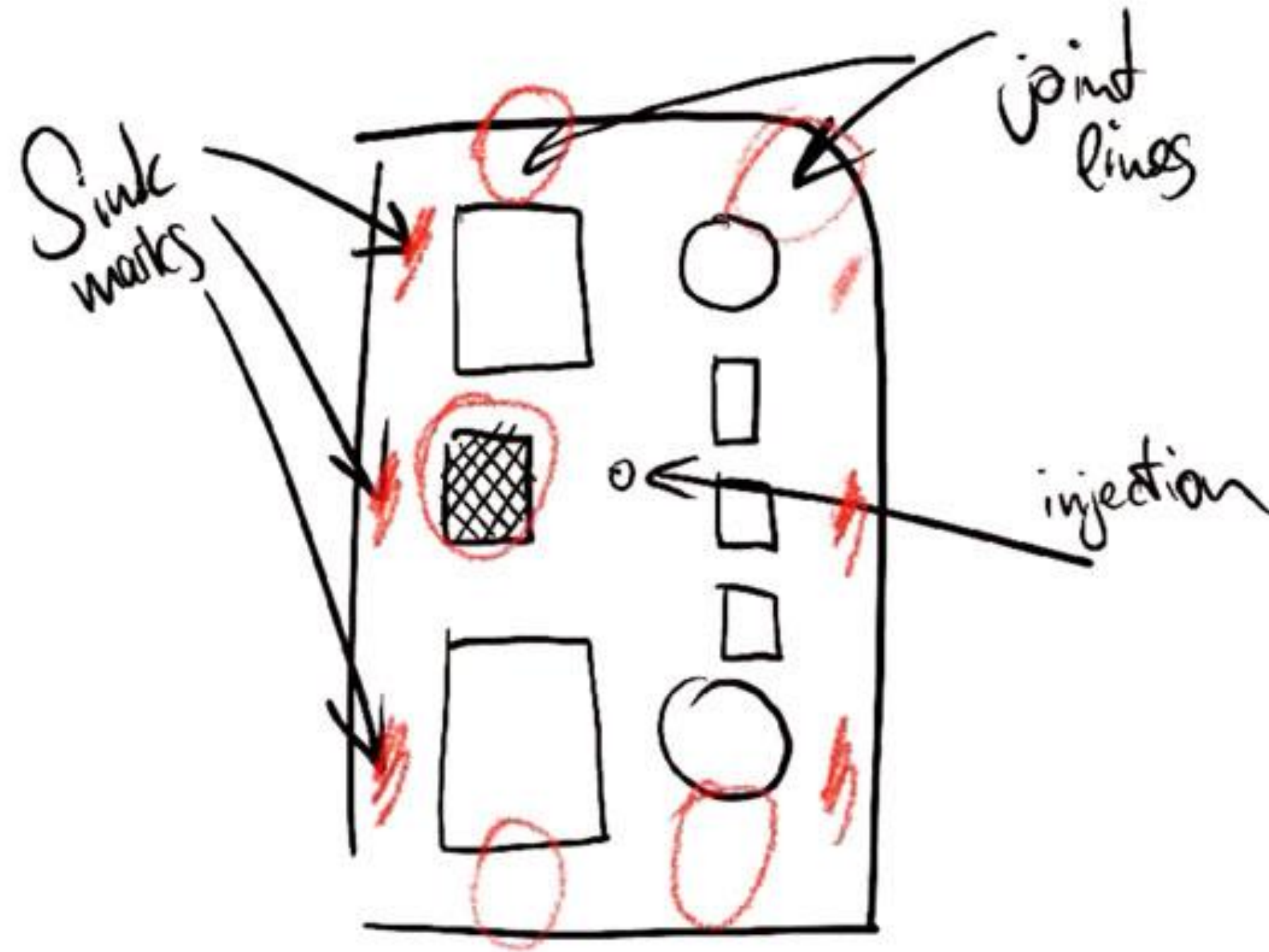
# Mould thermal management

# OUR SERVICE



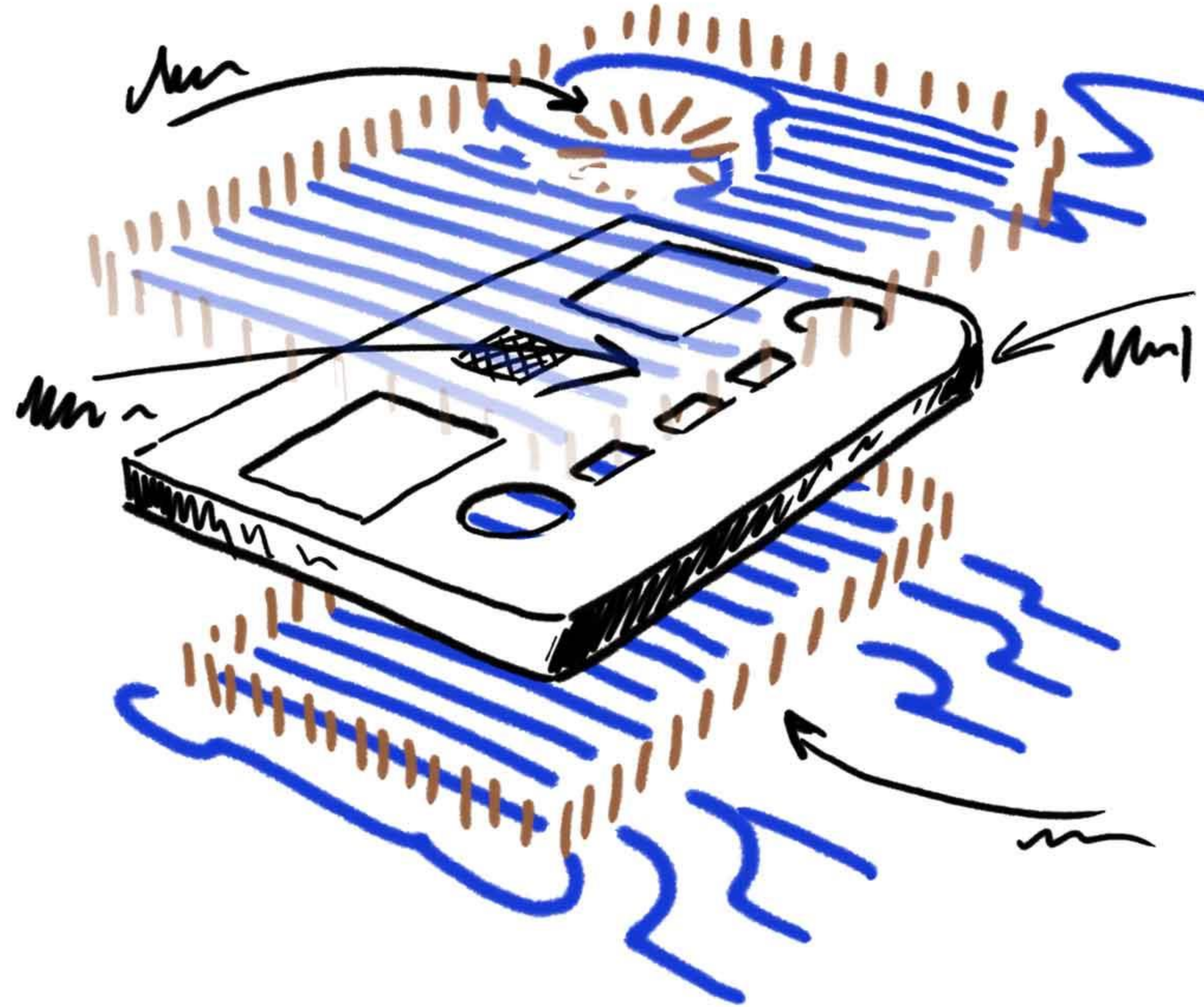
Starting with your Product ...

# OUR SERVICE



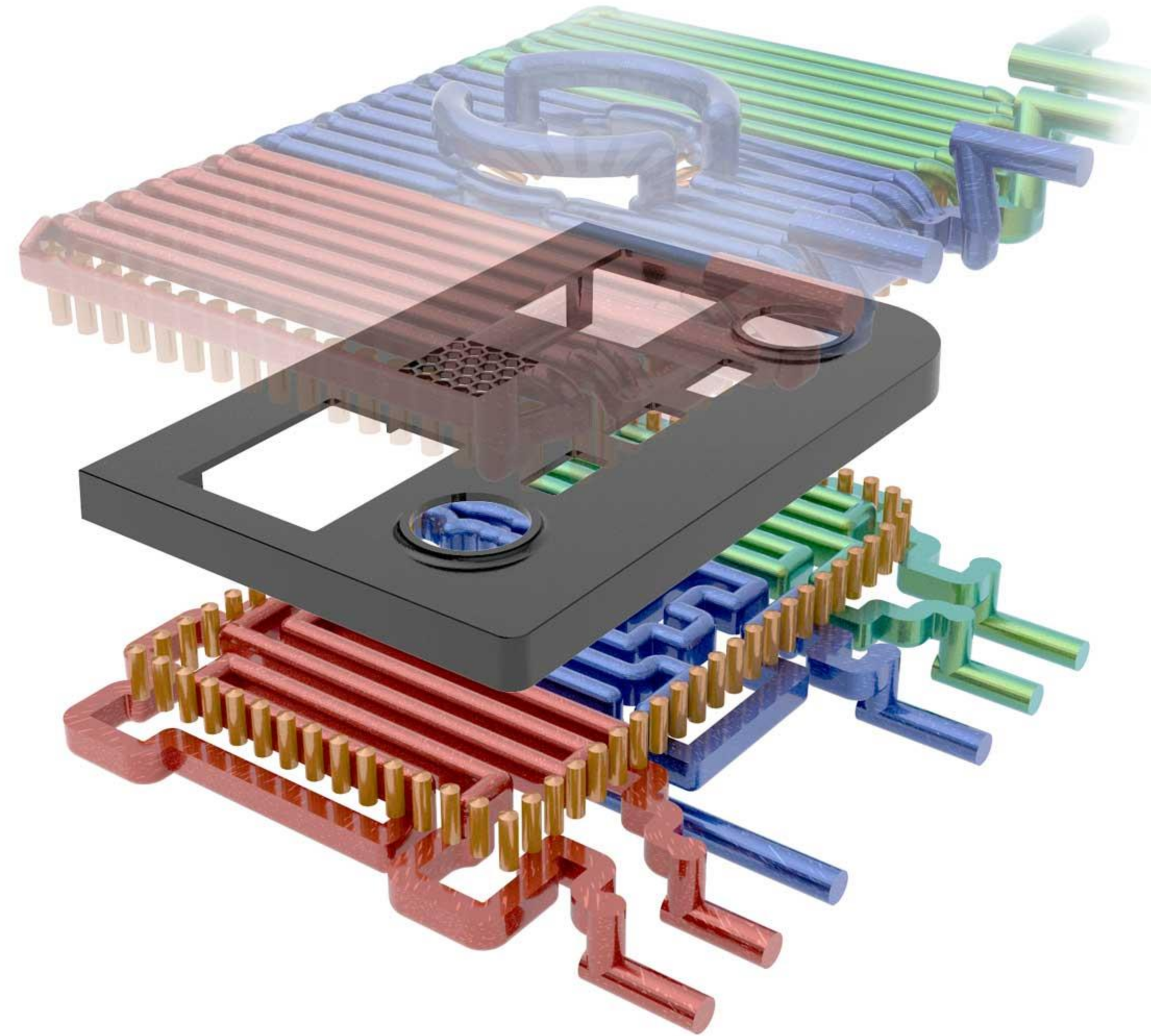
We analyze the project for possible problem areas,

# OUR SERVICE



Developing an optimal solution,

# OUR SERVICE



Design this solution and manufacture the mold insert,



# OUR SERVICE



For a perfect product!

Injection moulding is one of our core competences





# WHAT DETERMINES CYCLE TIMES?

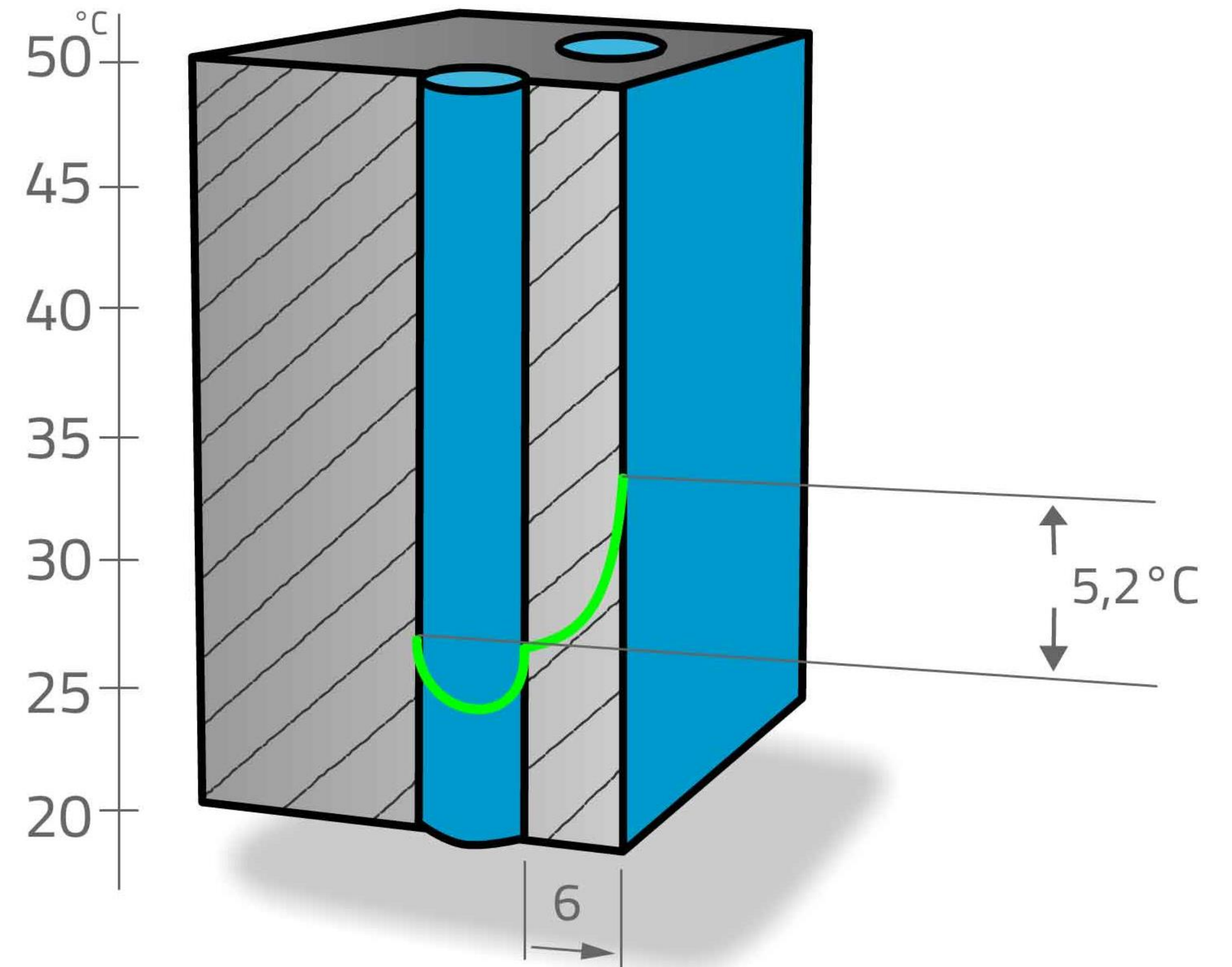
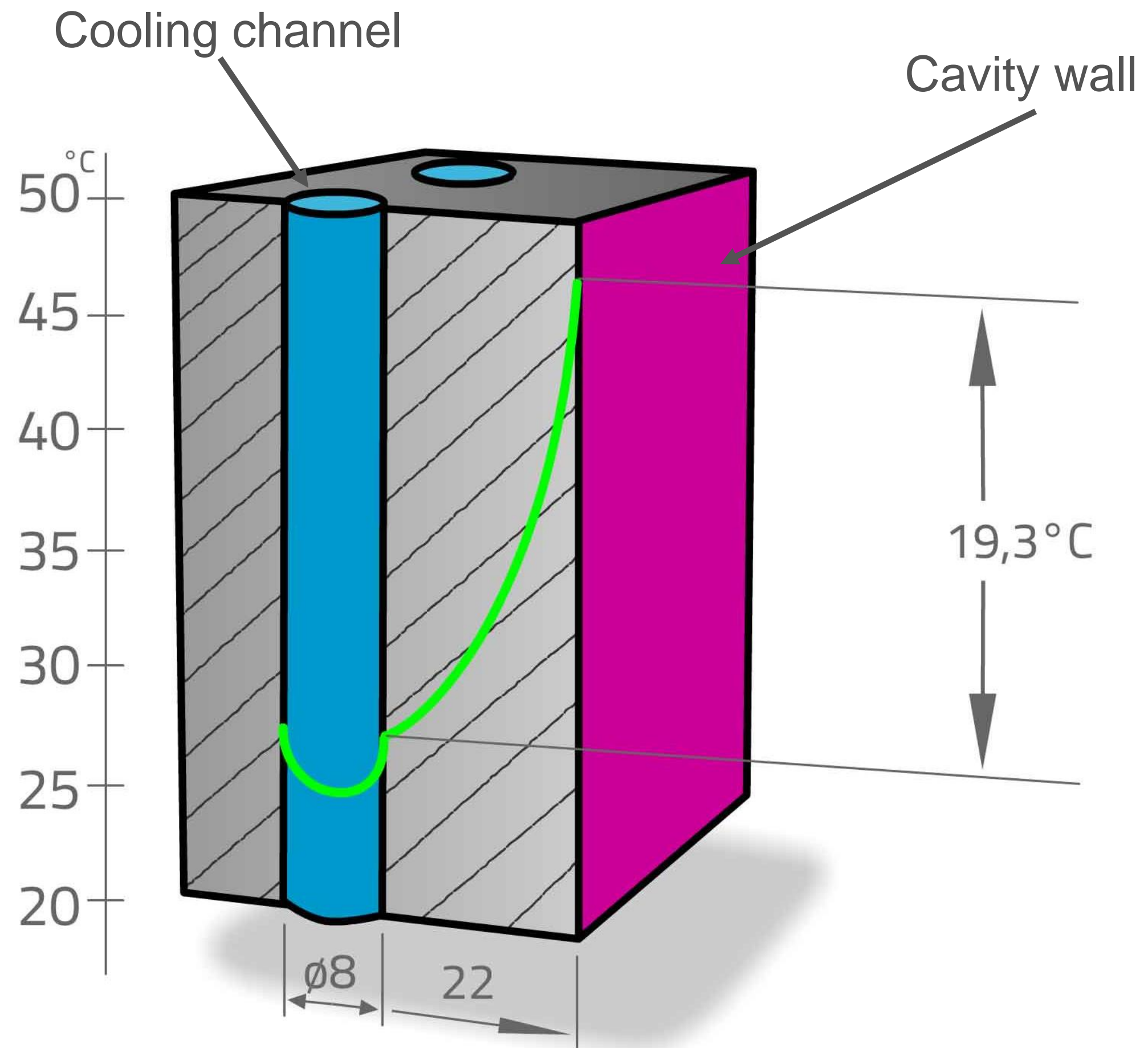


# COOLING TIME CALCULATION OF A FLAT PLASTIC PART

$$t_K = \frac{s^2}{\pi^2 a_{\text{eff}}} \cdot \ln \left( \frac{4}{\pi} \cdot \frac{\vartheta_M - \bar{\vartheta}_W}{\hat{\vartheta}_E - \bar{\vartheta}_W} \right)$$

Cavity wall temperature

# CONVENTIONEL VS CONFORMAL



# TEMPERATURE SITUATION ON THE MOLD SURFACE IN A MOLD

Messured Temperature in the Mold



Settings on the TCU



Quality Issues on the Plastic Part



## CALCULATION OF THE PHYSICAL COOLING TIME

### Material:

**Gruppe:**    
**Material:**    
**Bezeichnung:**    
**Hersteller:**    
**Glasfaseranteil:**  %   
**Massetemperatur:**  °C (280 - 320 °C)

### Formteil:

**Geometrie:**    
**Wanddicke:**  mm   
**Werkzeugwandtemperatur:** DS  °C (80 - 120 °C)   
 AS  °C

### Zeiten:

Theoretische Kühlzeit:	10,0 s
Summe der Nebenzeiten:	0,0 s
Zykluszeit:	10,0 s

### Kunde:

**Name:**    
**Auftrag:**    
**Formteil:**    
**Werkzeug:**

### Nebenzeiten:

**Einspritzzeit:**  s   
**Werkzeug öffnen:**  s   
**Formteil auswerfen:**  s   
**Formteil entnehmen:**  s   
**Werkzeug schließen:**  s   
**Sonstiges:**  s

### Berechnungen:

manuelle Eingabe:

**Mittlere Entformungstemperatur:** 111,86 °C   
**Effekt. Temperaturleitfähigkeit:** 0,1096 mm<sup>2</sup>/s   
**Max. Entformungstemperatur:** 130,05 °C

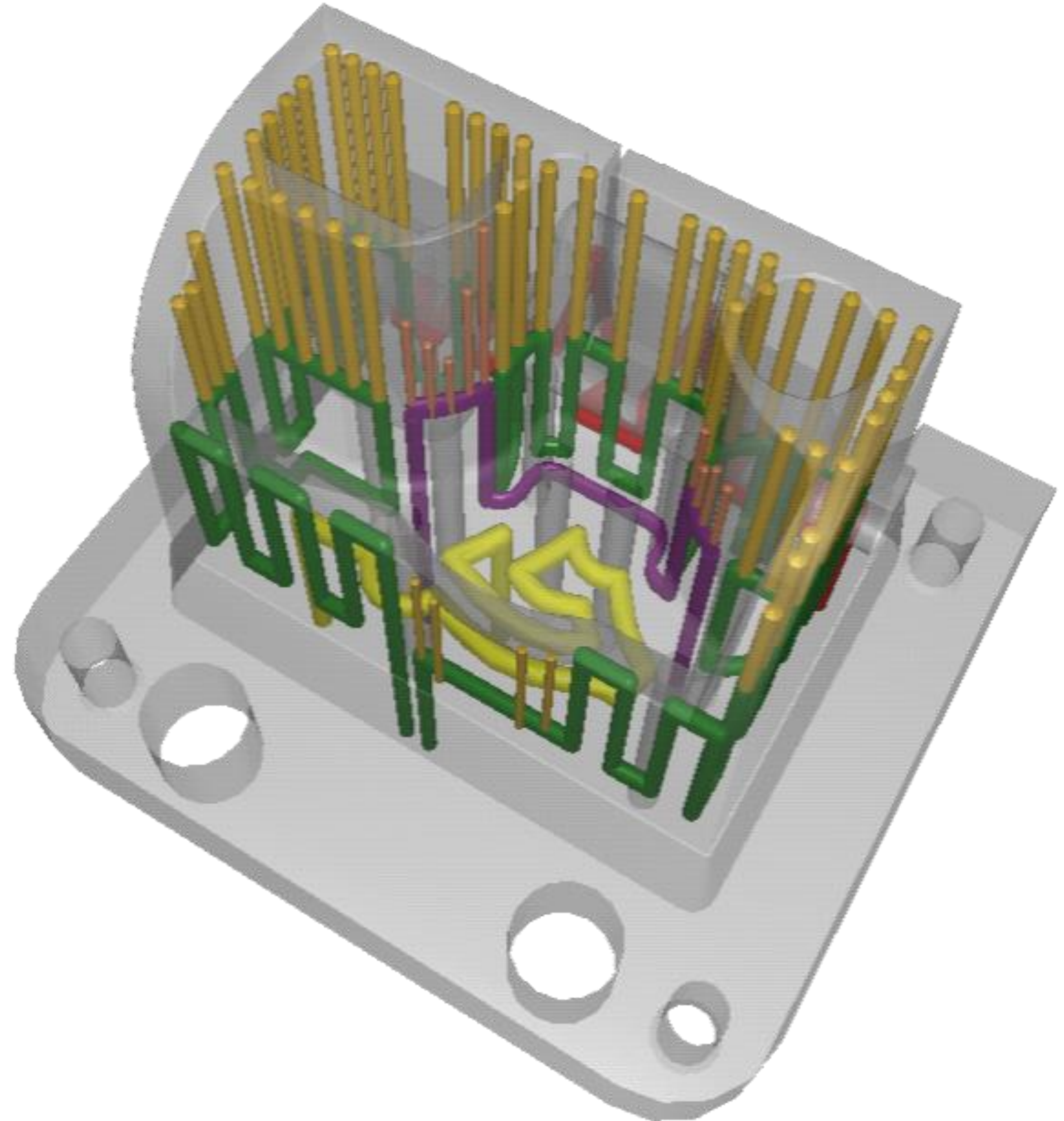
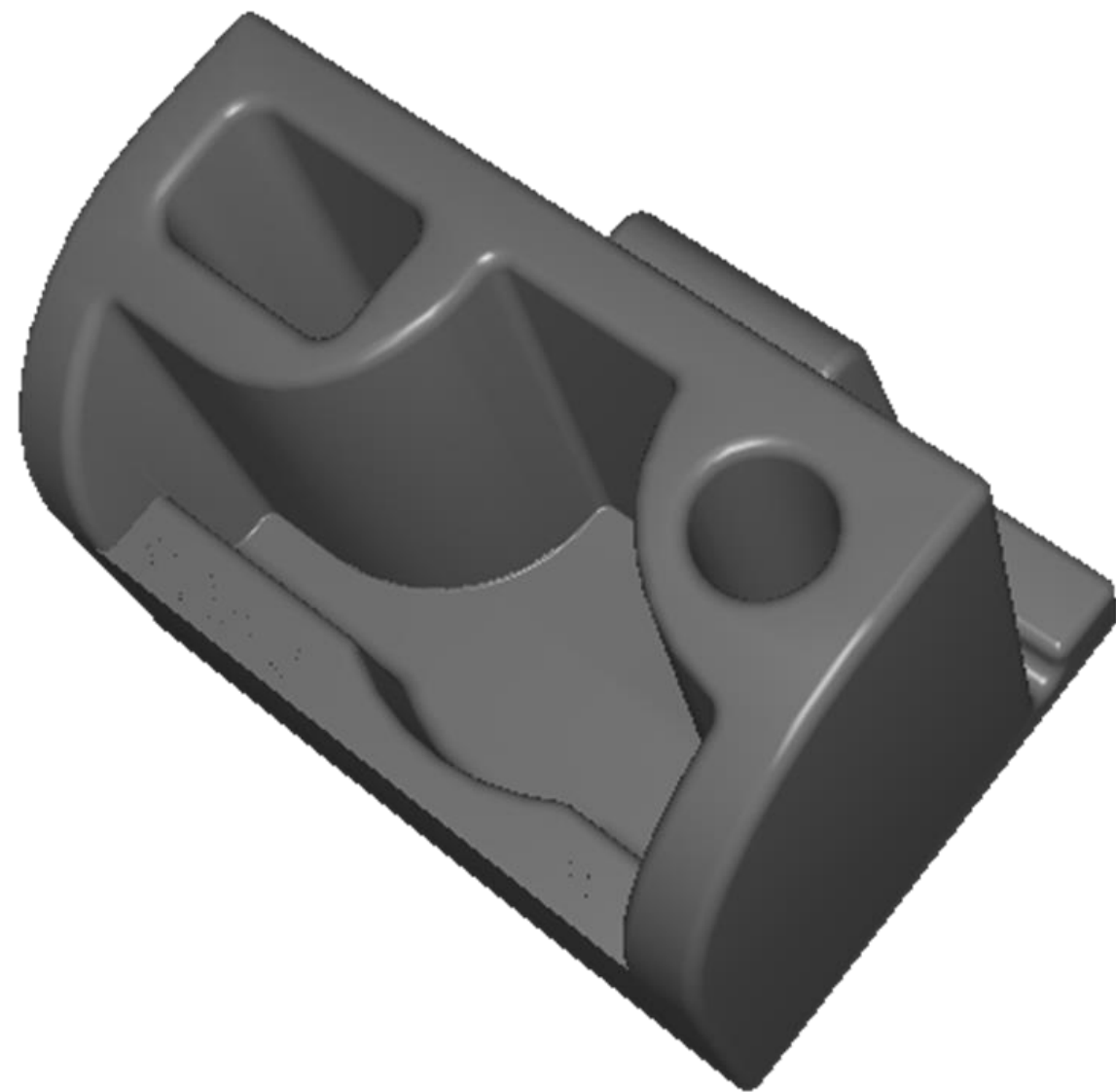
# CALCULATION OF THE PHYSICAL COOLING TIME

<b><u>Material:</u></b>		<b><u>Kunde:</u></b>	
Gruppe:	PC	Name:	
Material:		Auftrag:	
Bezeichnung:		Formteil:	
Hersteller:		Werkzeug:	
Glasfaseranteil:	0 %	<b><u>Nebenzeiten:</u></b>	
Massetemperatur:	280 °C (280 - 320 °C)	Einspritzzeit:	0 s
<b><u>Formteil:</u></b>		Werkzeug öffnen:	0 s
Geometrie:	Platte	Formteil auswerfen:	0 s
Wanddicke:	2,5 mm	Formteil entnehmen:	0 s
Werkzeugwandtemperatur:	DS 110 °C (80 - 120 °C)	Werkzeug schließen:	0 s
	AS 110 °C	Sonstiges:	0 s
<b><u>Zeiten:</u></b>		<b><u>Berechnungen:</u></b>	
Theoretische Kühlzeit:	26,0 s	<input type="checkbox"/> manuelle Eingabe:	
Summe der Nebenzeiten:	0,0 s	Mittlere Entformungstemperatur:	111,86 °C
Zykluszeit:	26,0 s	Effekt. Temperaturleitfähigkeit:	0,1109 mm <sup>2</sup> /s
		Max. Entformungstemperatur:	112,92 °C

$\Delta t_{\text{Mo-Surface}} = +30^\circ\text{C}$  Cooling Time +160%!!!

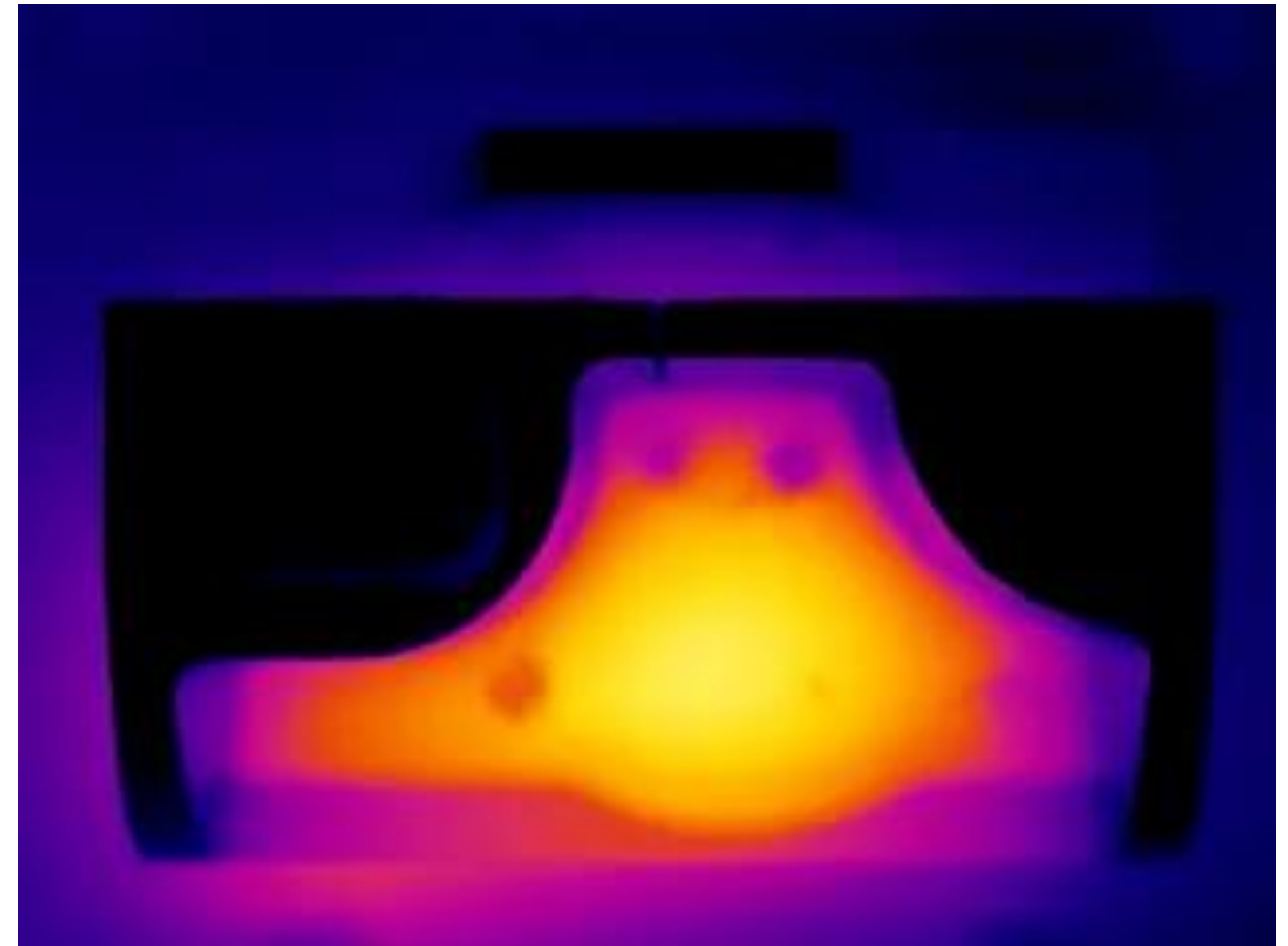
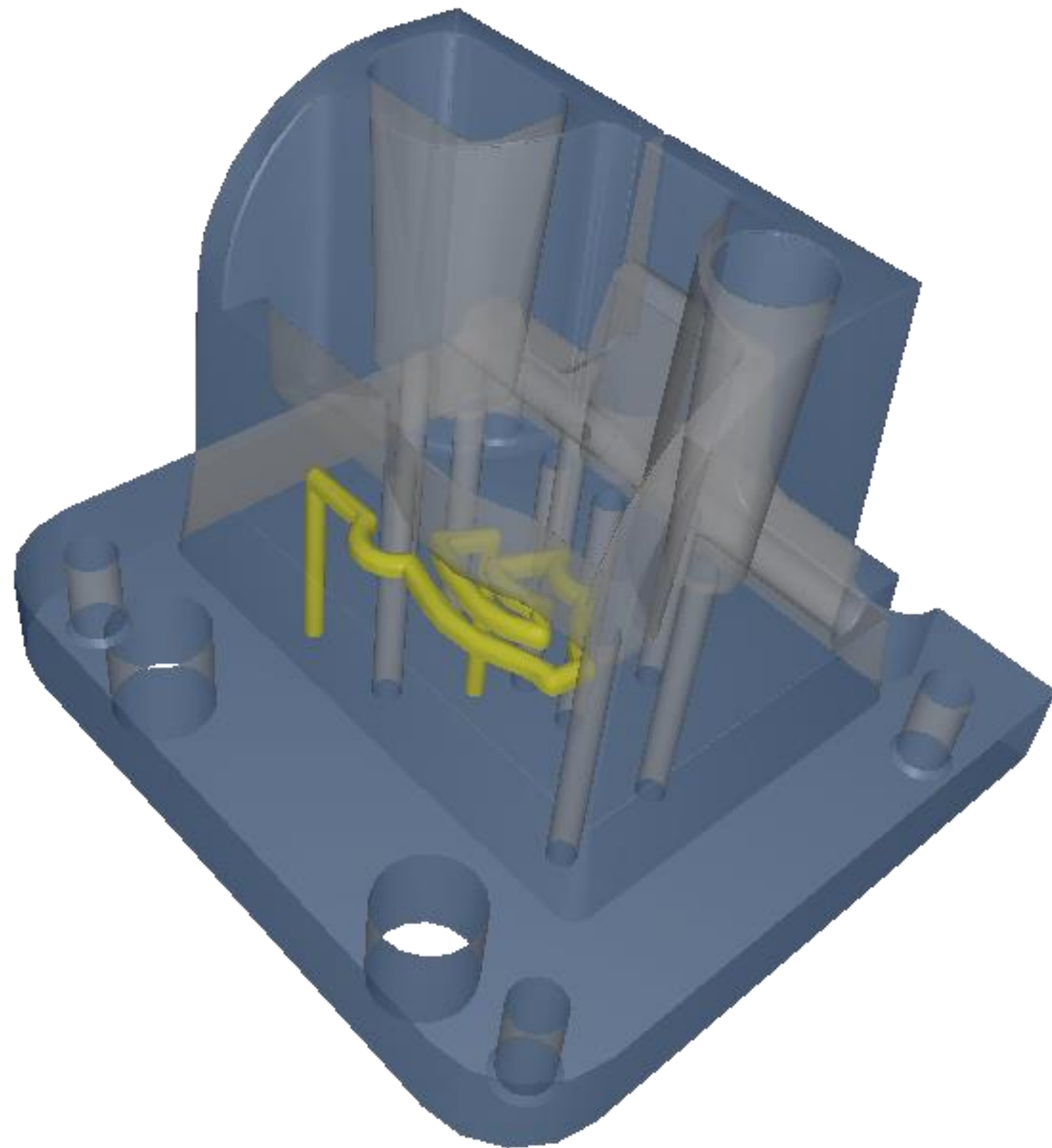
# Conformal, segmented waterlines

Shrinkage control by different coolant temperatures in multiple independant waterlines



# APPLICATION EXAMPLE

Heating and cooling of a circuit is very much limited to the mould surface area that is covered by this circuit.

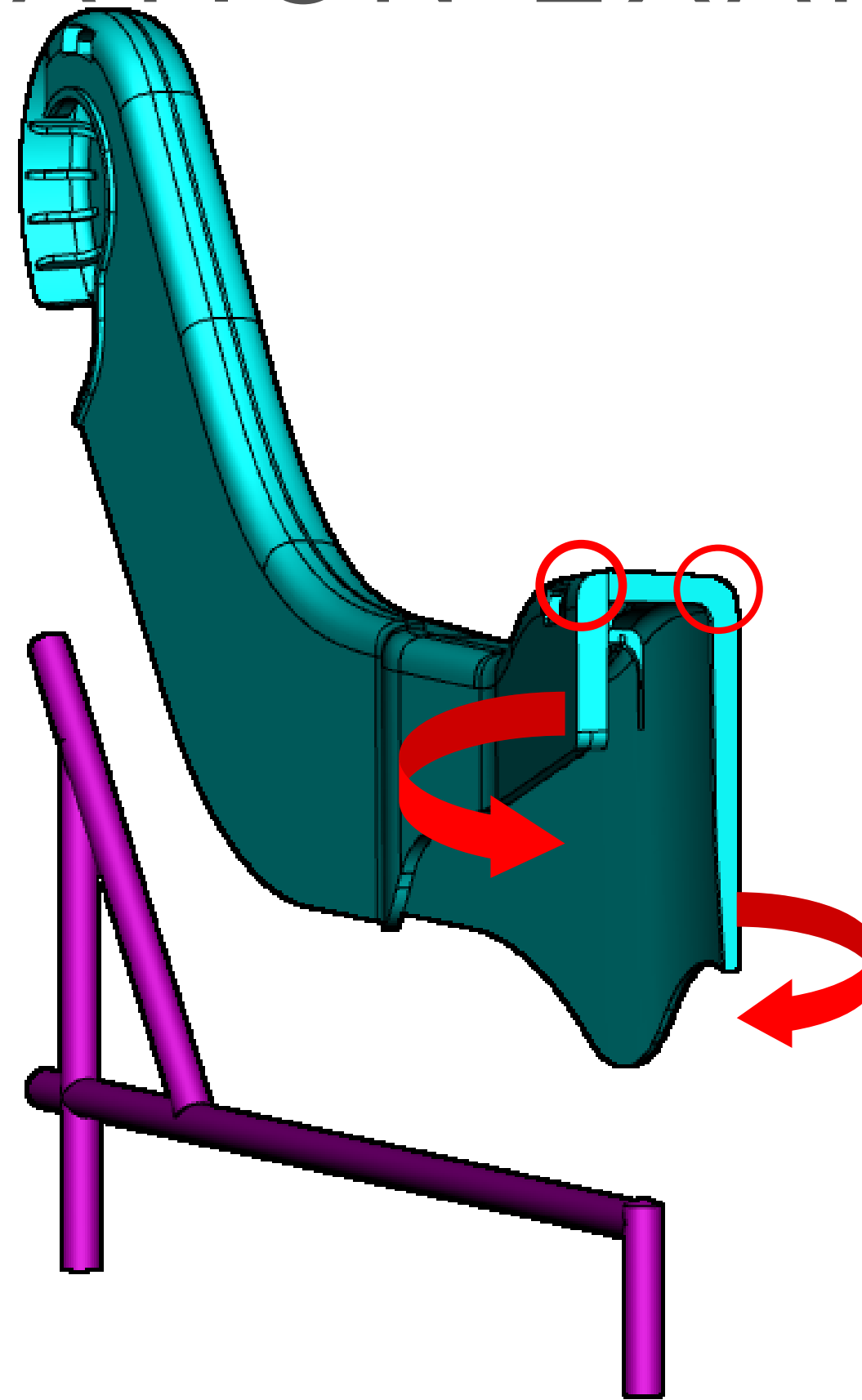


Temperatur control of injection area



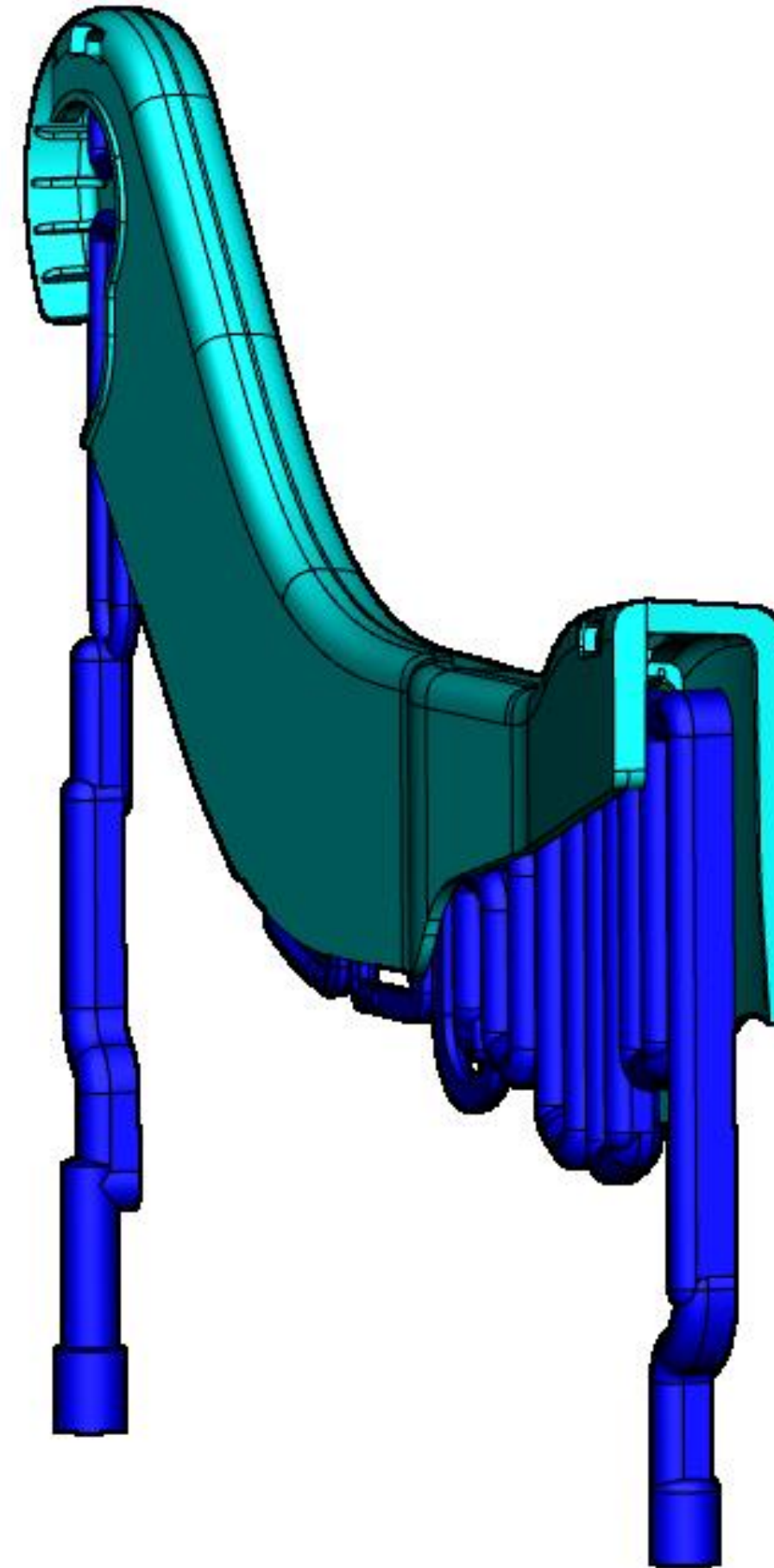
# APPLICATION EXAMPLE

Verzugsoptimierung  
Automotive  
Interieur-Bauteil

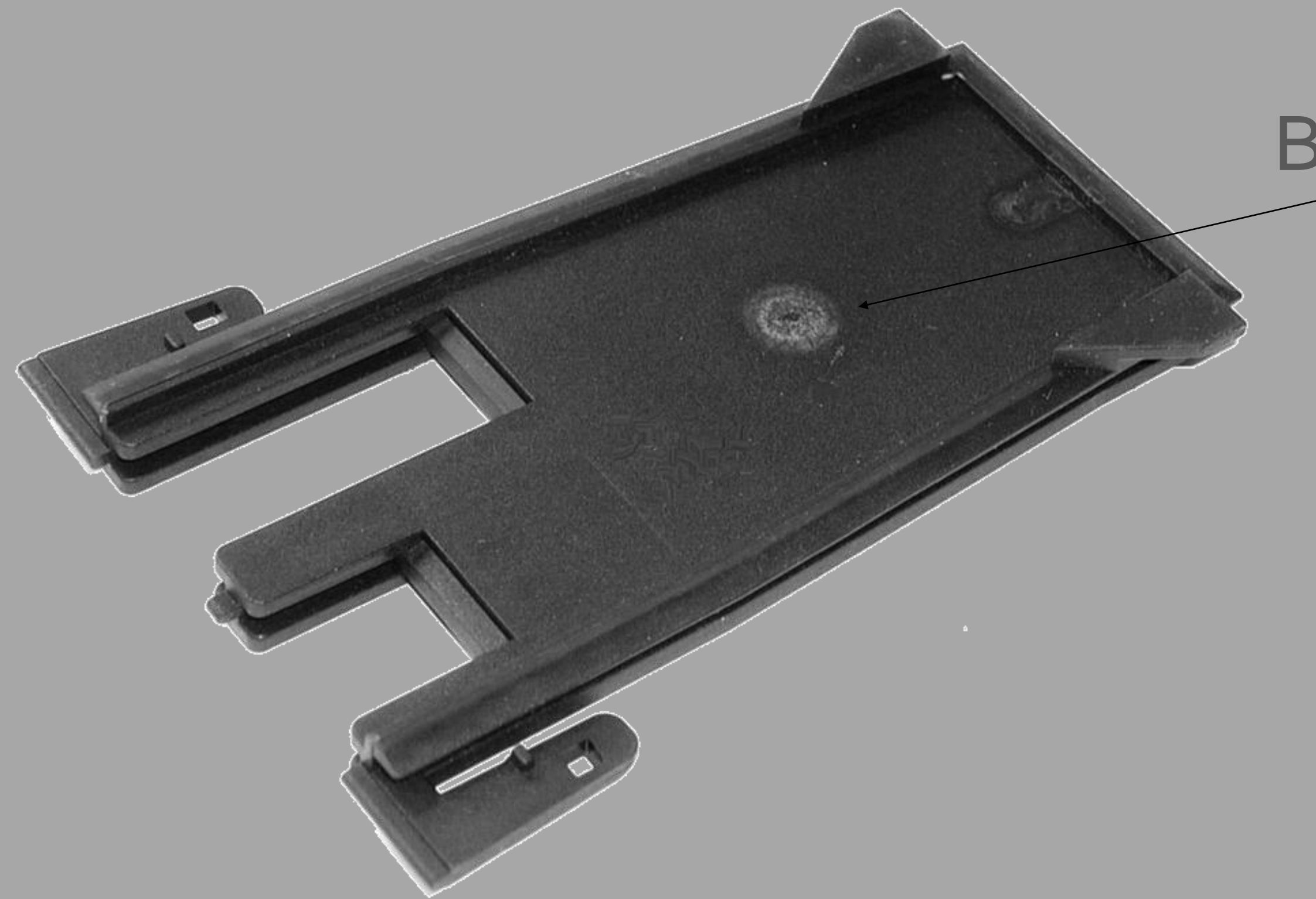


# ANWENDUNGSBEISPIEL

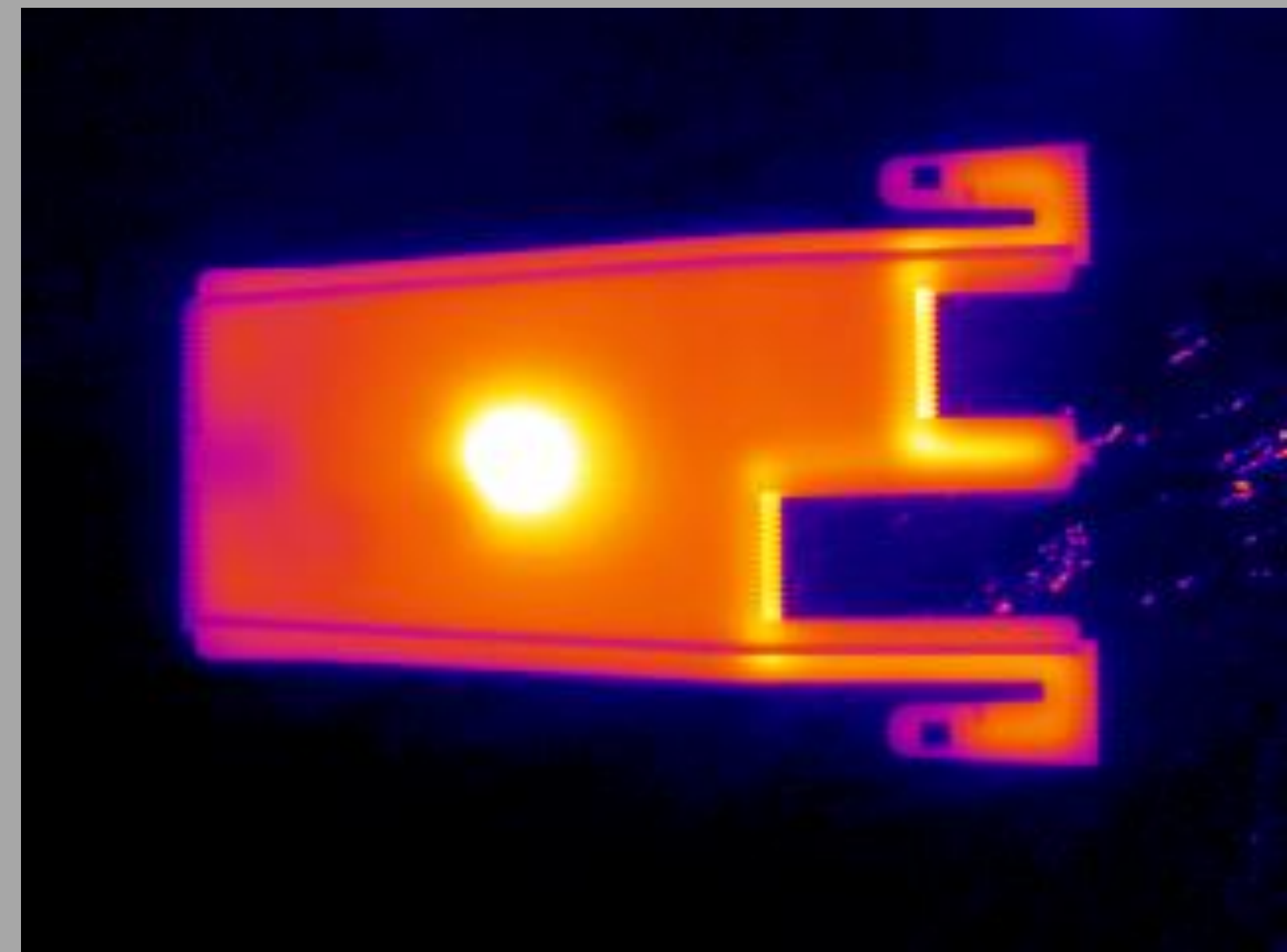
Verzugsoptimierung  
Automotive  
Interieur-Bauteil



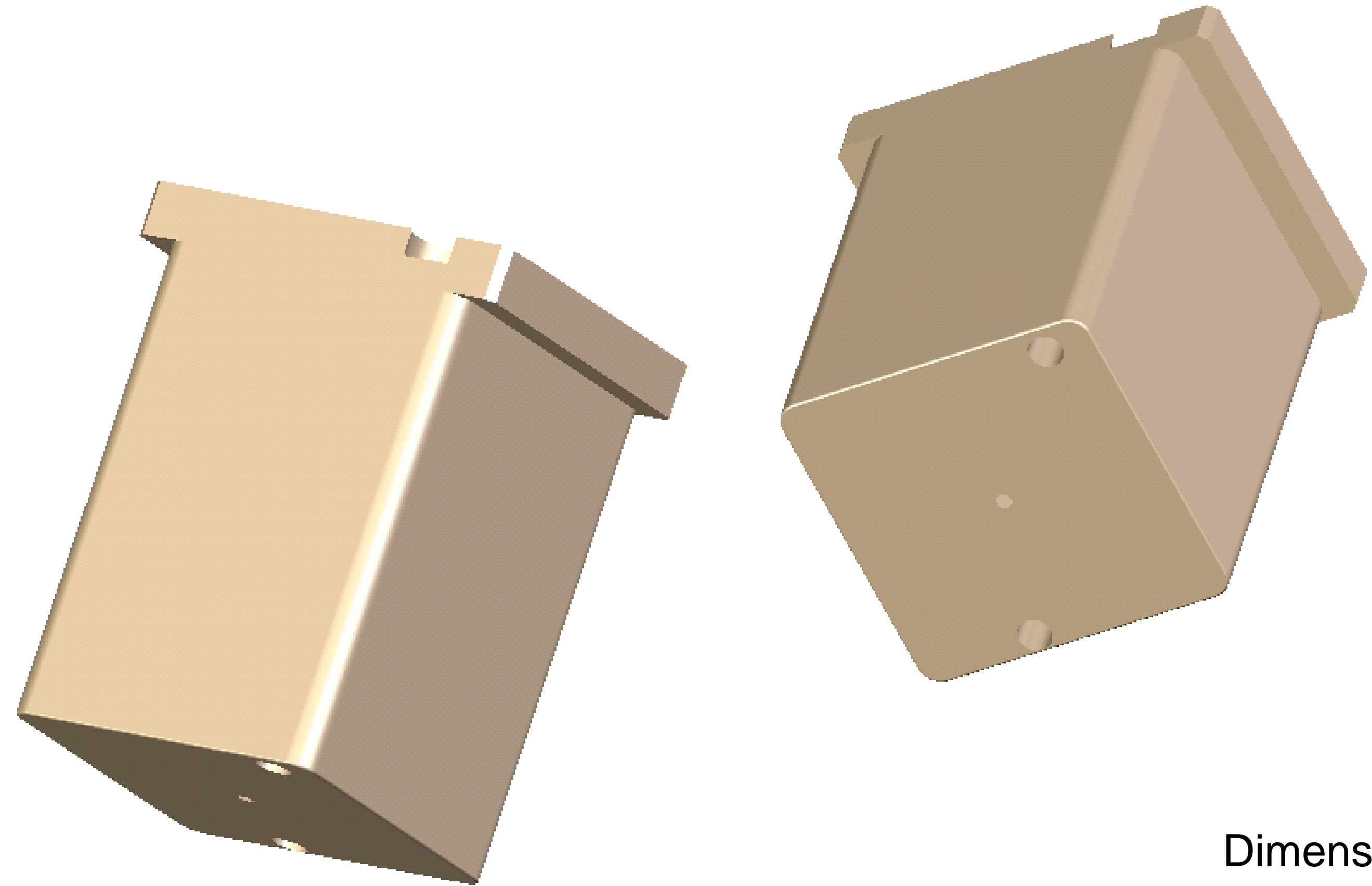
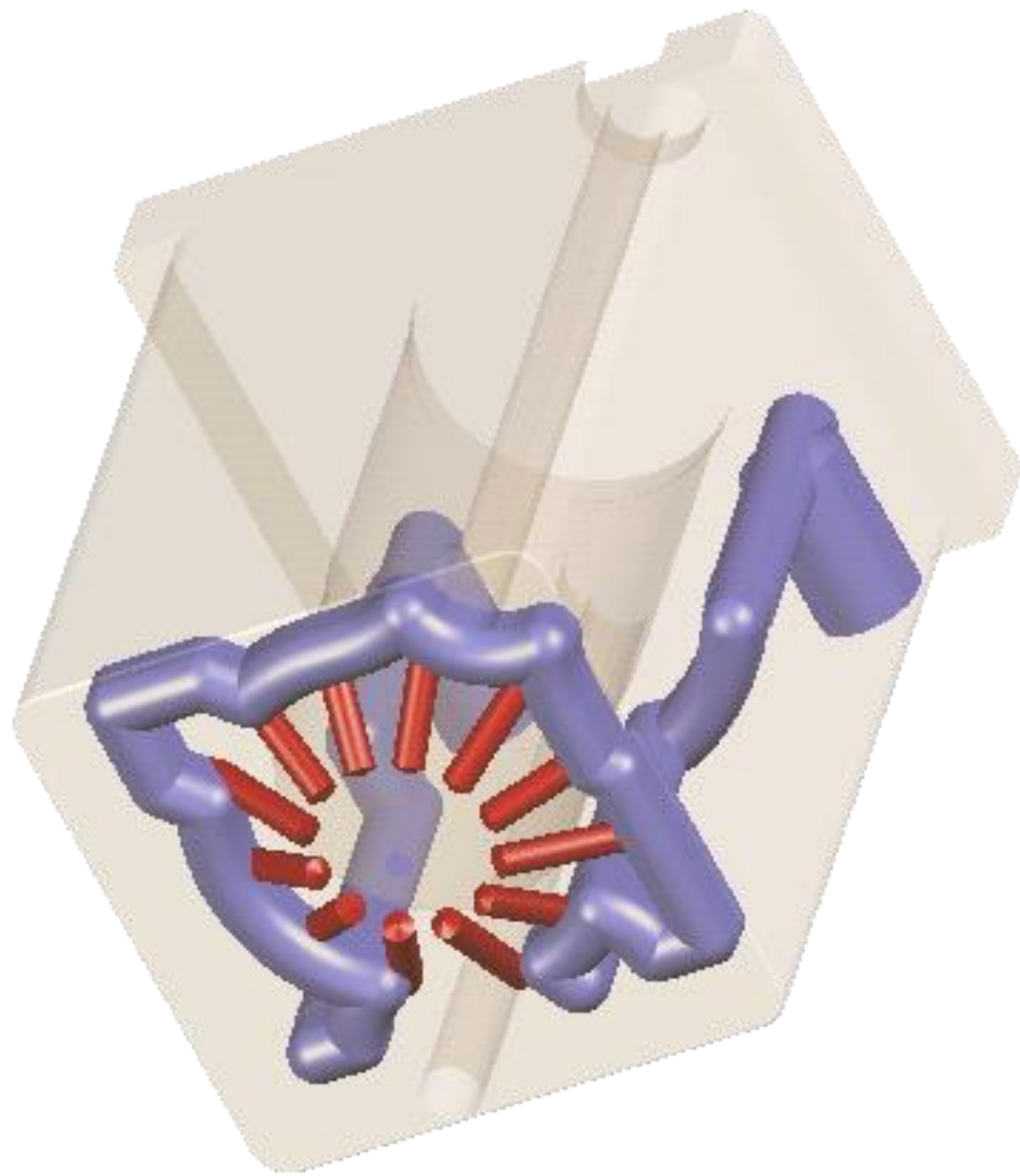
# APPLICATION EXAMPLE



Burnmark by overheated gate area



# APPLICATION EXAMPLE



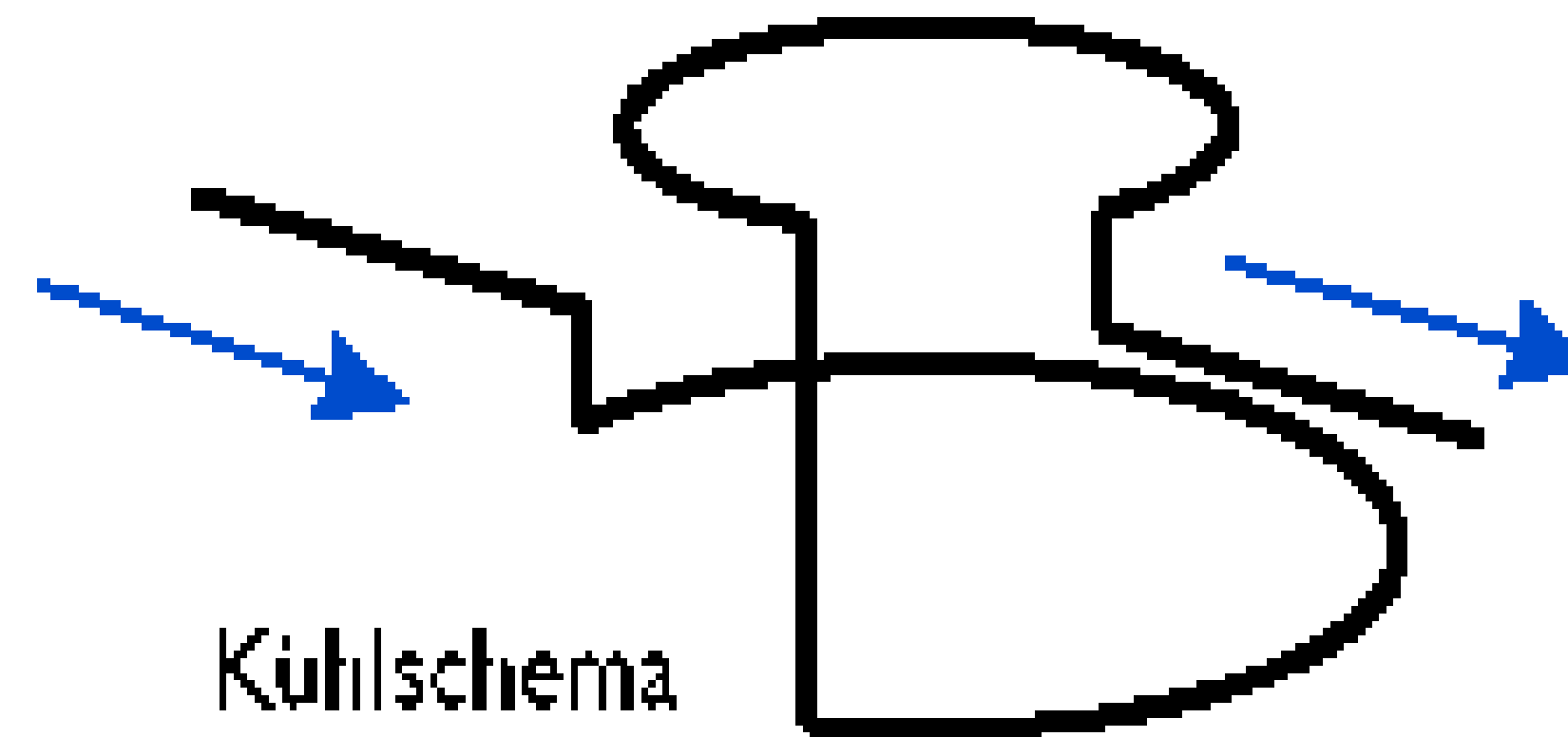
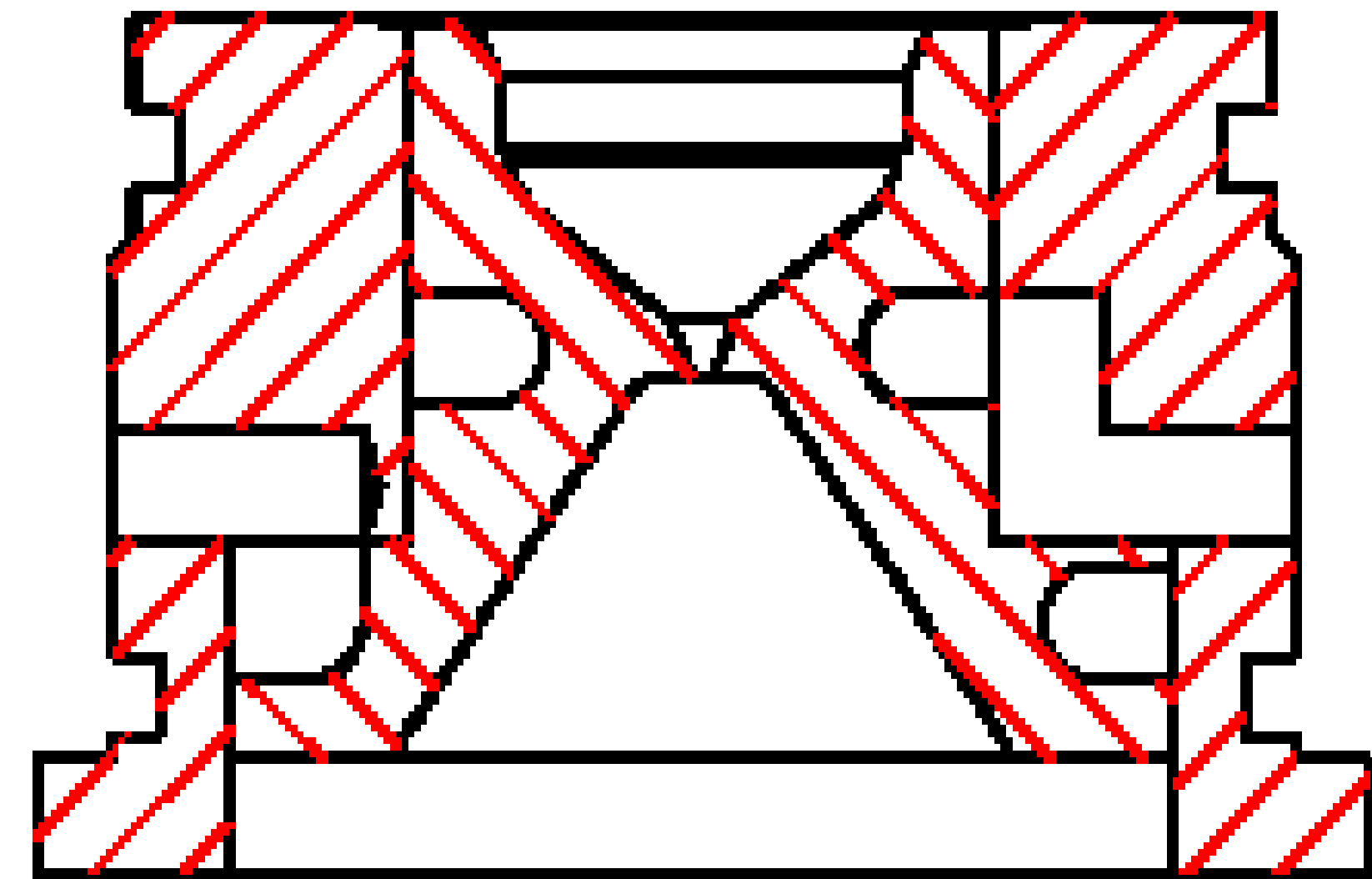
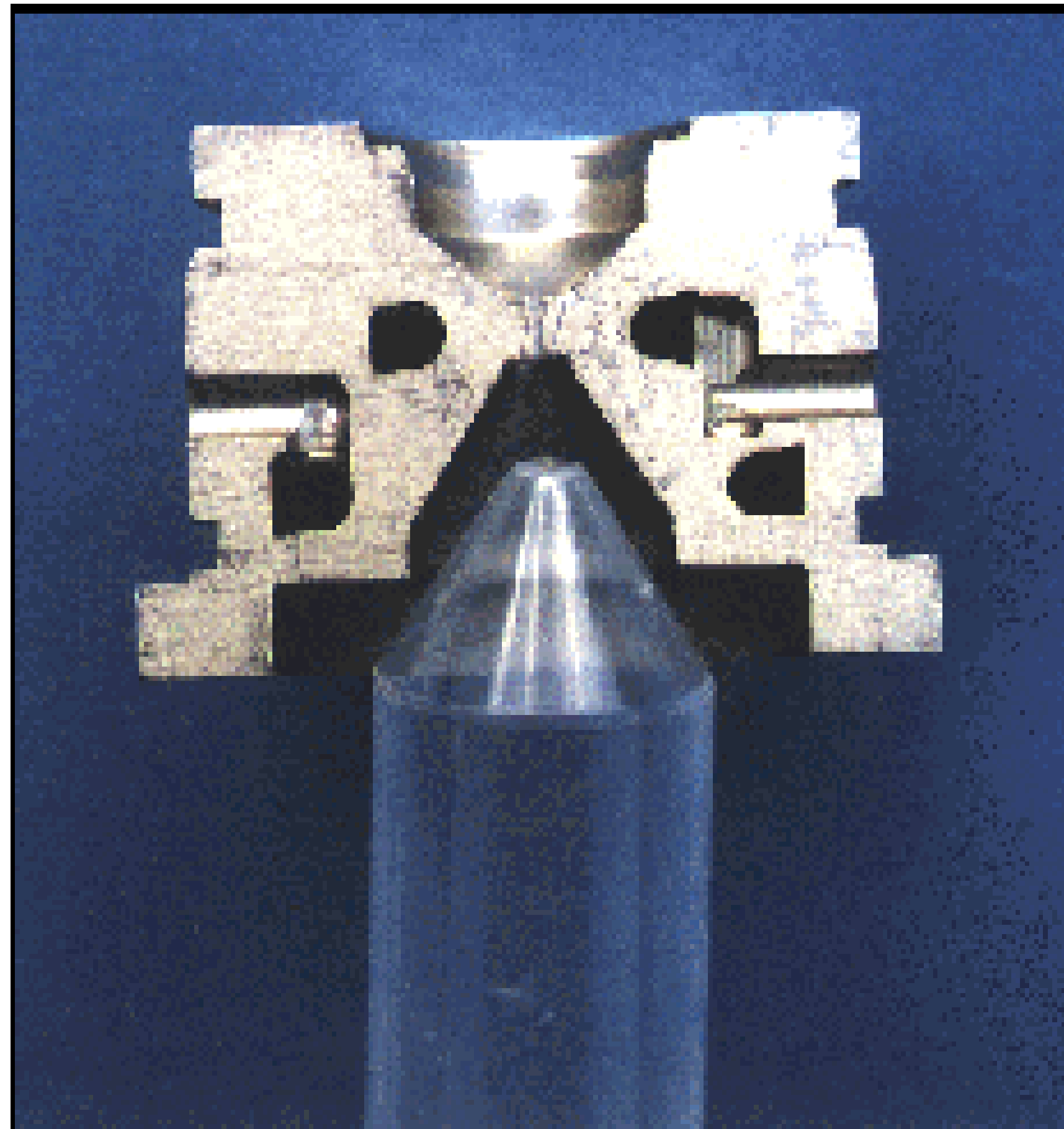
Dimension:

L: 40 mm

W: 40 mm

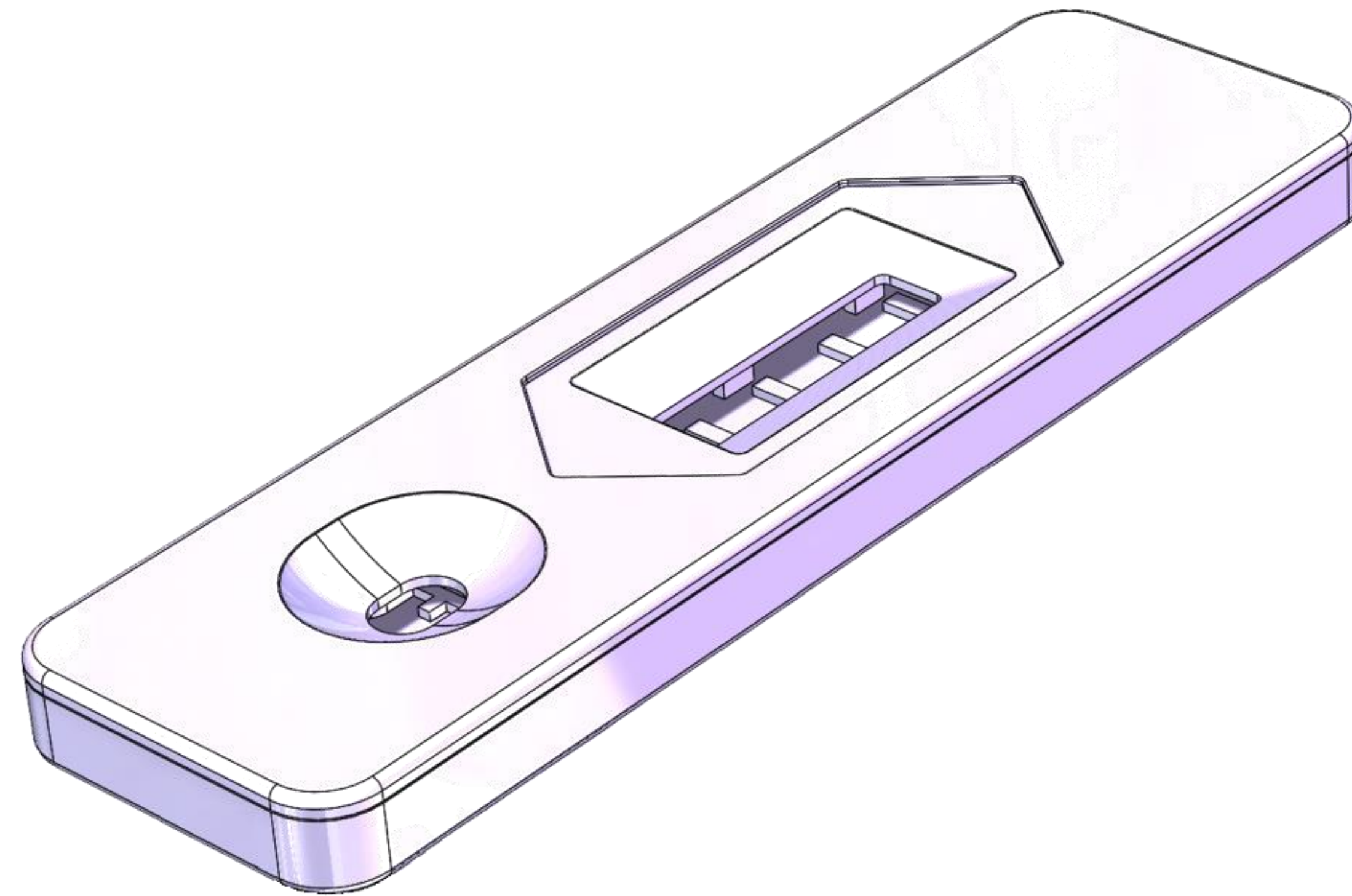
H: 60 mm

# APPLICATION EXAMPLE



# APPLICATION EXAMPLE

Covid-19 rapid test



# APPLICATION EXAMPLE

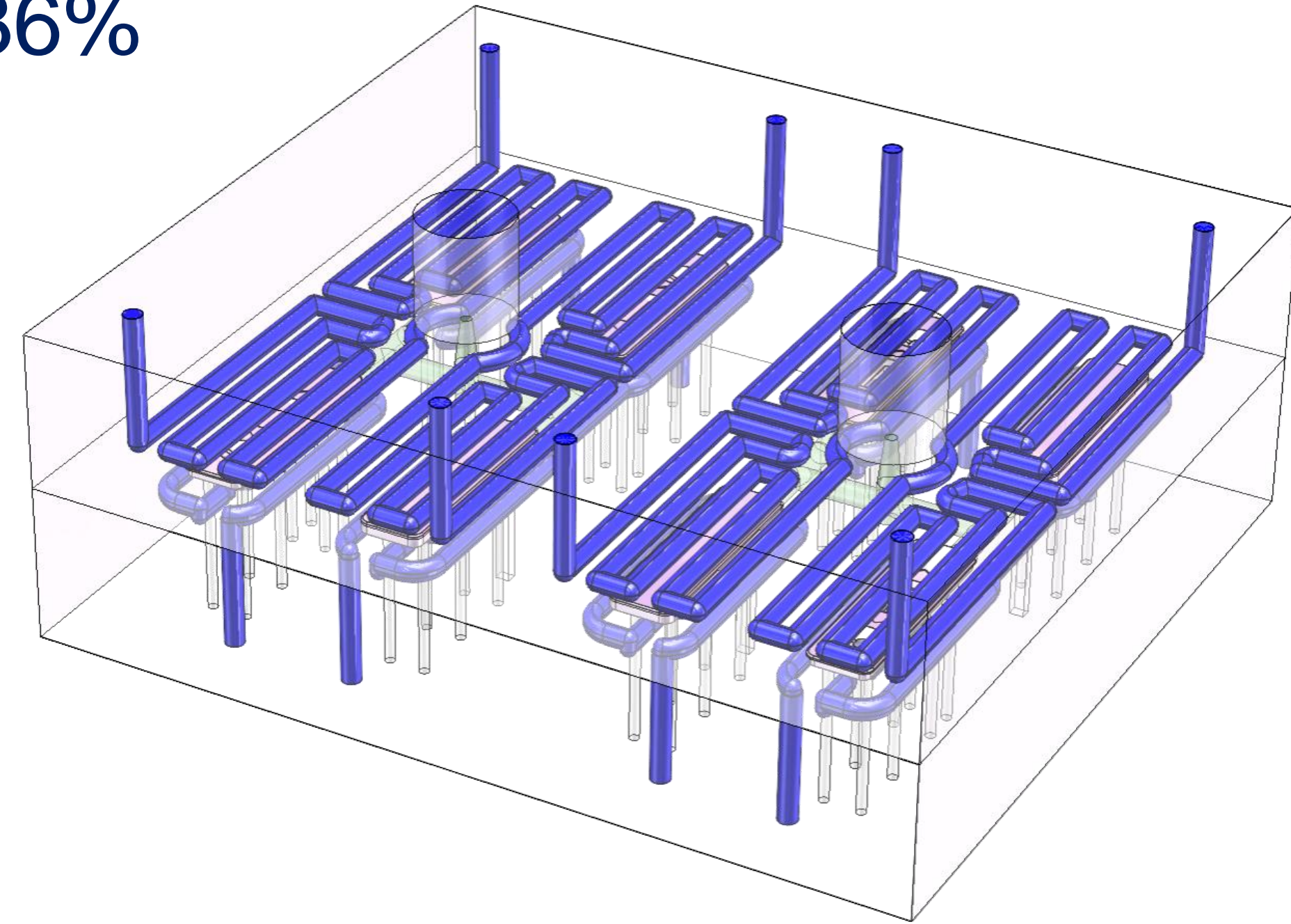
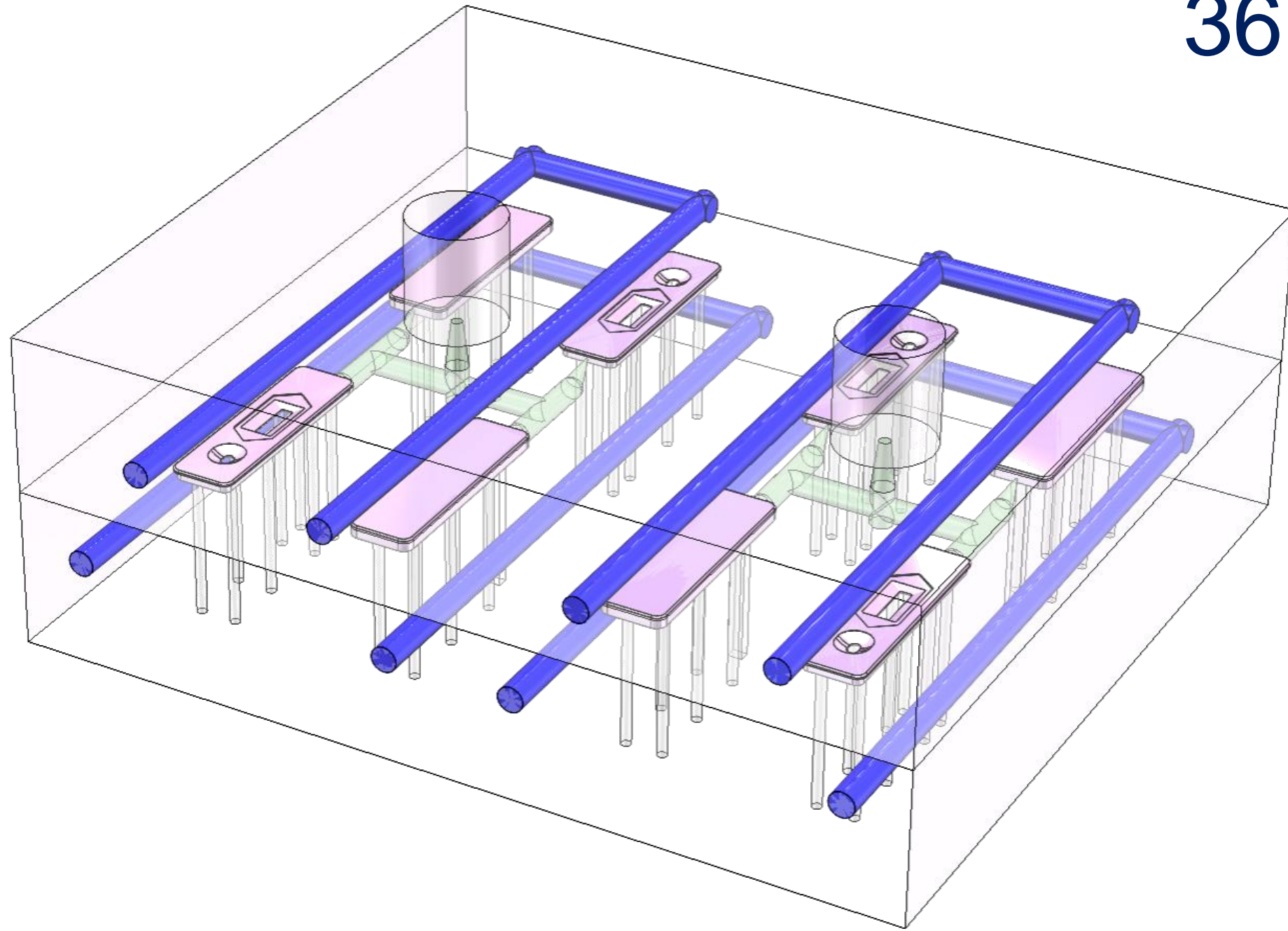
Conventional cooling

Cycle time **conventional** = 5.5 sec

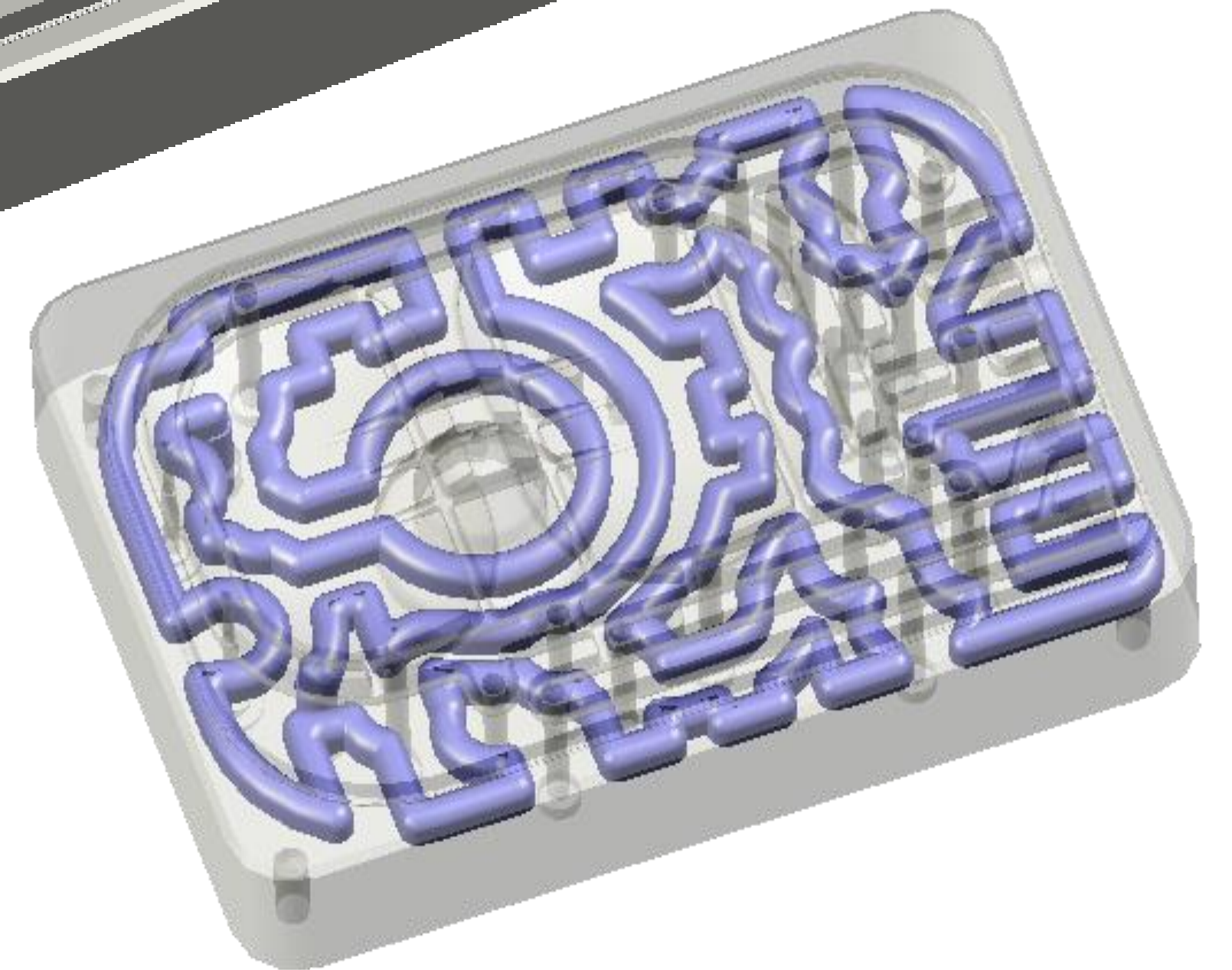
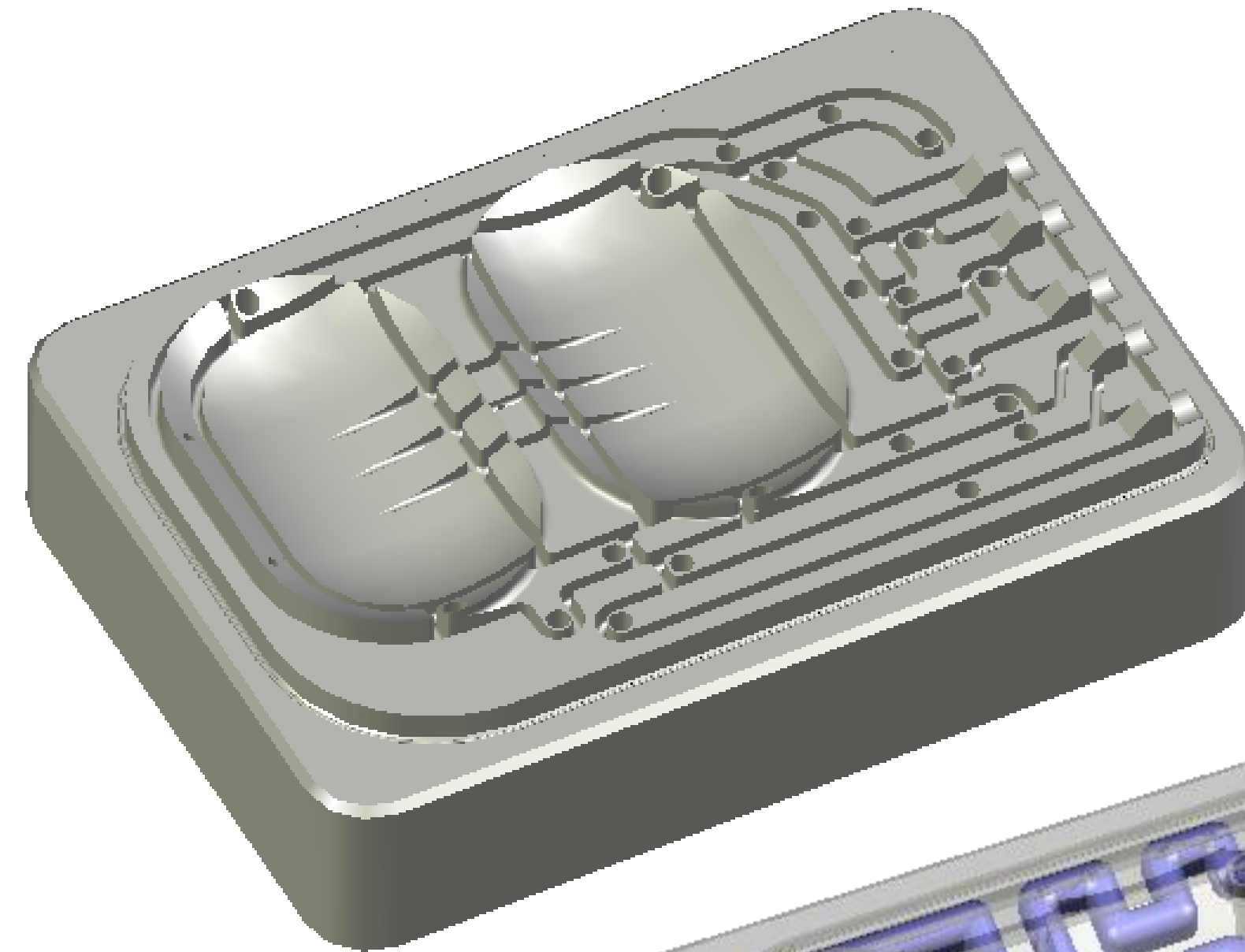
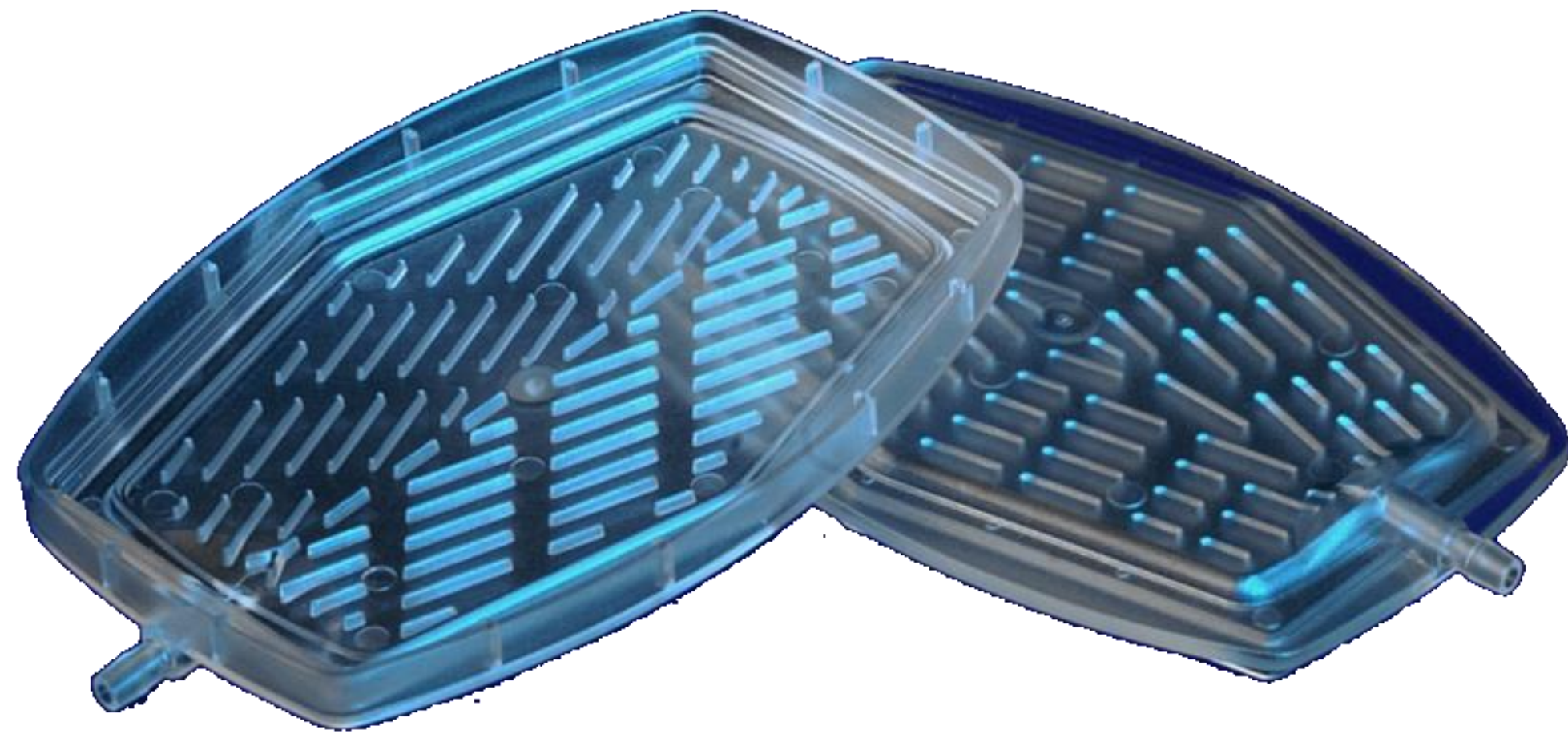
CONTURA cooling

Cycle time with **CONTURA** = 3.5 sec

Cycle time reduction  
36,36%



# APPLICATION EXAMPLE



Insert dimension:

L: 146 mm

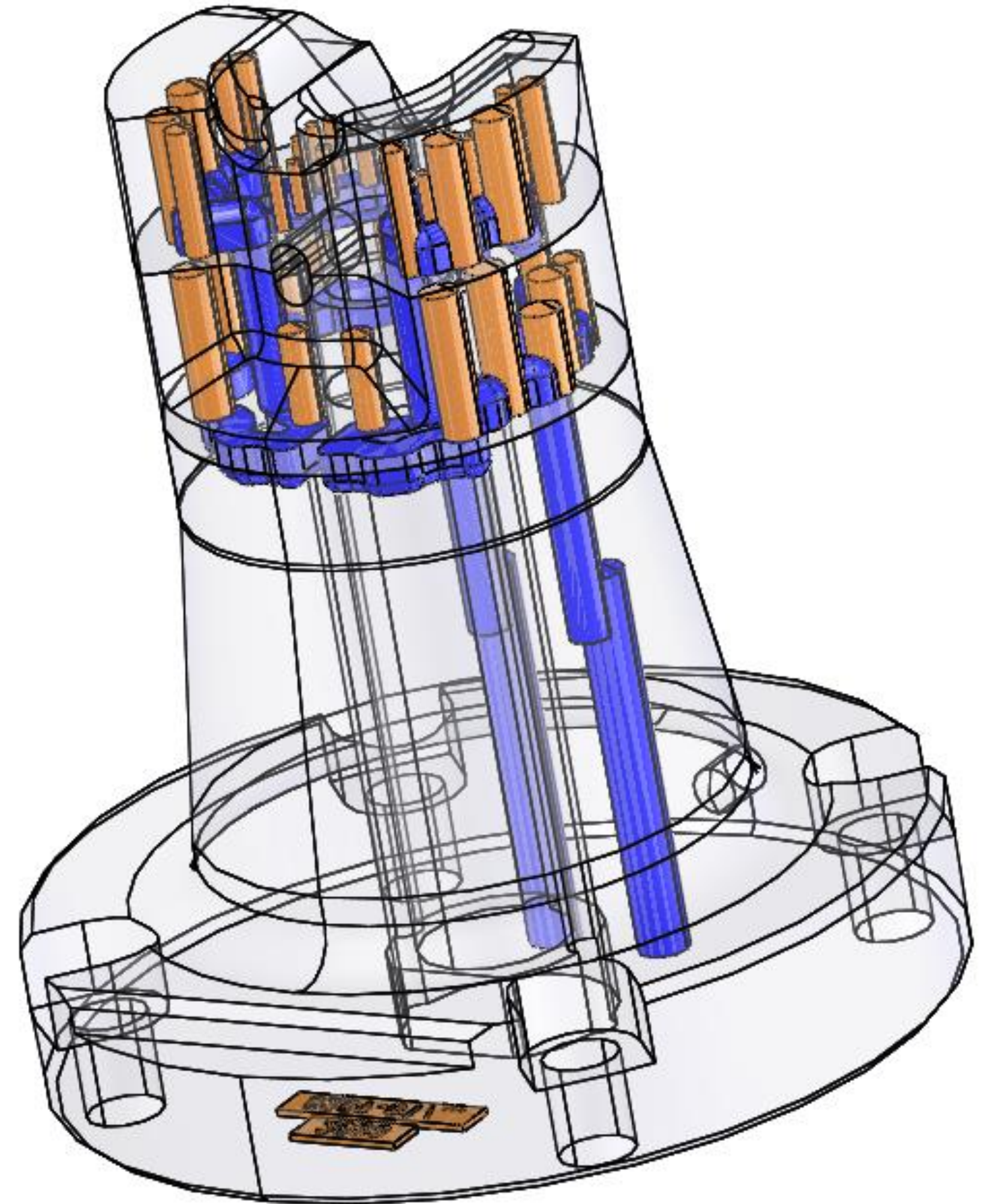
W: 105 mm

H: 37 mm



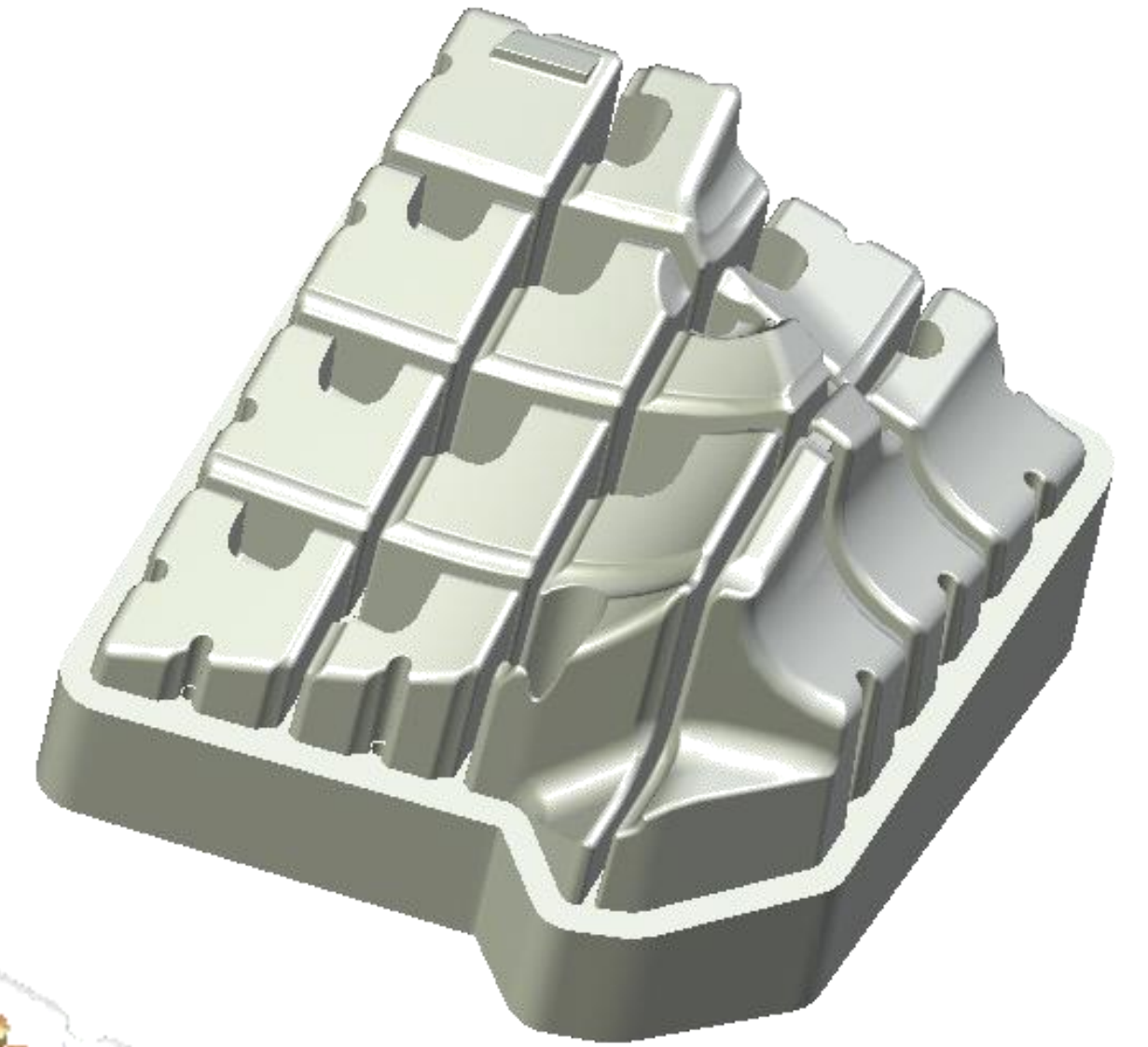
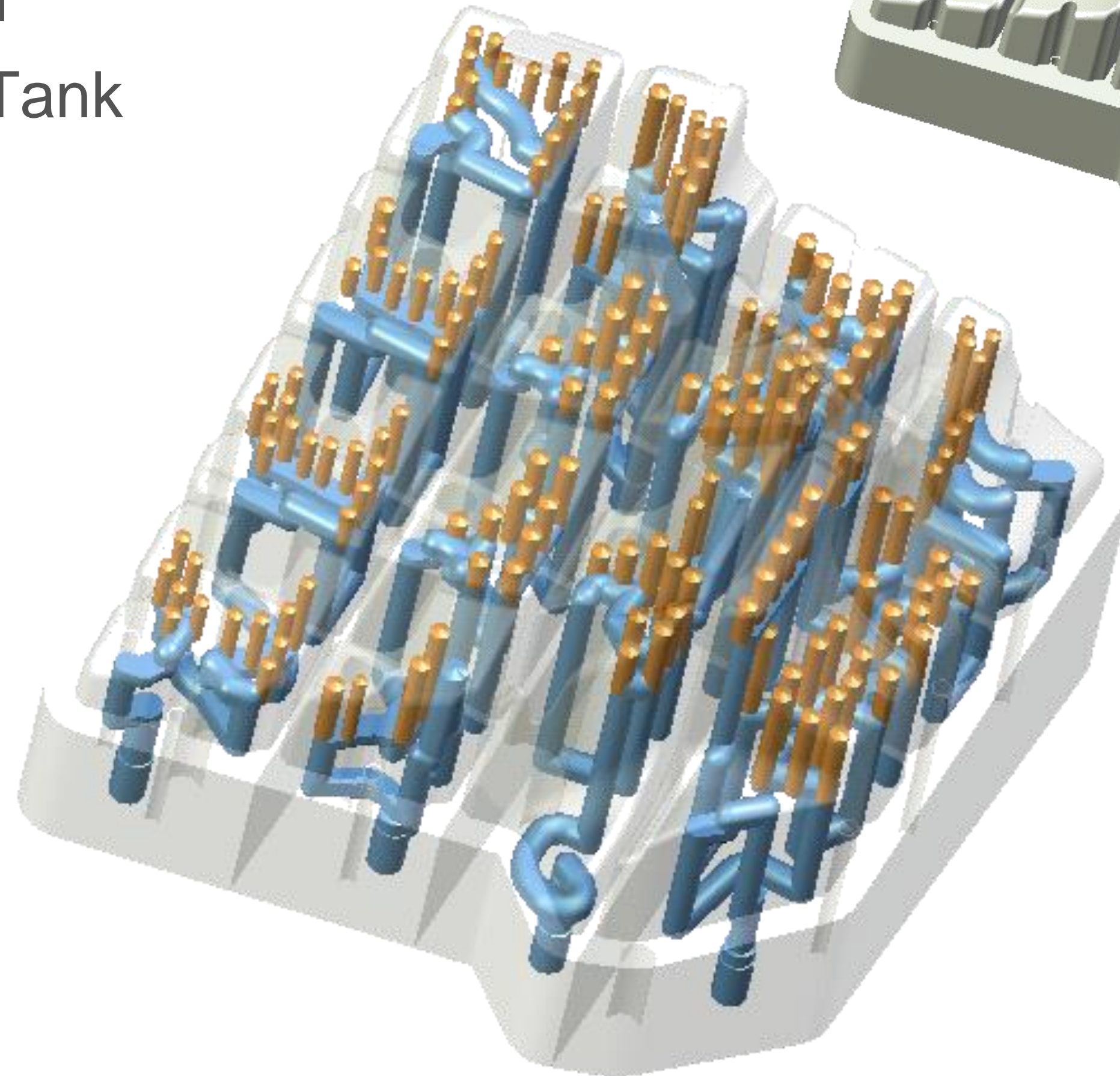
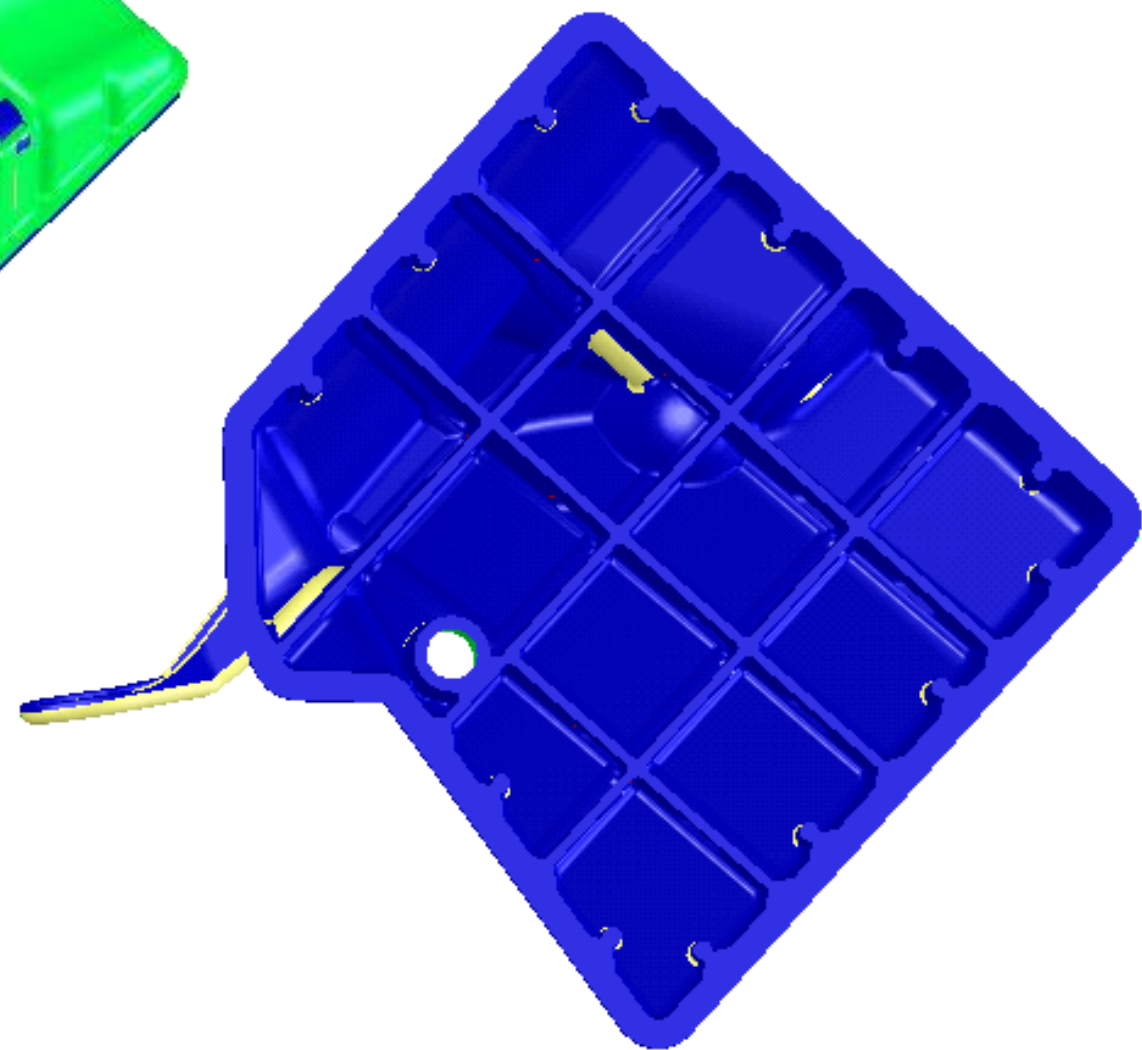
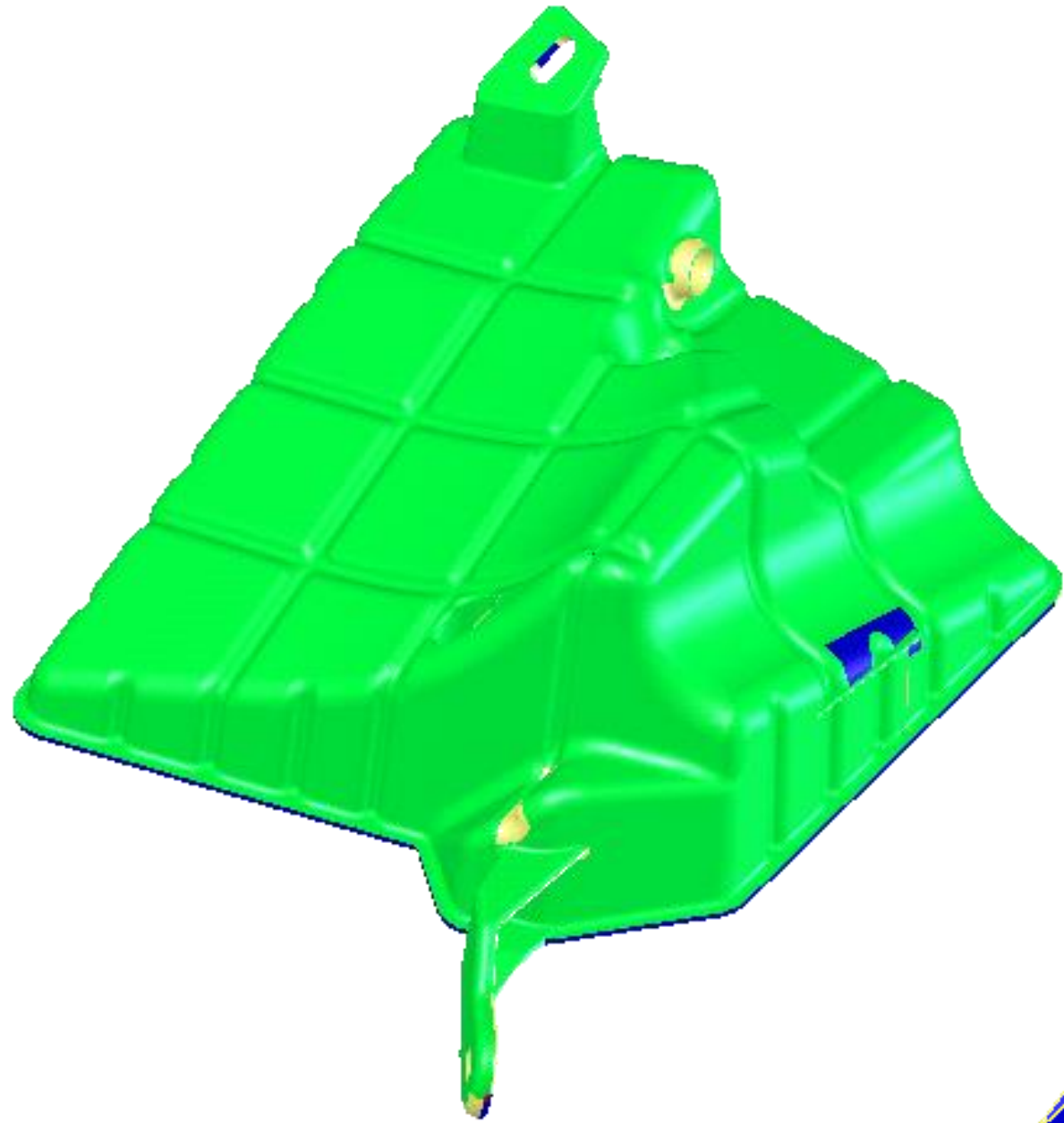
# APPLICATION EXAMPLE

Spray Cap Core  
Steel grade:  
Stavax  
Stainless 420



# APPLICATION EXAMPLE

Cycle Time optimization  
of a Automotive Water Tank



# APPLICATION EXAMPLE

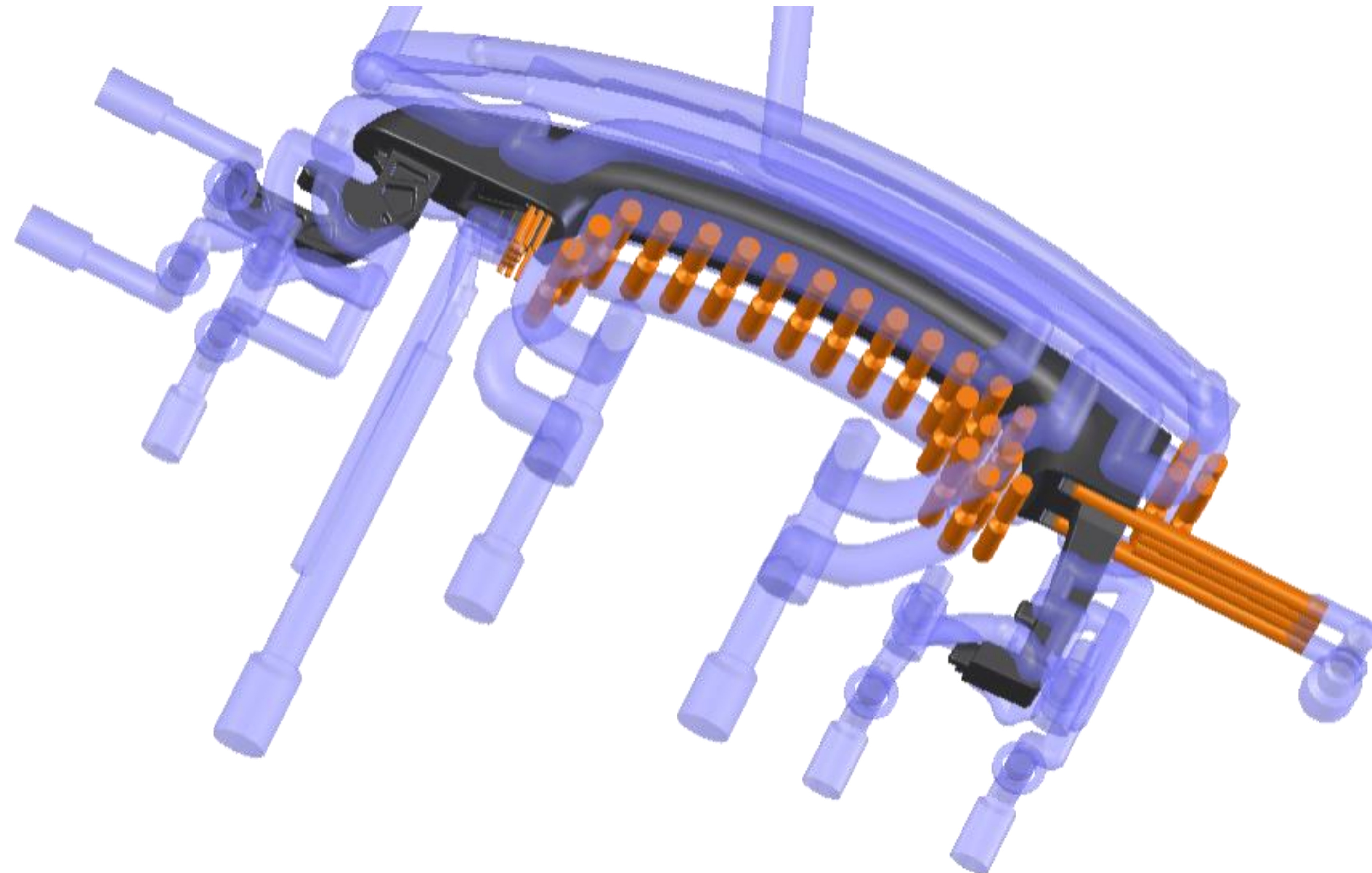
Door handle (gas assist)



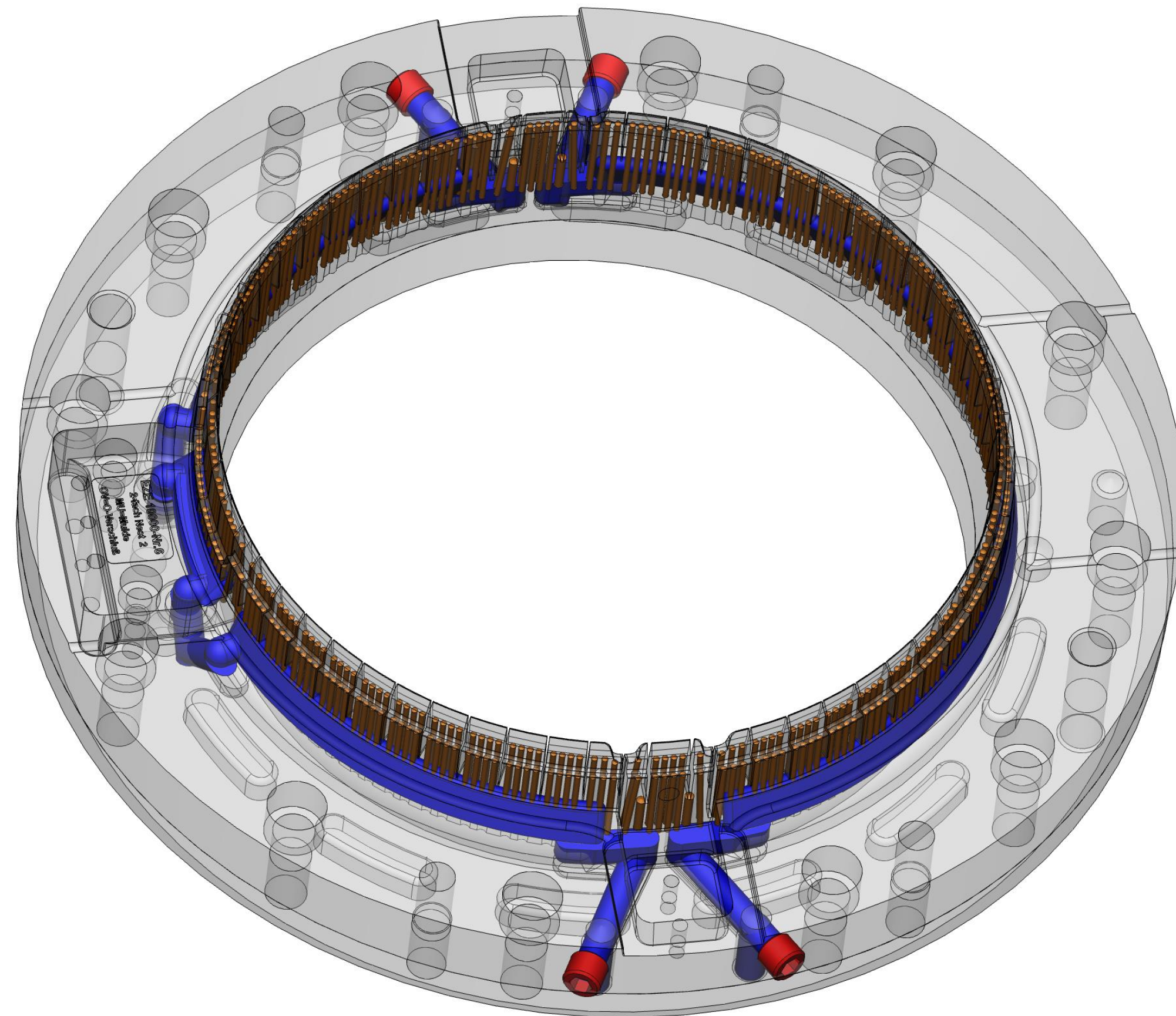
Material:  
PA 6.6 GF30

# APPLICATION EXAMPLE

Door handle (gas assist)

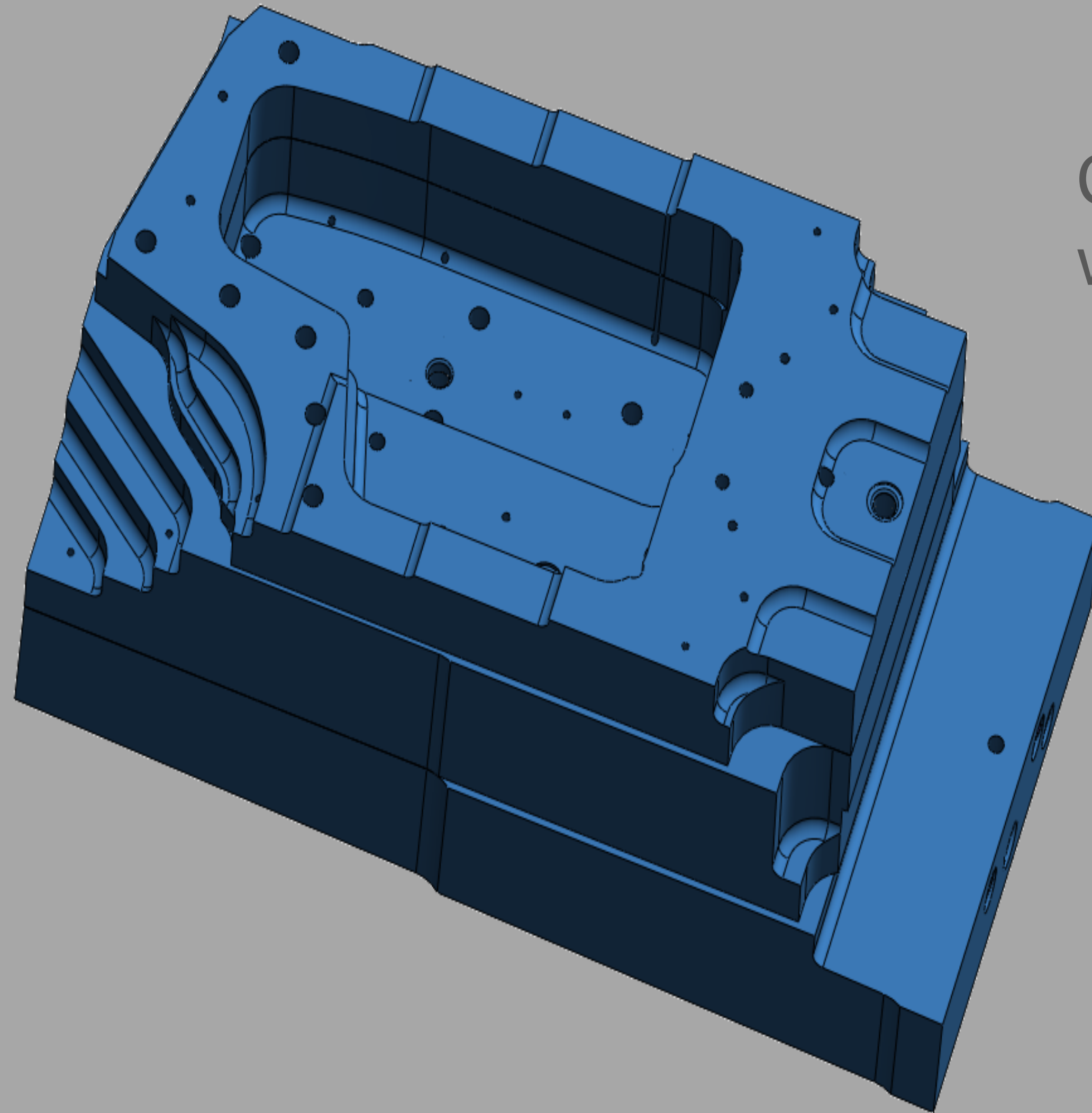


# APPLICATION EXAMPLE



# APPLICATION EXAMPLE

Insert Center  
console  
Automotive

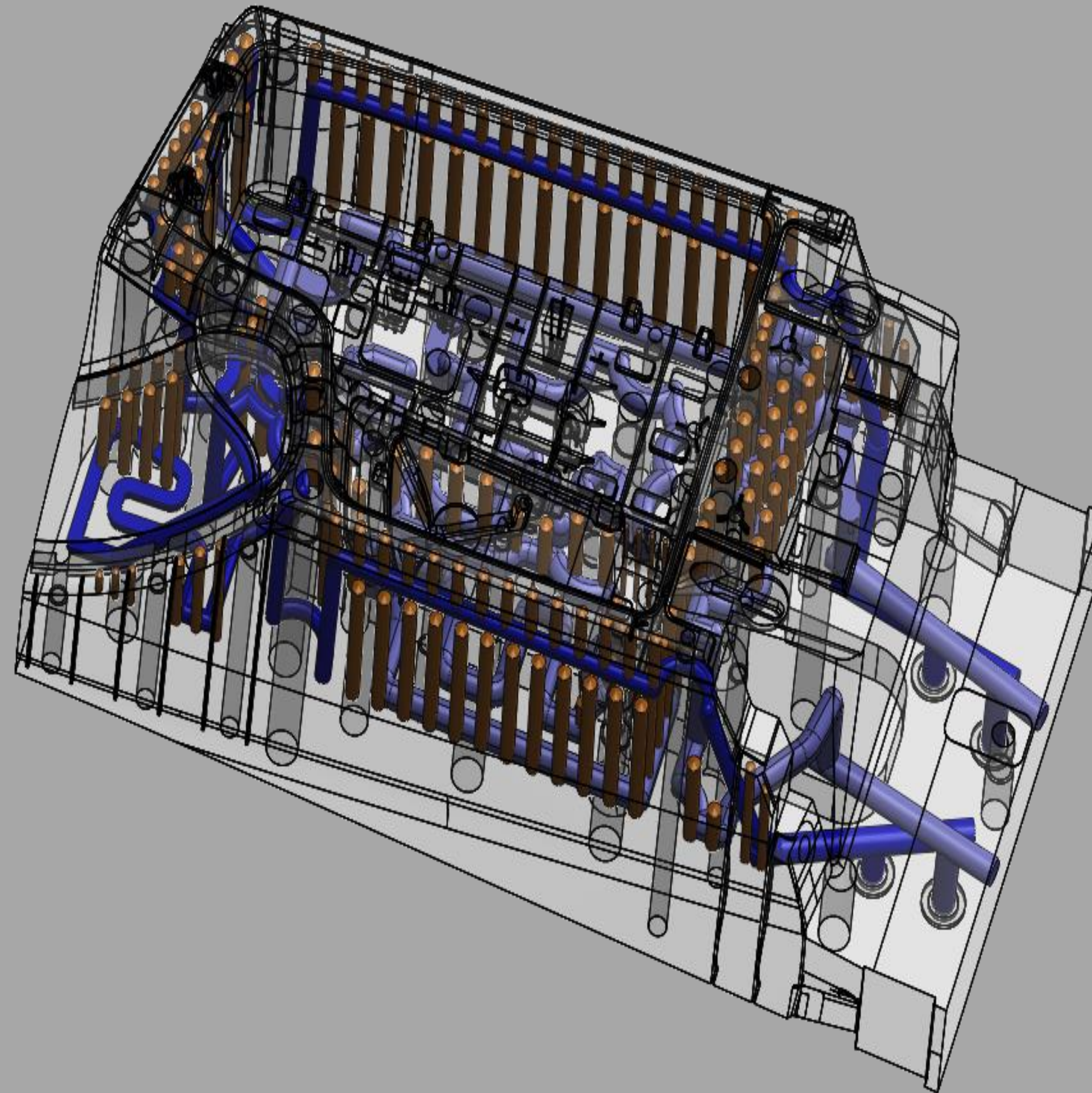


Contura-mold insert blank  
with oversize

Material: 1.2344ESU  
430x 210x 160mm

# APPLICATION EXAMPLE

Insert Center  
console  
Automotive

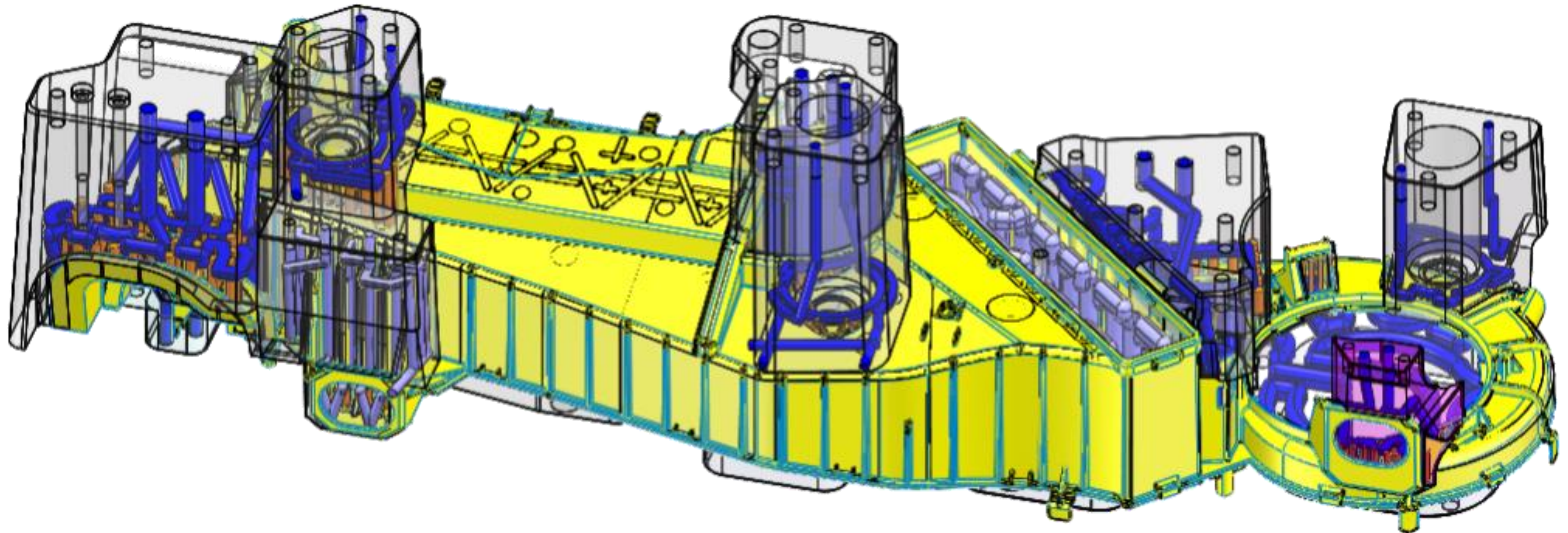


Contura-waterline with  
copper heat transfer  
elements

Material: 1.2344ESU  
430x 210x 160mm

# APPLICATION EXAMPLE

Automotive housing

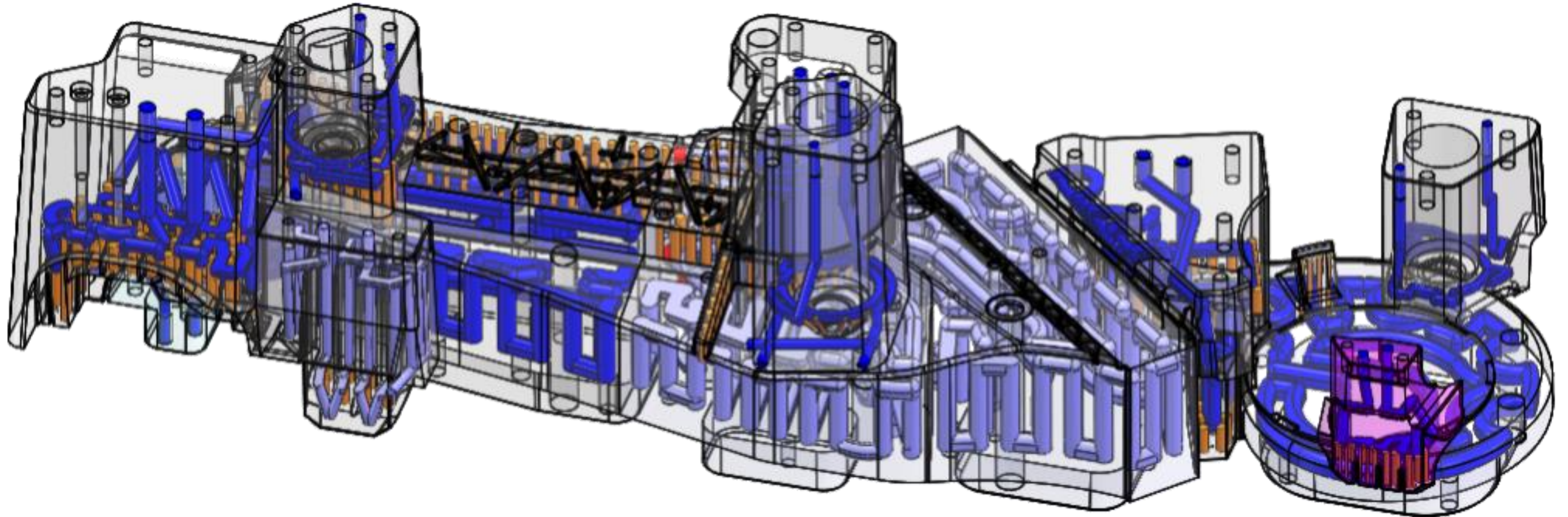


Housing dimension 820 mm of length



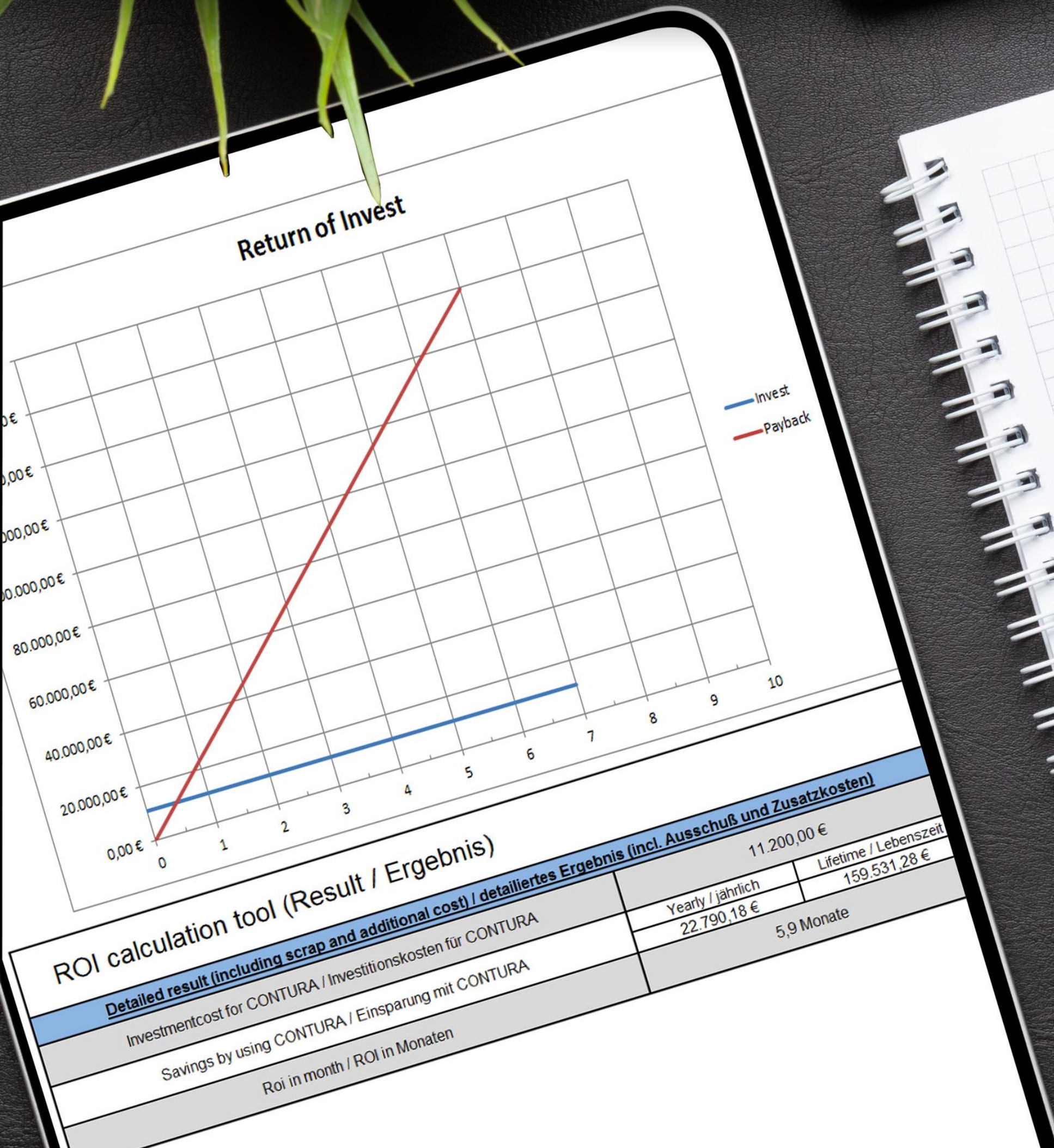
# APPLICATION EXAMPLE

Automotive housing

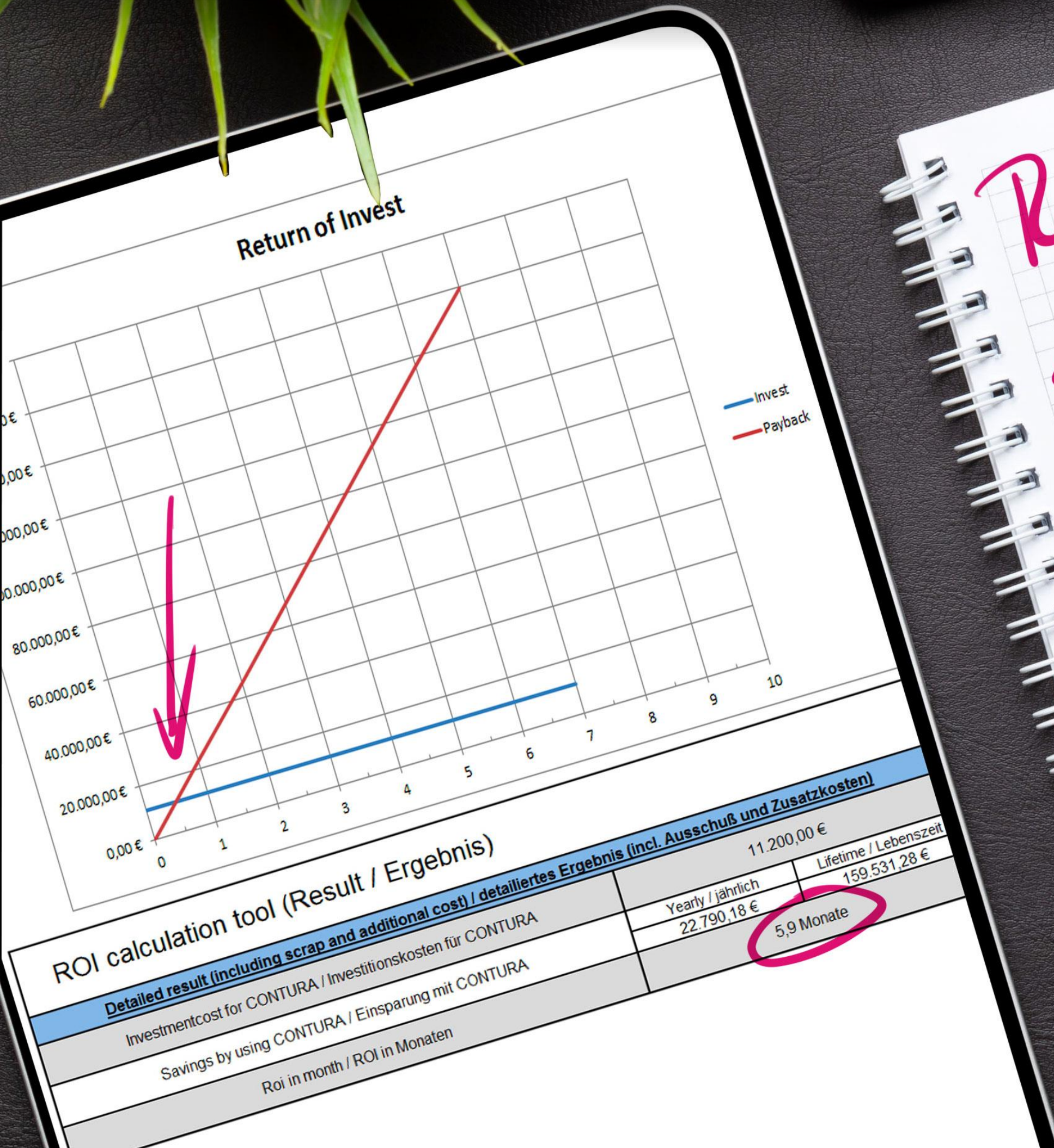


Housing dimension 820 mm of length

# PROFITABILITY OF CONFORMAL COOLING



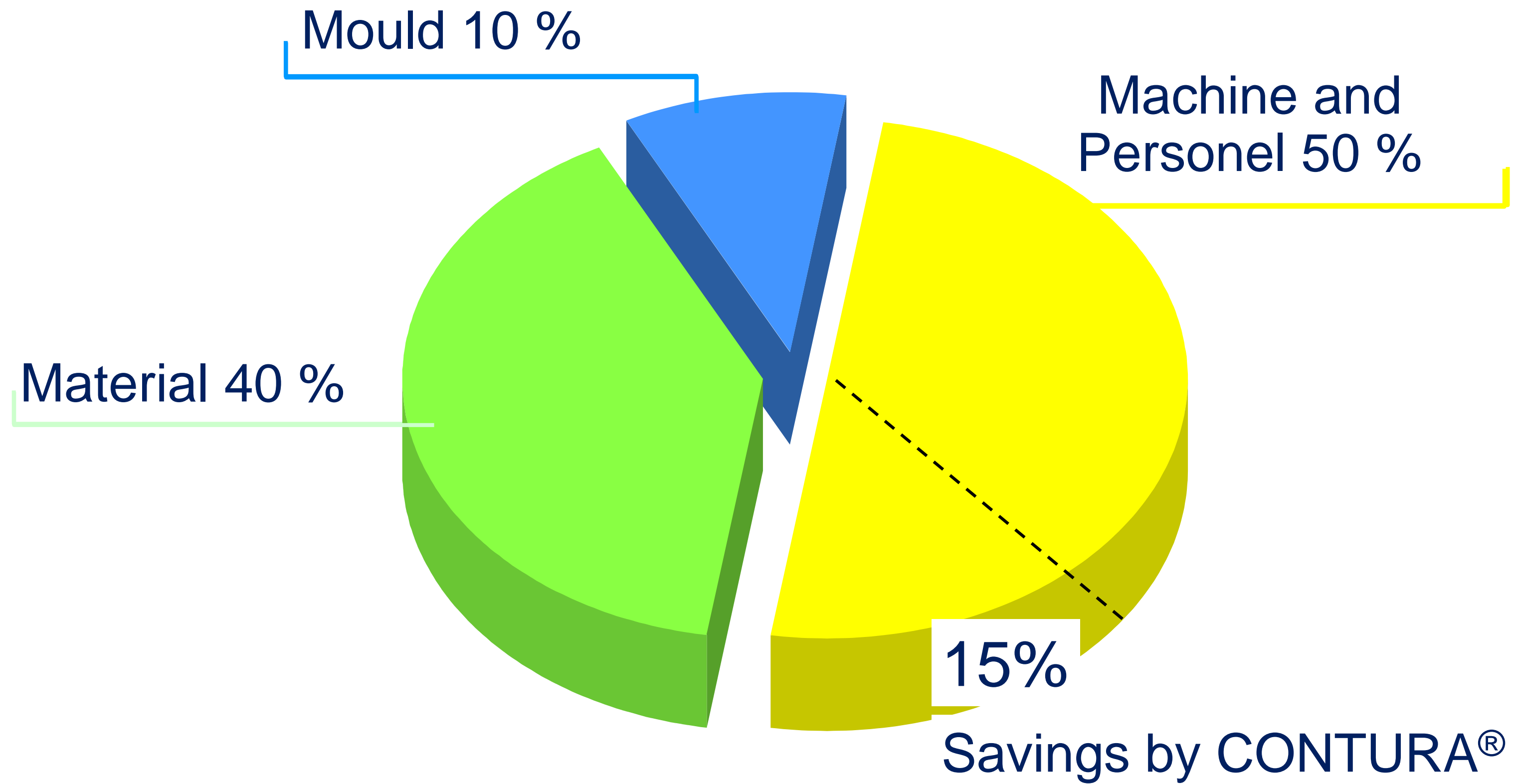
# PROFITABILITY OF CONFORMAL COOLING



Return of Invest  
< 6 months  
 Savings over lifetime:  
~160.000 €



# Breakdown of the piece costs of a molding



# Cost calculation (Spray cap):



16 cavity mould

Machine: 200 Ton, hourly rate:	36 € (Incl. worker)
Conventional cycle time:	11,5 Seconds
No. of annual cycles (220 prod. days):	1.100.000
Cycle with conformal cooling:	7,8 Seconds
Saved seconds per shot:	3,7 Seconds

**Annual Savings = 1.100.000 cycles x 3,7 seconds = 4.070.000 seconds or  
1.130 machine hours**

## **Cost calculation (Spray cap):**

**Annual savings of 1.130  
machinen hours x 36,00**

**€/hour**

**=**

**40.680 € annual saving**

## **Cost calculation (Spray cap):**

**The investment in conformal cooling on this mould has been  
34.240,00 € (€ 2.140,--/Cav.)**

**ROI is 0,84 years or a bit  
more than 10 month!**

## **Advantages of conformal cooling in injection moulds**

- Significant cycle time reduction (Averagely by 30%);
- Increase of cpk-values (better process stability)
- Less adaption and tuning on new moulds
- Less scrap
- Allows Rapid Heating and Cooling injection moulding processes in acceptable cycletimes at low power consumption;



**BOOST  
YOUR  
PROCESS!**



 **CONTURA**

[www.contura-mtc.de](http://www.contura-mtc.de)



THANK YOU FOR YOUR  
ATTENTION!