


# ONLINE PUBLIC DEMONSTRATION

*17th November 2020, 10:00-12:00 CET*



*InteGrated and PHysically Optimised Battery System for Plug-in Vehicles Technologies*

 This session is being recorded

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This project has received funding from the European Union's Horizon2020 Programme for research and innovation under grant agreement No.770019.



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## Housing manufacture

*Dr. Felix Weidmann*



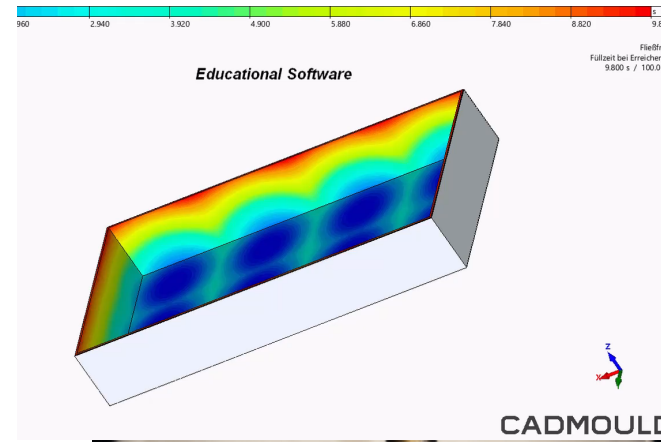
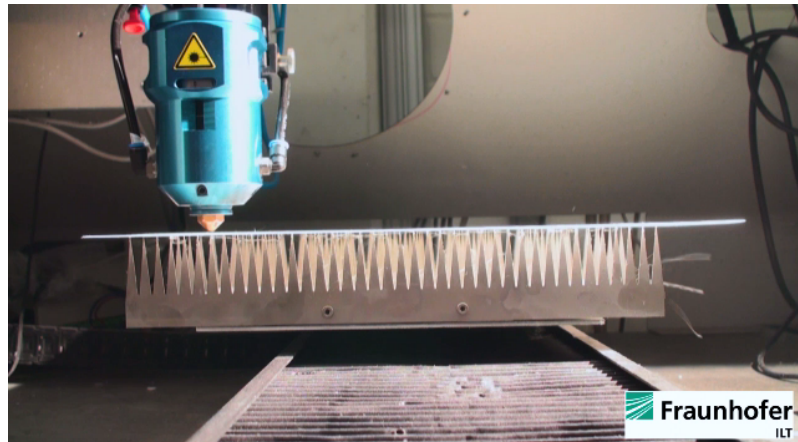
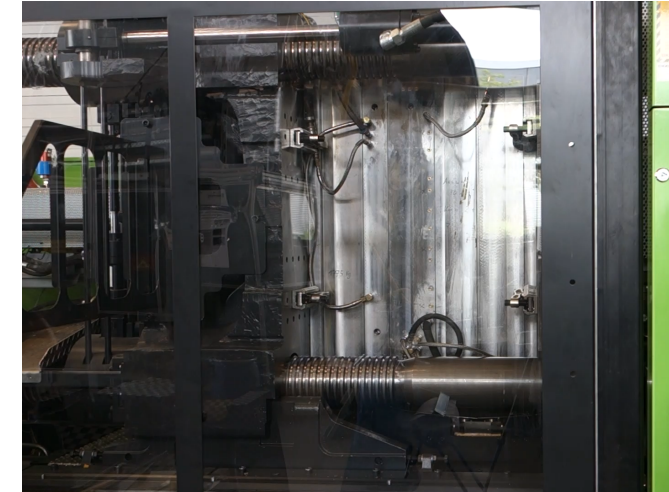
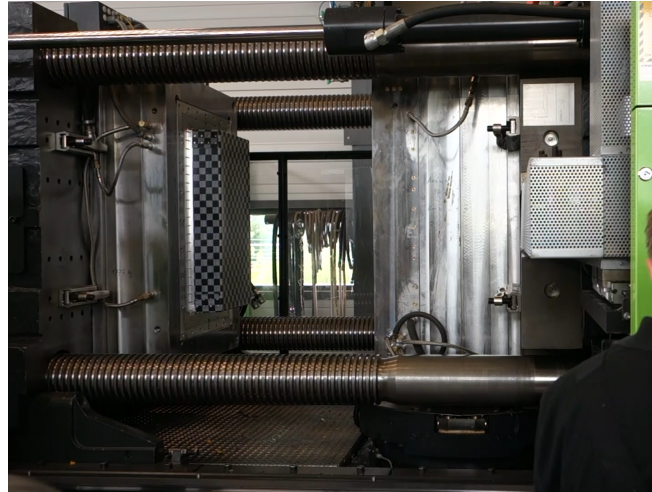
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# Housing Manufacture



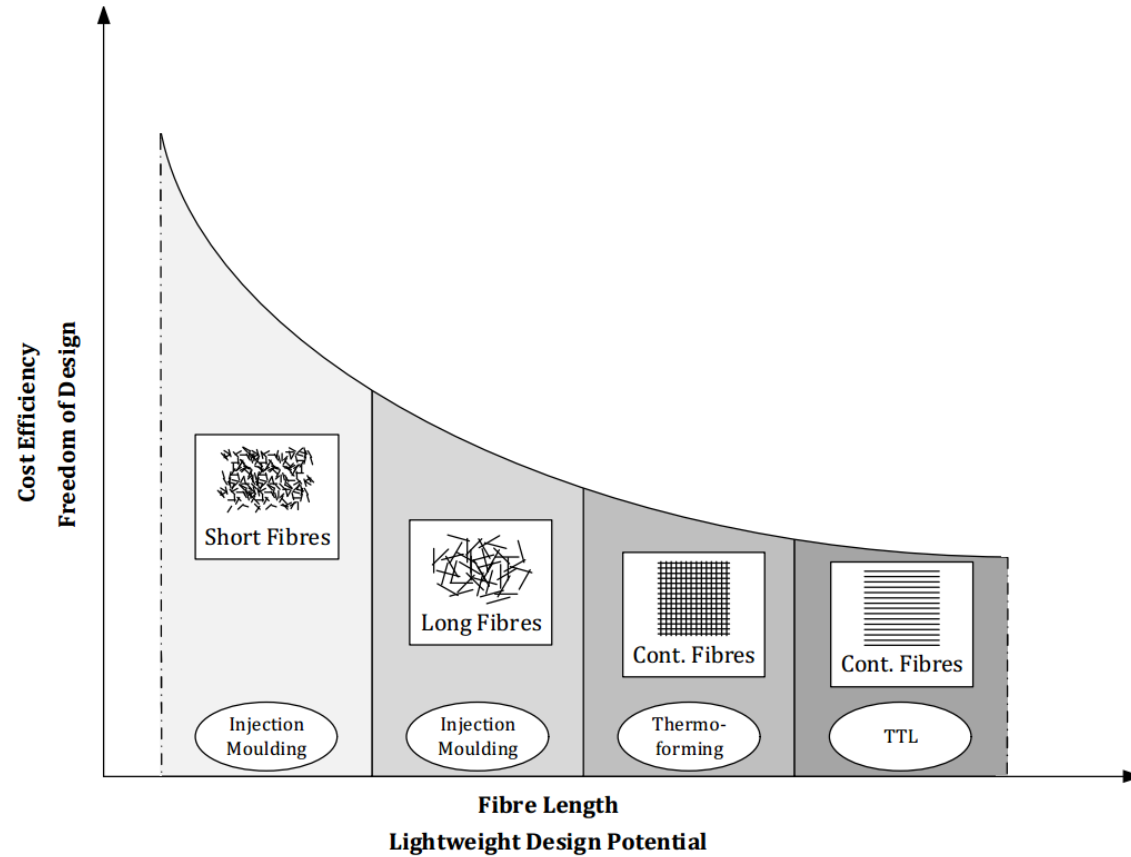
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Fraunhofer  
LBF

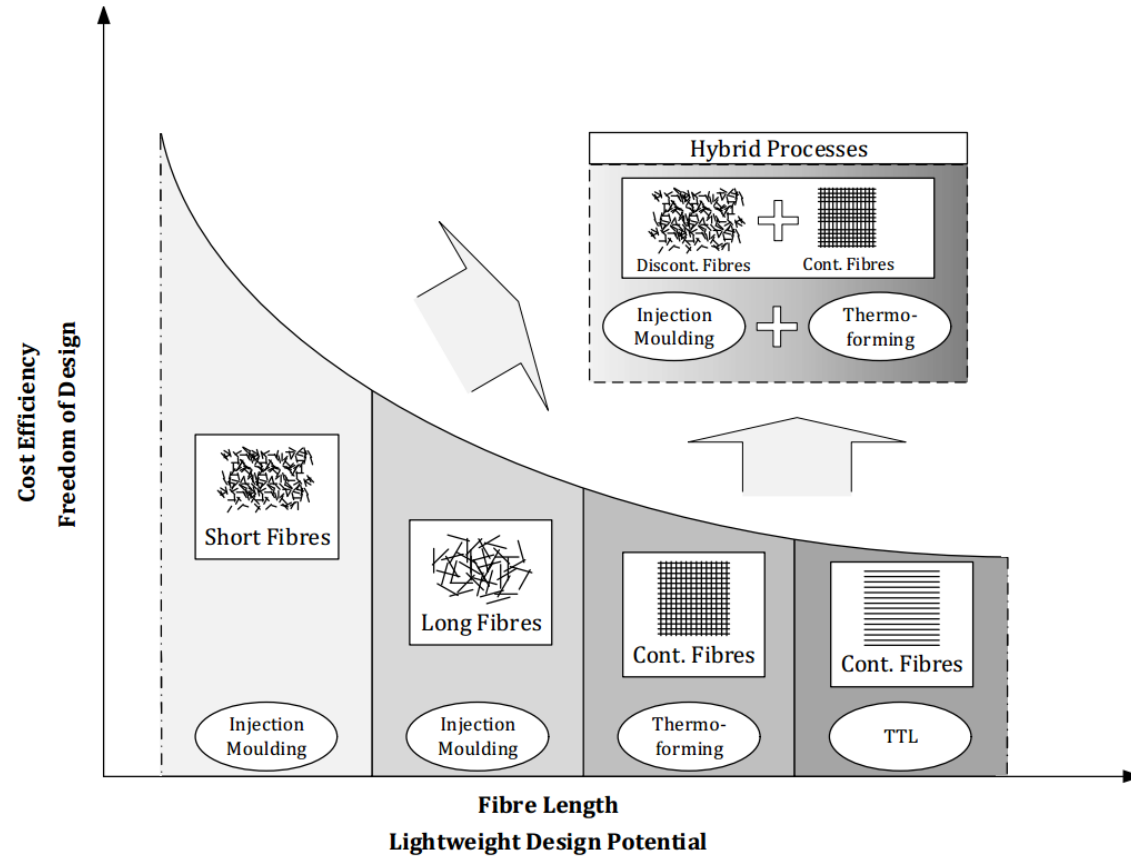
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17<sup>th</sup> November 2020

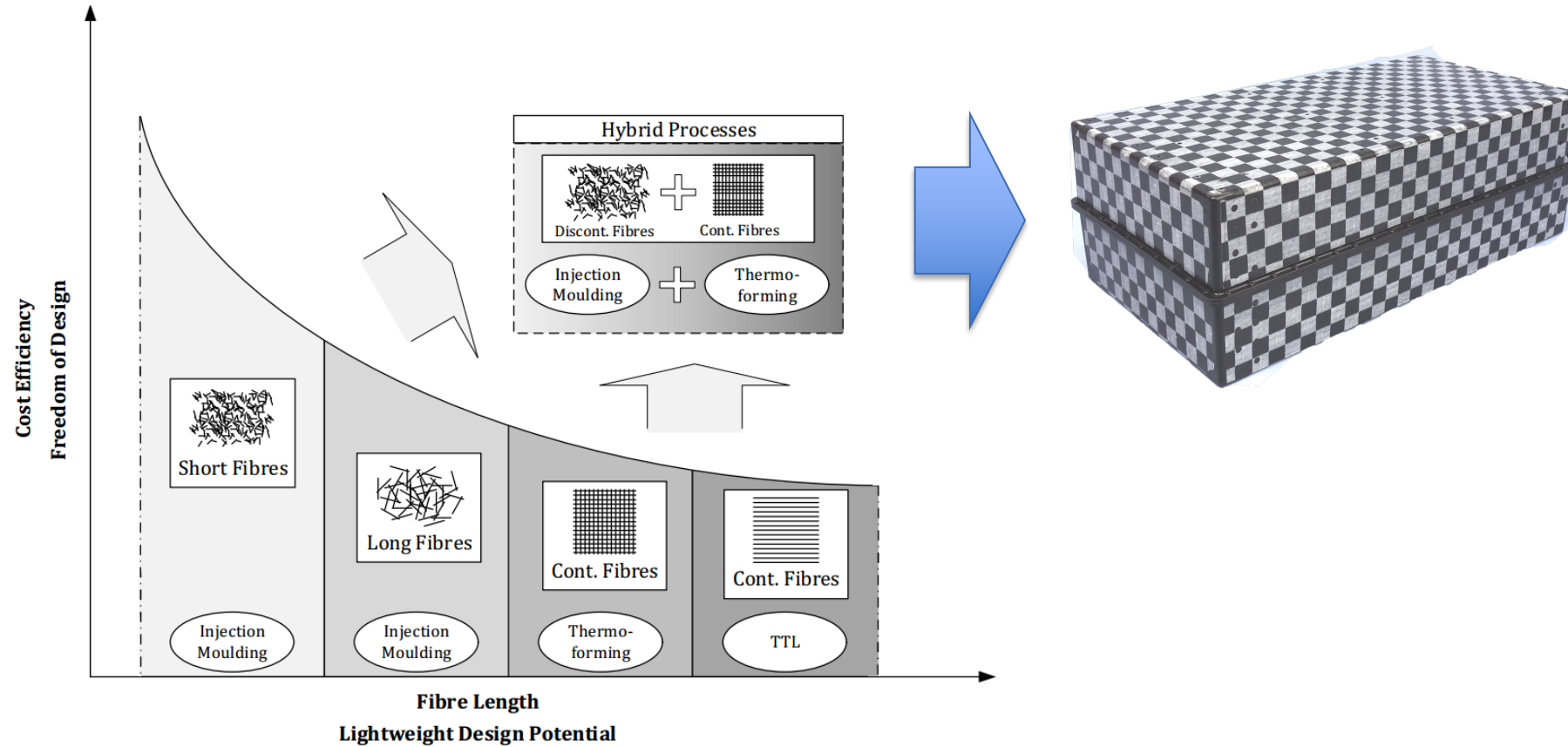
# Housing Manufacture – Lightweight Design



# Housing Manufacture – Lightweight Design



# Housing Manufacture – Lightweight Design



➤ New process technology for efficient manufacture of lightweight battery housing: **In-Situ CFRTP Sandwich Moulding**

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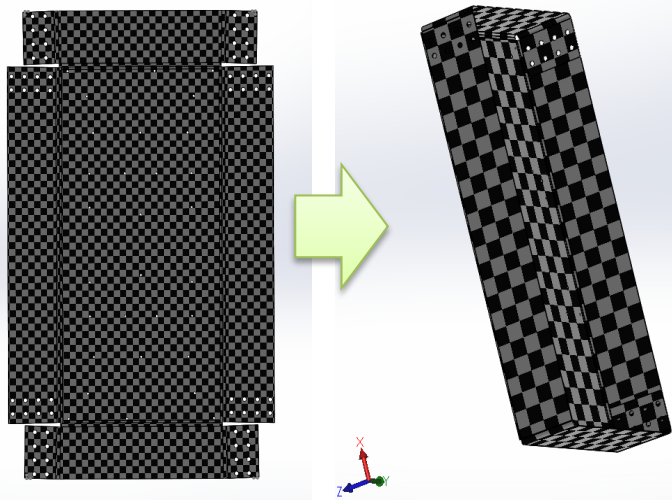
Fraunhofer  
LBF

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17<sup>th</sup> November 2020

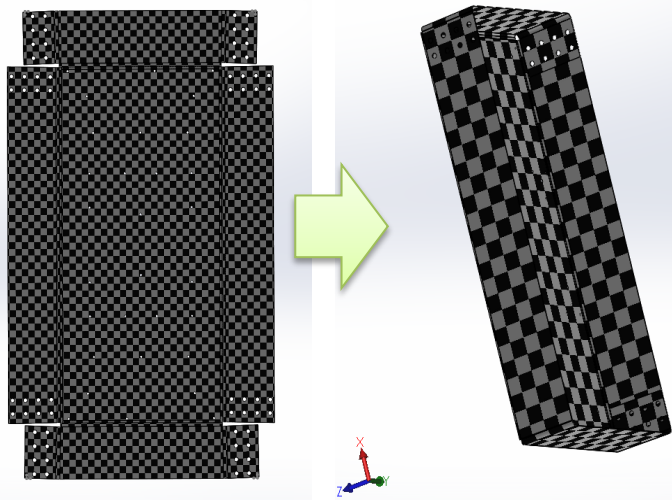
# Housing Manufacture – Process Steps

Composite-Preforms

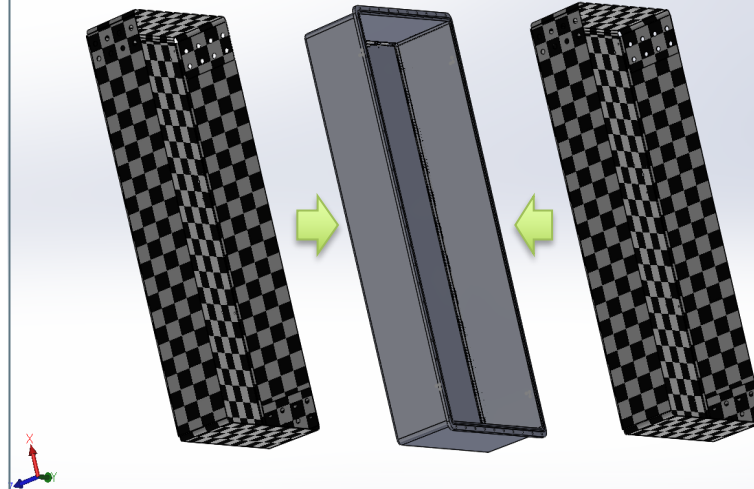


# Housing Manufacture – Process Steps

Composite-Preforms

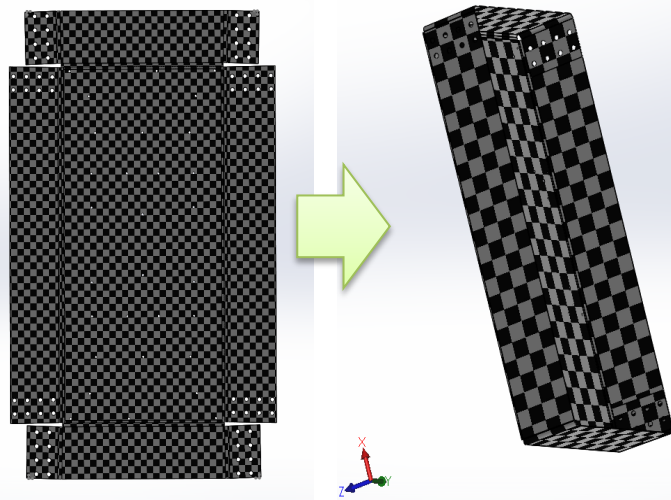


Lightweight Housing Manufacture

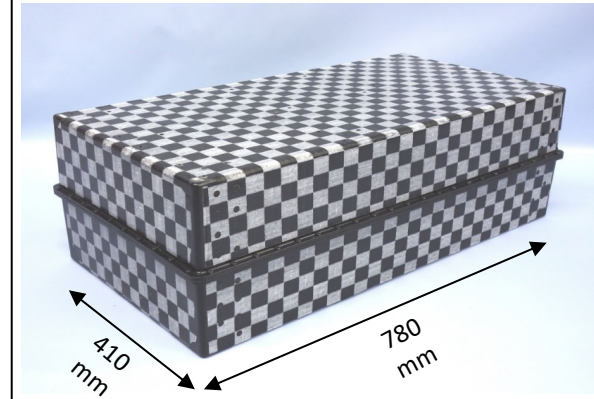
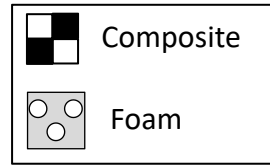
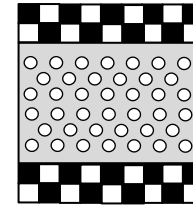
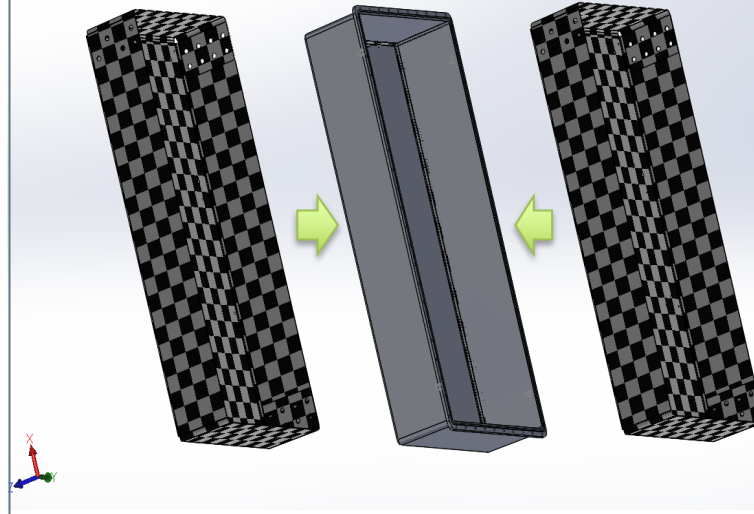


# Housing Manufacture – Process Steps

Composite-Preforms

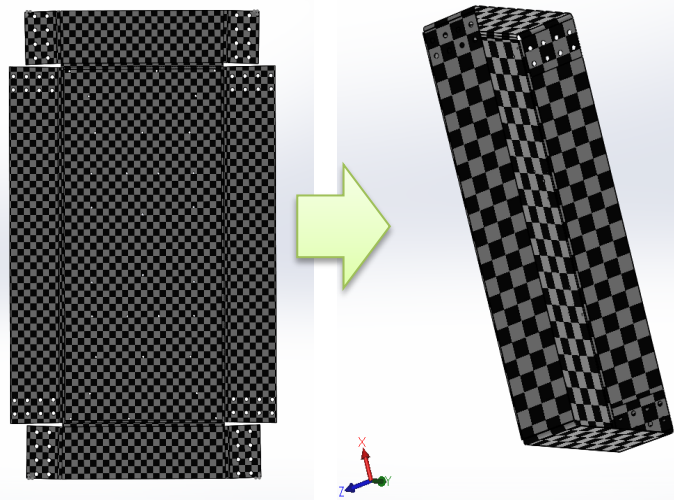


Lightweight Housing Manufacture

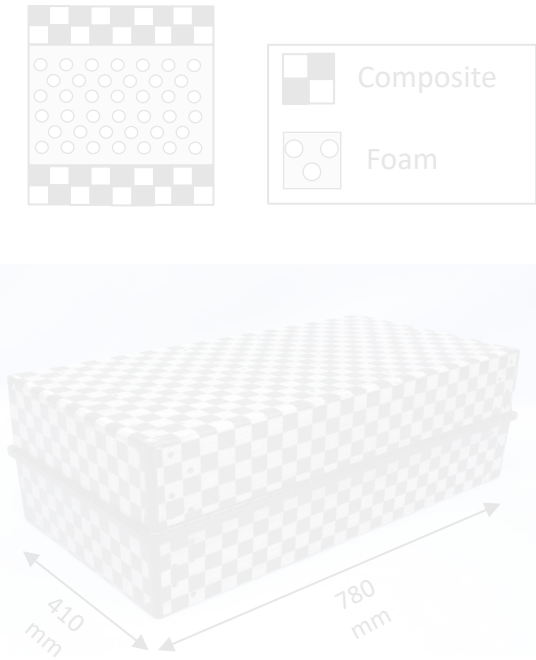
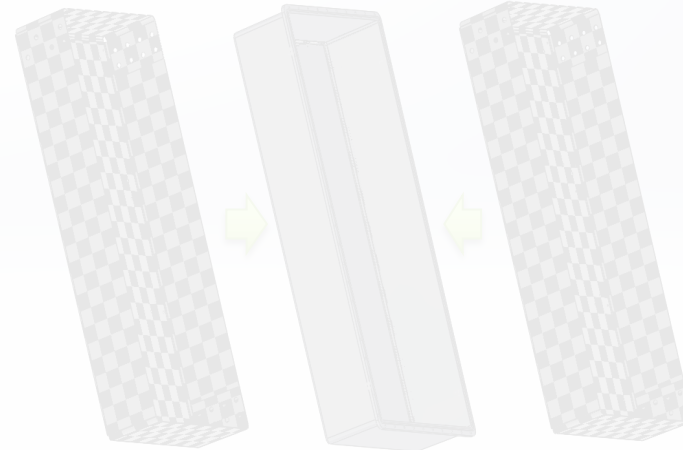


# Housing Manufacture – Process Steps

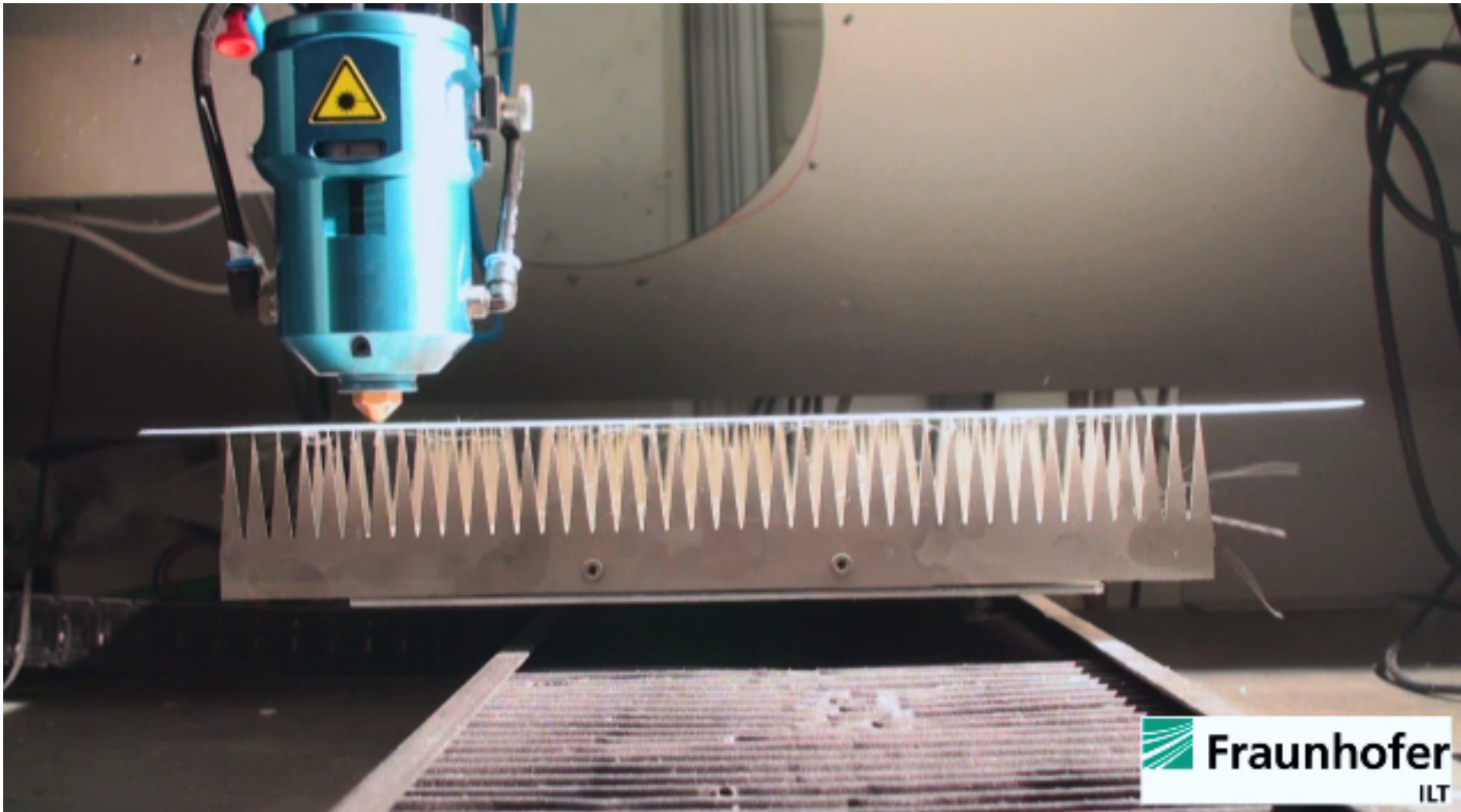
## Composite-Preforms



## Lightweight Housing Manufacture



# Housing Manufacture – Composite Cutting



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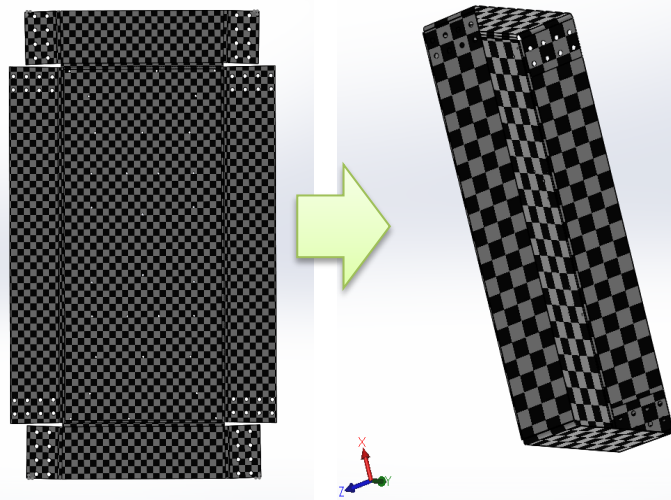
Fraunhofer  
LBF

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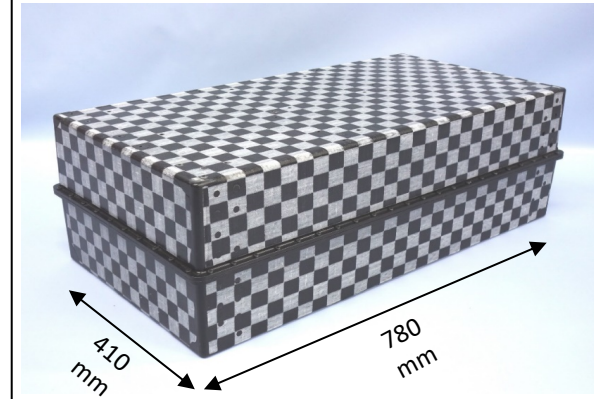
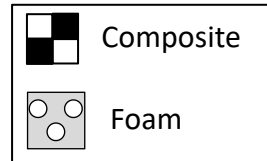
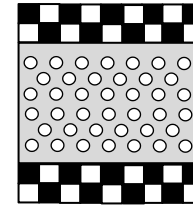
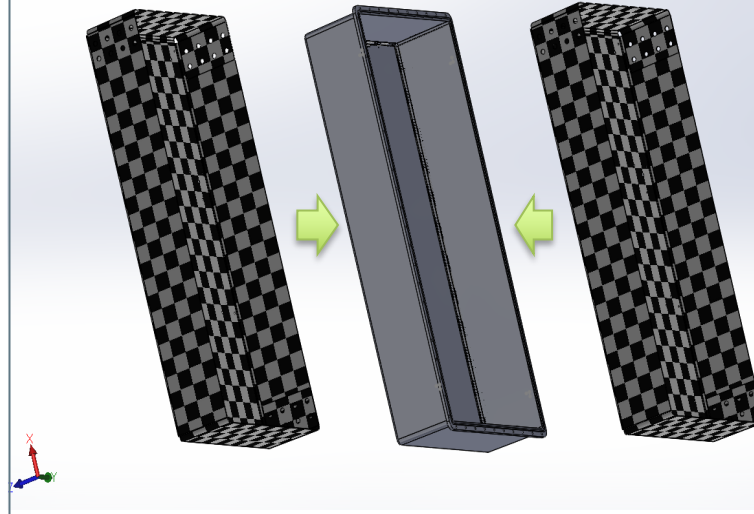
17<sup>th</sup> November 2020

# Housing Manufacture – Process Steps

Composite-Preforms

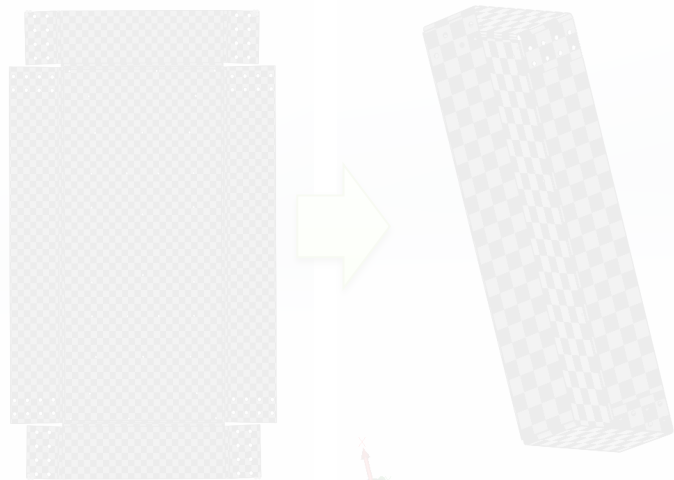


Lightweight Housing Manufacture

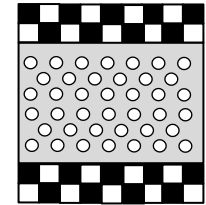
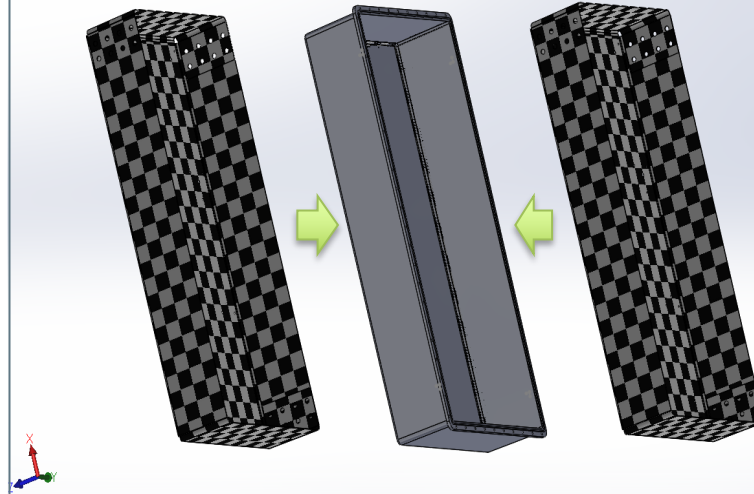


# Housing Manufacture – Process Steps

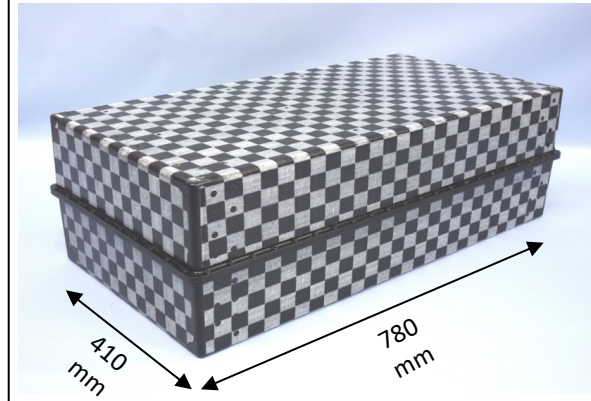
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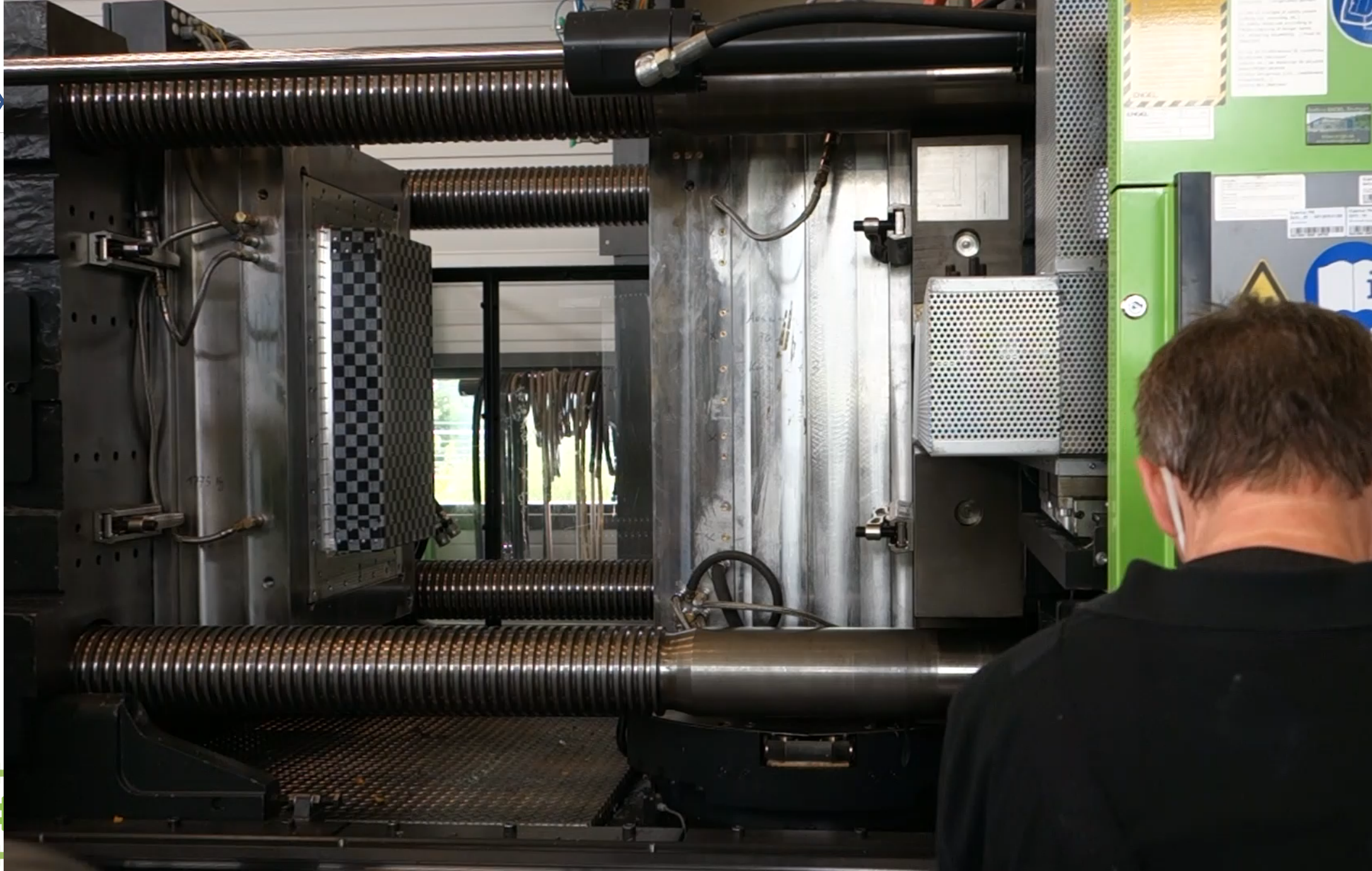


Lightweight Housing Manufacture



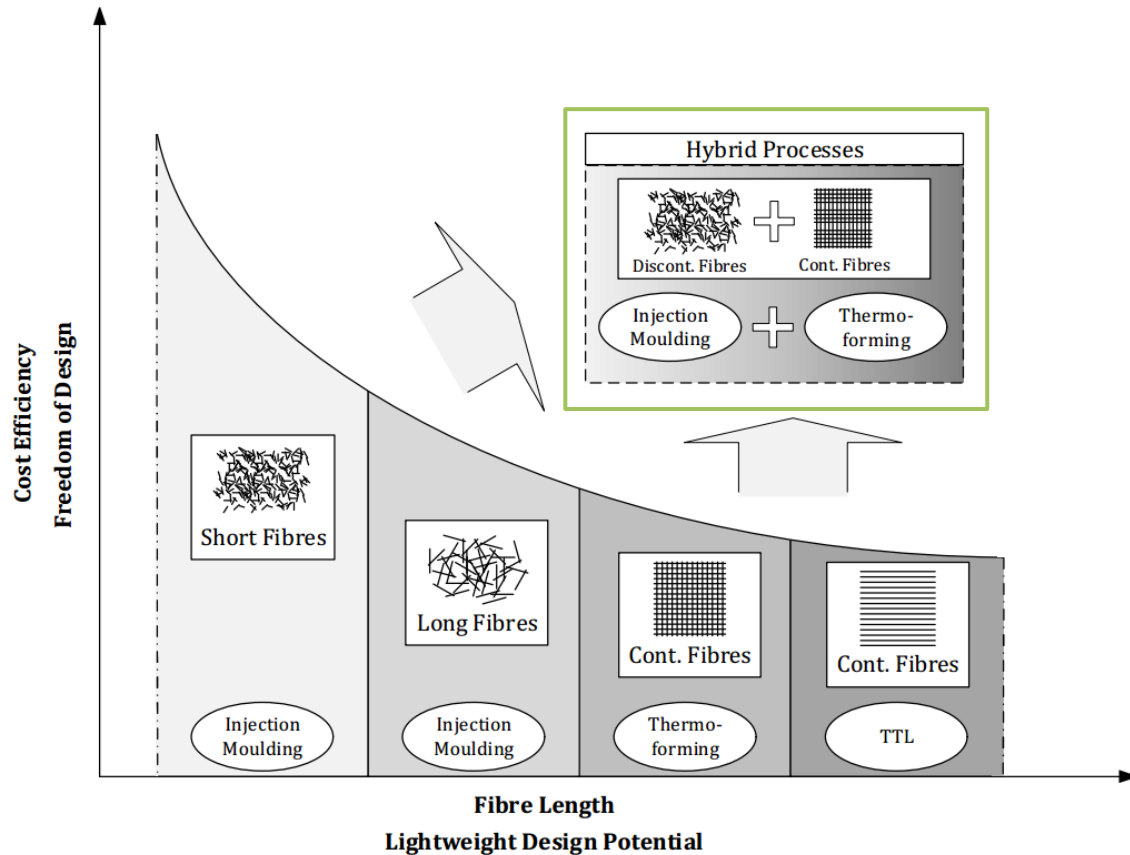
Composite  
Foam



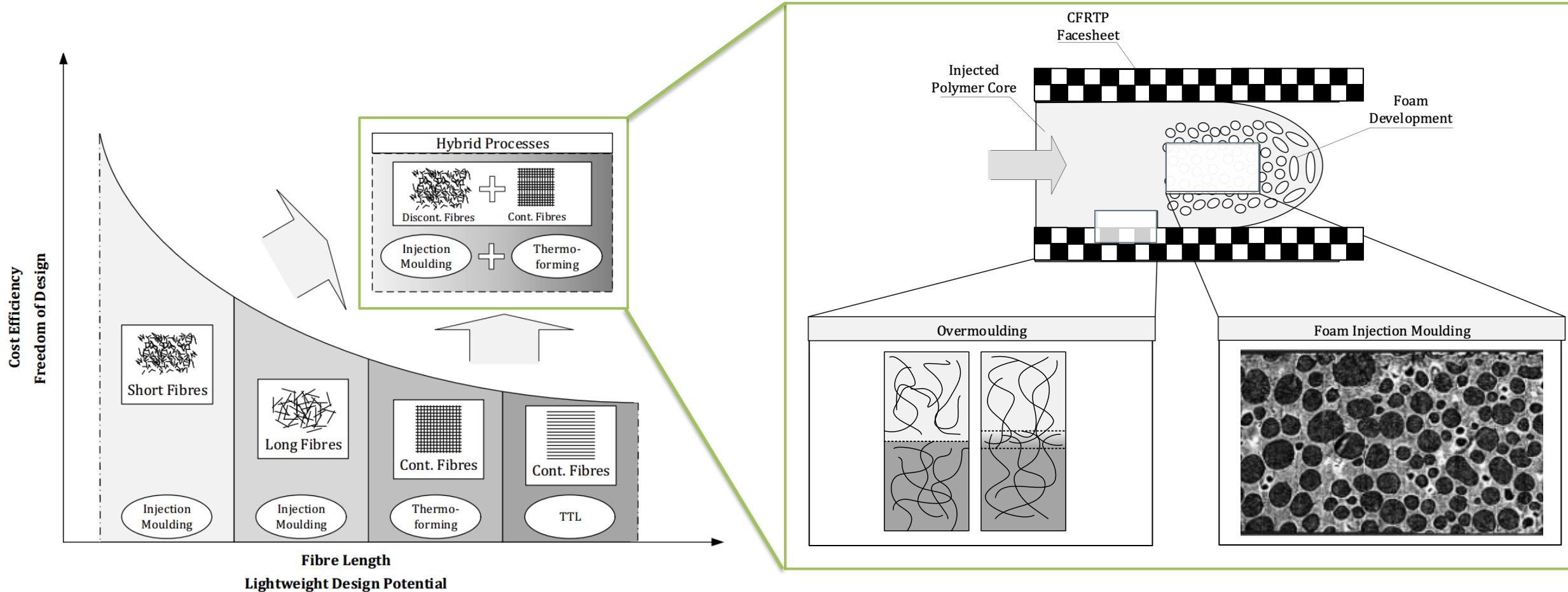




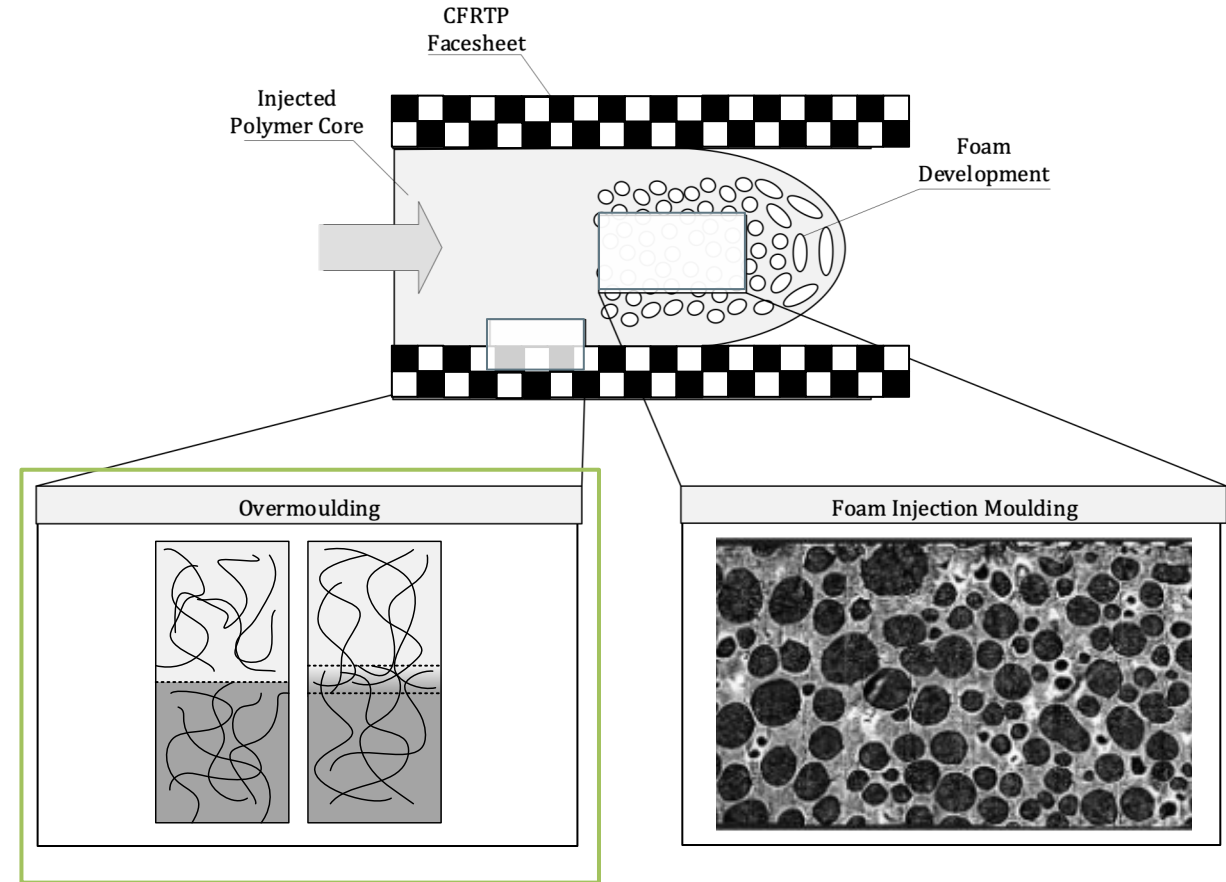
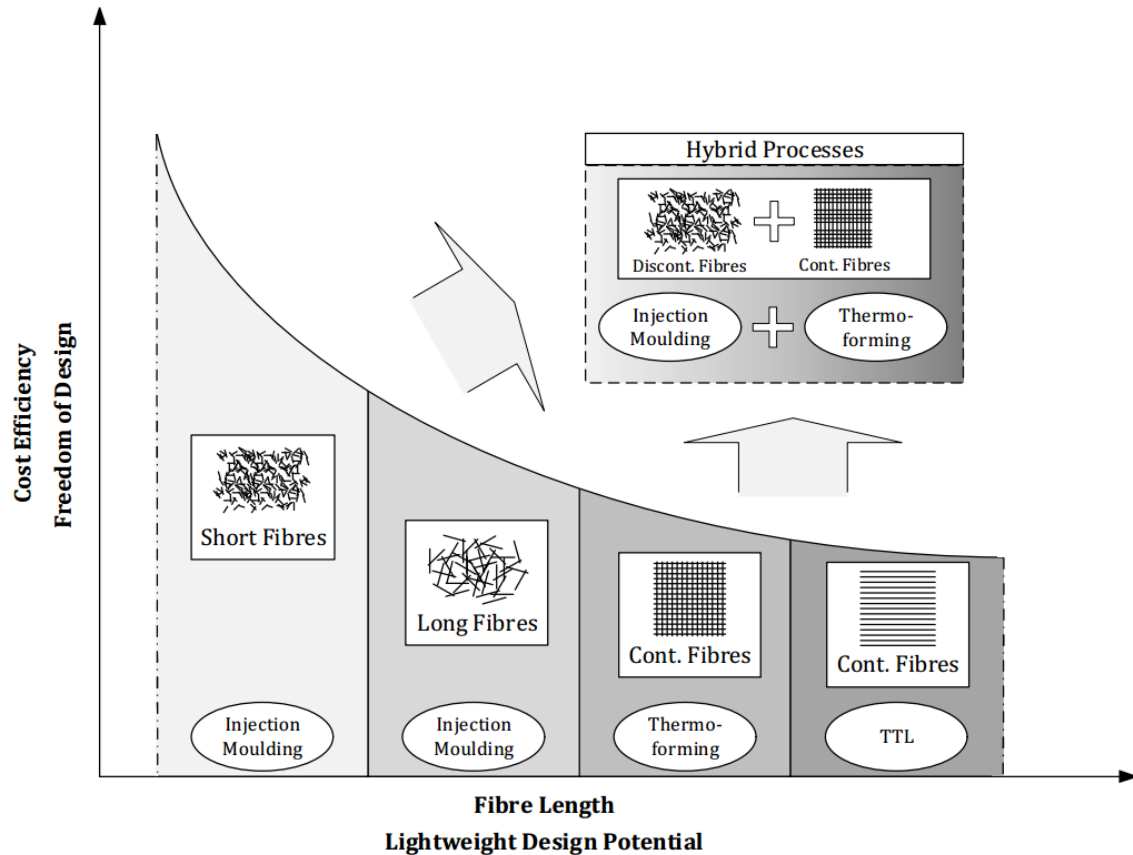
# Housing Manufacture – Hybrid Moulding



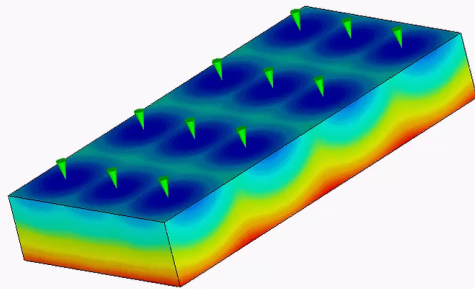
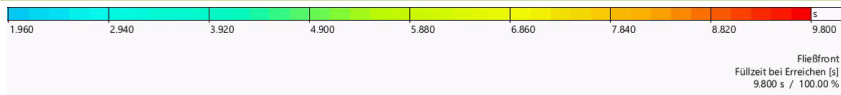
# Housing Manufacture – Hybrid Moulding



# Housing Manufacture – Hybrid Moulding



# Housing Manufacture – Hybrid Moulding



Educational Software

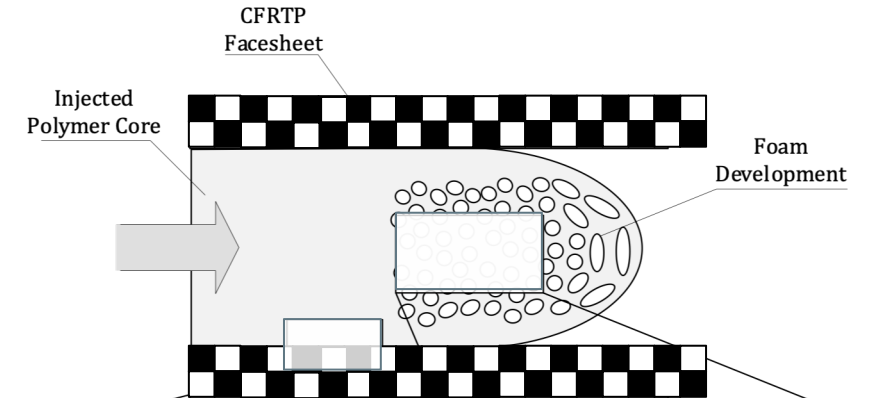


CADMOULD

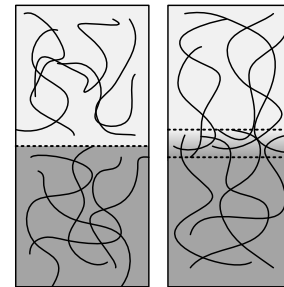
$$D_{ic}(t) = \frac{d(t)}{d_0 + w_0}$$

$$D_{ic}(t) = D_{ic,0} \left[ 1 + 5 \left( 1 + \frac{w_0}{d_0} \right) \left( \frac{a_0}{d_0} \right)^2 \int_0^t \frac{p_{app}(t)}{\eta_0(\bar{T}(t))} dt \right]^{1/5}$$

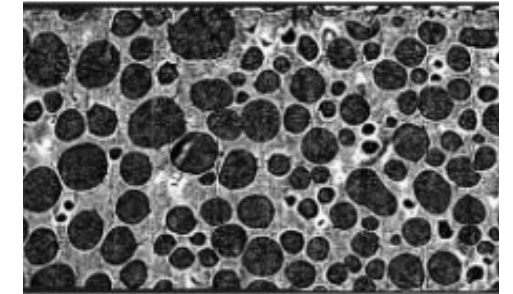
$$\frac{G_c(t)}{G_{c,\infty}} = D_h(t)^2 = \sum_{t=0}^t \left[ \frac{t_{i+1}^{\frac{1}{4}} - t_i^{\frac{1}{4}}}{t_R^{\frac{1}{4}}} \right]^2$$



Overmoulding



Foam Injection Moulding



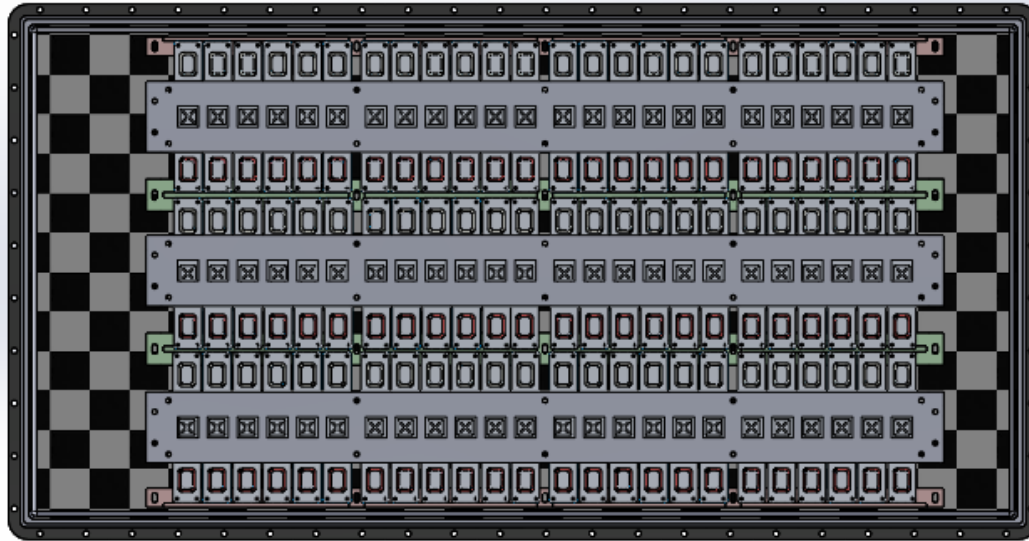
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# Housing Manufacture – Hybrid Moulding

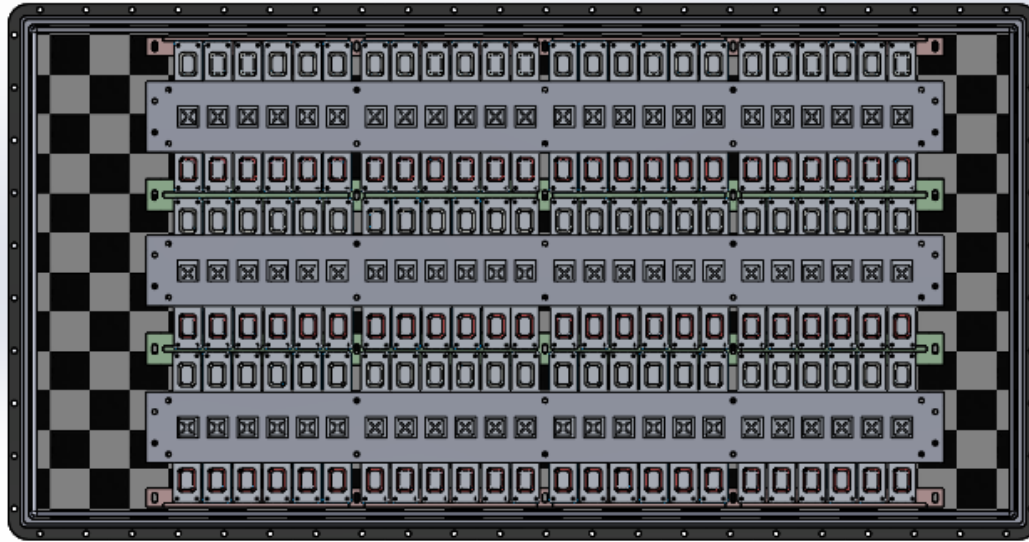
- High mechanical properties
- Low weight
- Low cost
  - Manufacture time < 2 min
  - Efficient use of composite material
- Circular economy
  - Regranulating of end-of-life housings
  - 66% of new housing made made by regranulated housings
- Flame resistance
  - High resistance against gas flames



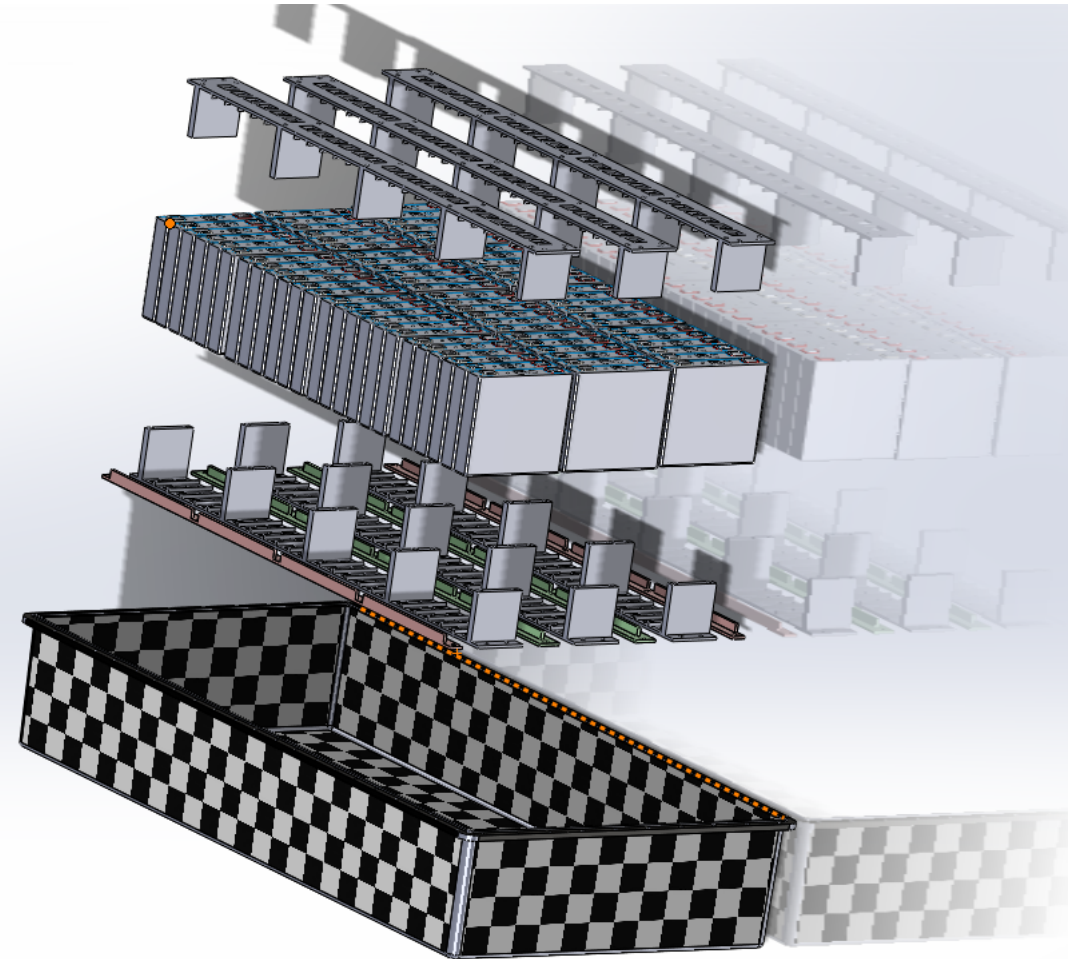
# Cell-2-Pack Design



# Cell-2-Pack Design



- Cell 2 pack design to increase energy density
- Lightweight design with composite cell holder



# Thank you



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17<sup>th</sup> November 2020

# Consortium



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**TOYOTA**



MOBILITY, LOGISTICS &  
AUTOMOTIVE TECHNOLOGY  
RESEARCH CENTRE



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This project has received funding from the European Union's Horizon2020 Programme for research and innovation under grant agreement No.770019.

