

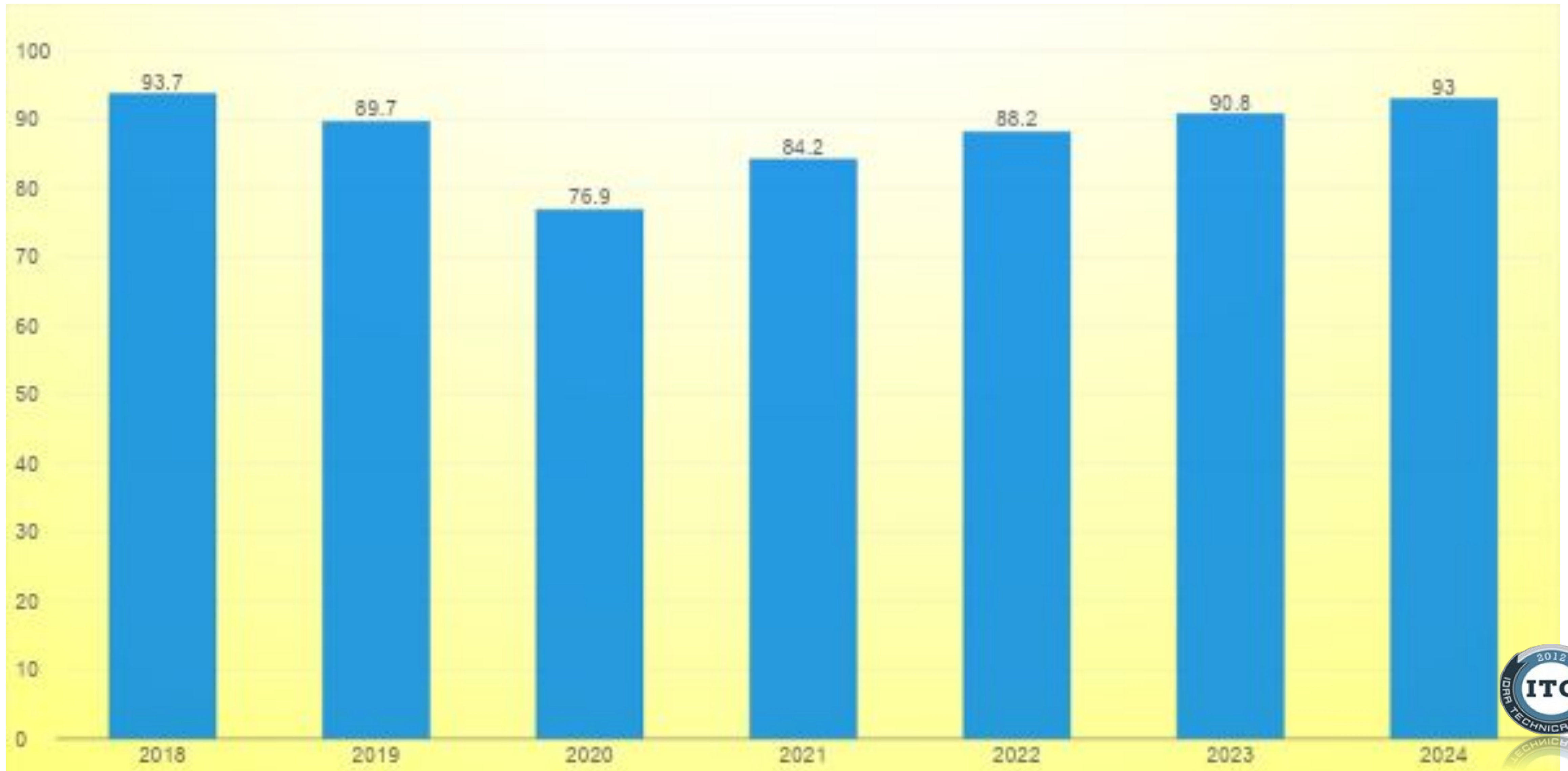
IDRA Light Alloy Application
Trends in the Automotive
Industries

- ❖ Primary AL growing from 25 million in 2000 to 63 in 2017.
- ❖ Utilization: Extrusion 32%, Rolling 29%, and **39% for castings**.
- ❖ Secondary Al usage in 2017: 27 million.

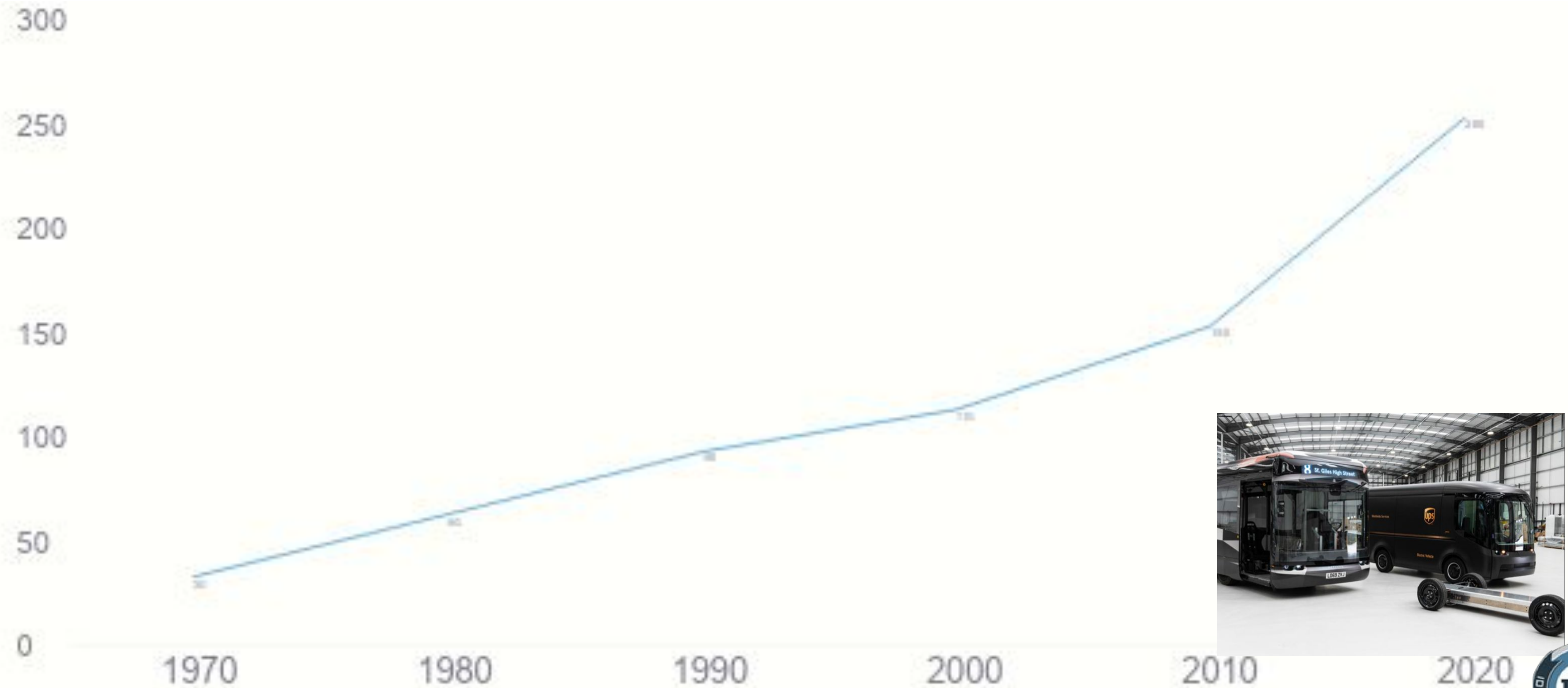
100 million ton usage in 2017
39 million for making castings
70 % for the automotive business

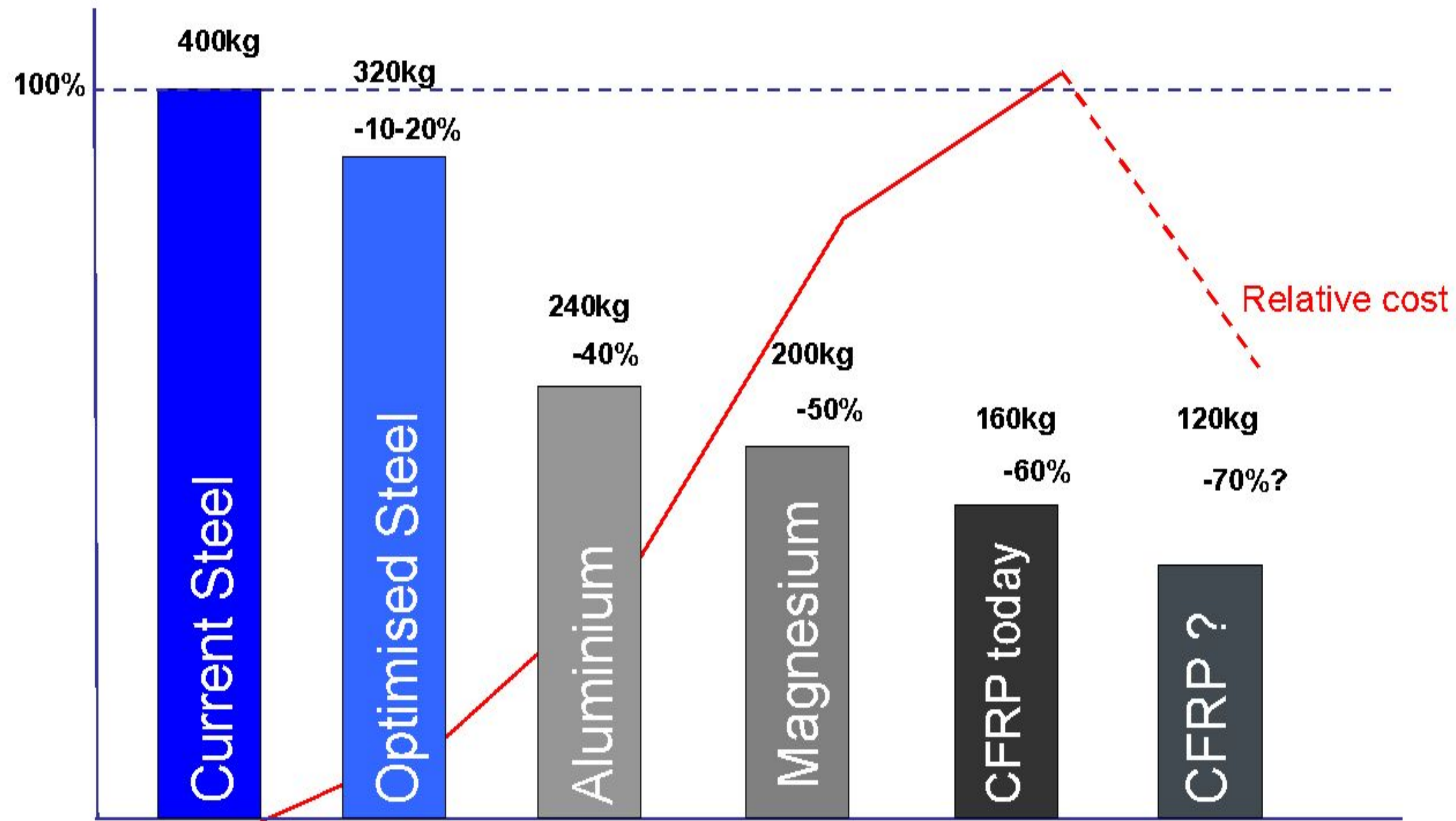
27 million

LET'S CONCENTRATE ON AUTOMOTIVE SECTOR



AL-MG WEIGHT/CAR (KG)

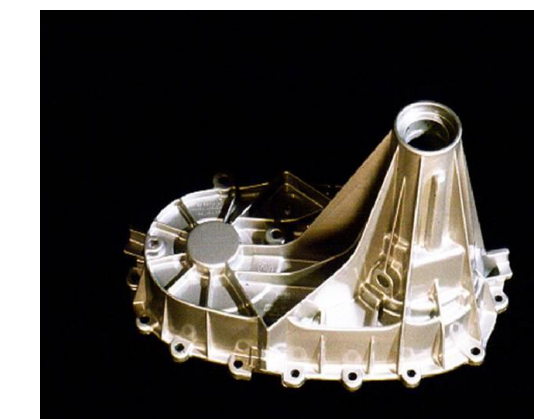




1970 Petrol crisis



diesel

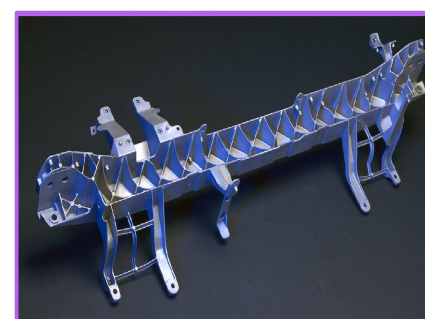


1980 Acid rain



engines
Aluminum

1990 Safe & Comfort



Engines
Mg

2010 Emissions CO²

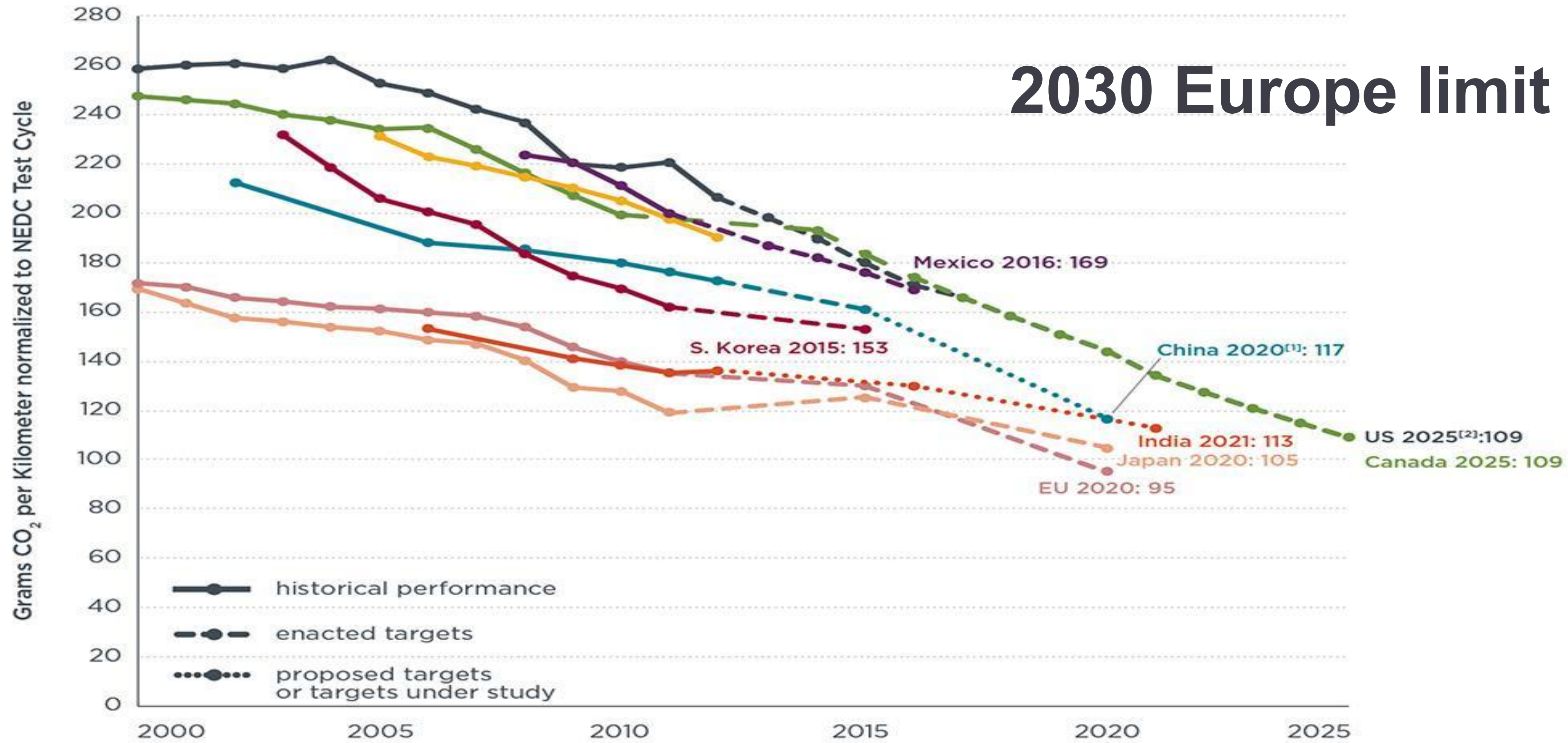


Al starts

2020 Sustainability

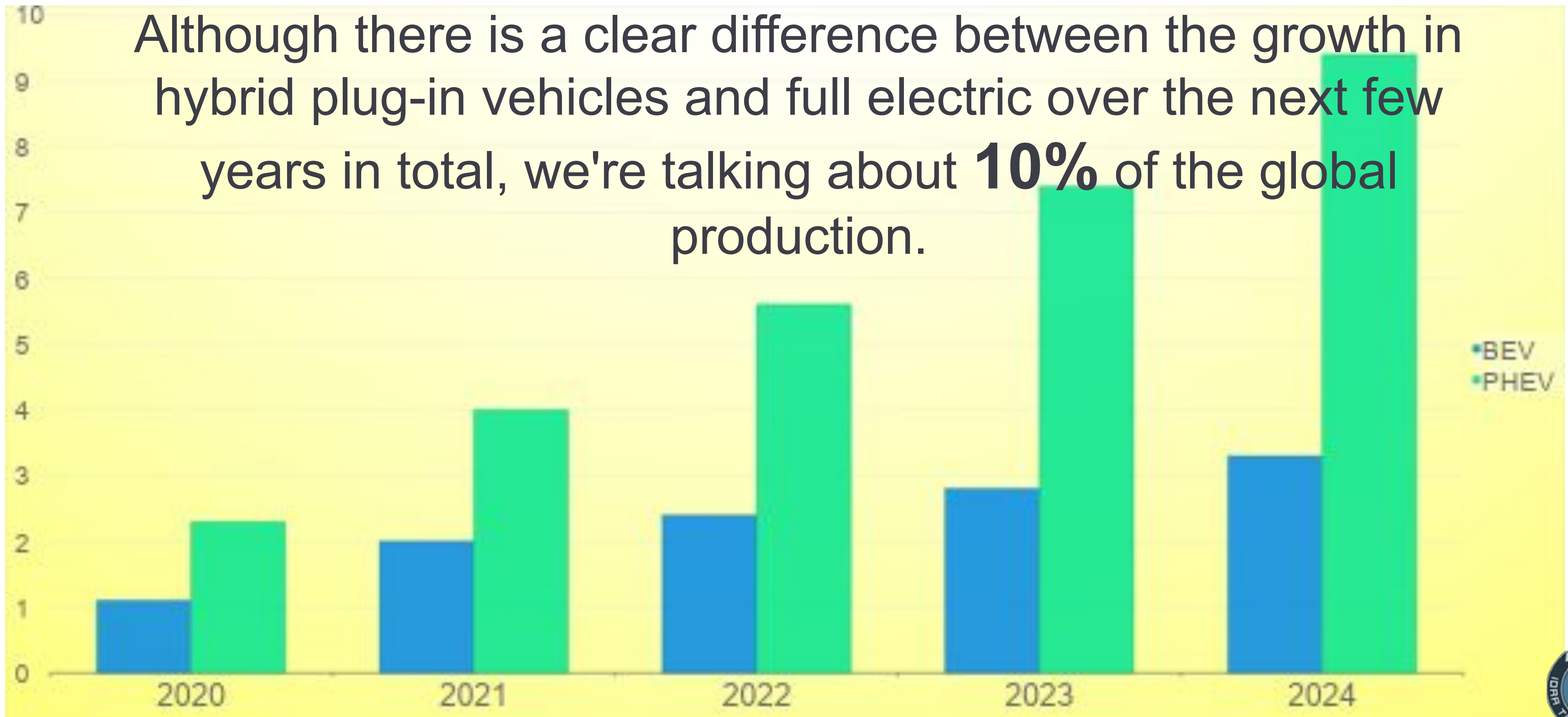


Structural
Giga
Parts



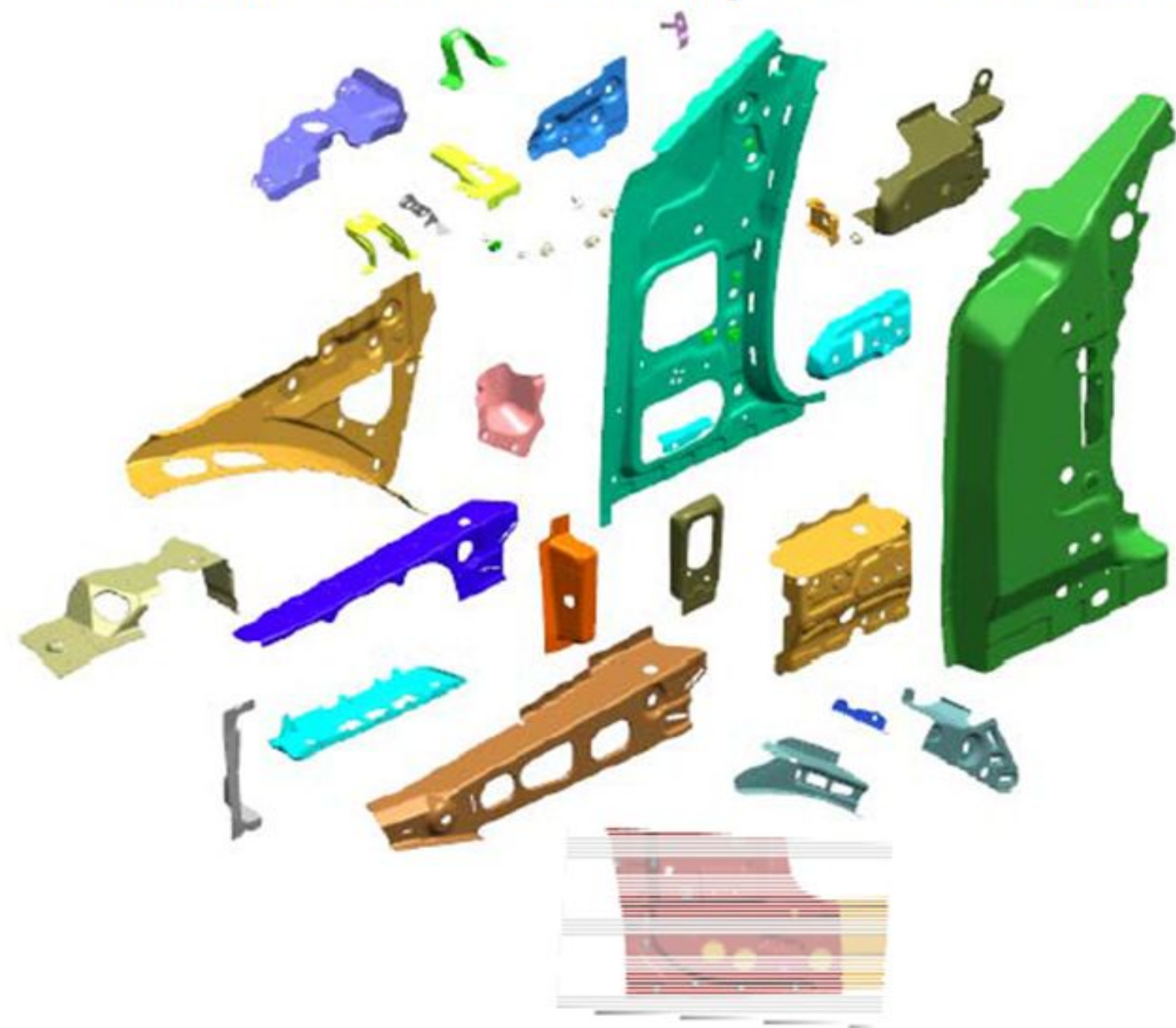
[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.
 [2] US, Canada, and Mexico light-duty vehicles include light-commercial vehicles.
 [3] Supporting data can be found at: <http://www.theicct.org/info-tools/global-passenger-vehicle-standards>

Although there is a clear difference between the growth in hybrid plug-in vehicles and full electric over the next few years in total, we're talking about **10%** of the global production.

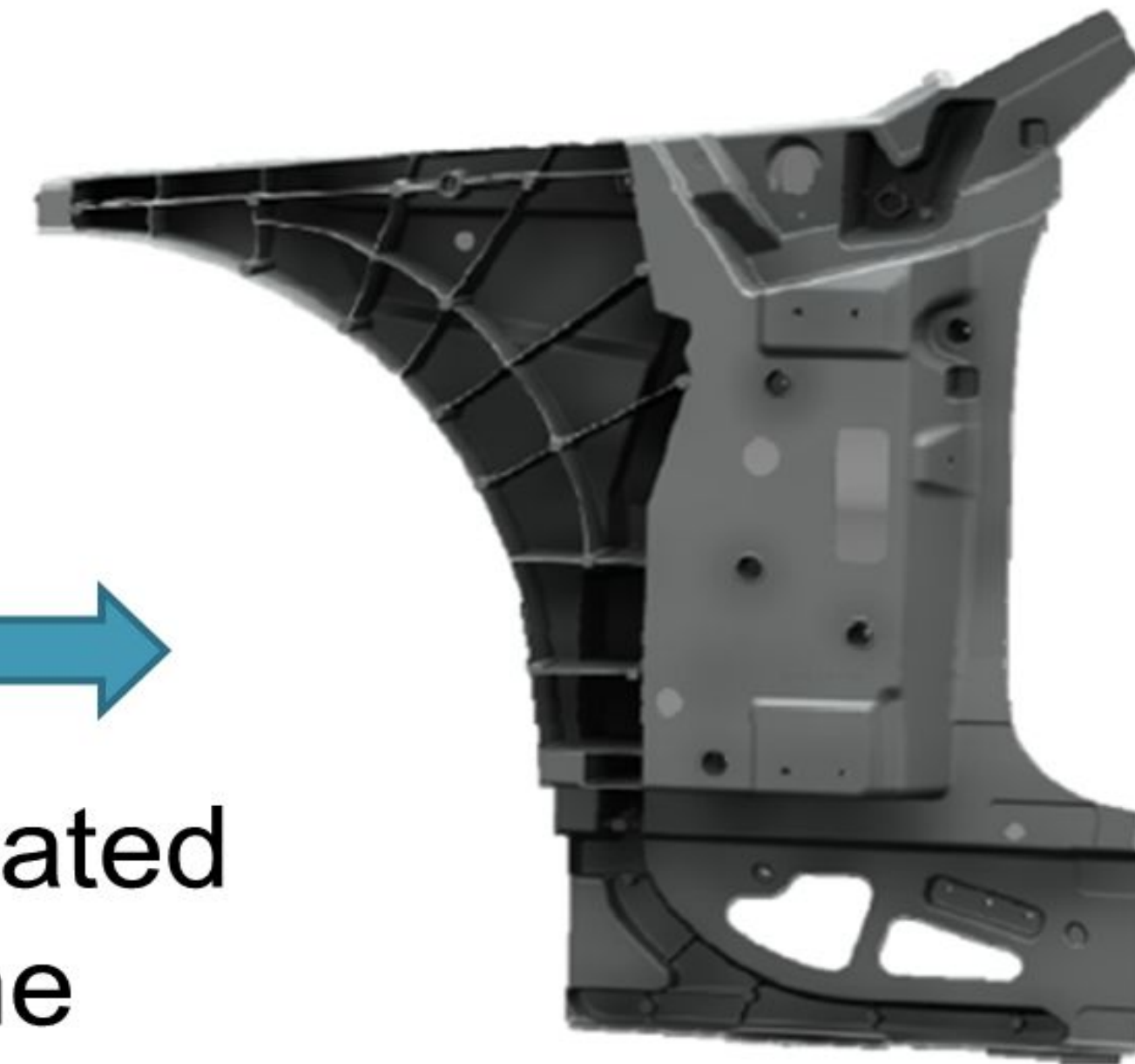


EFFICIENCY – FRONT BODY HINGE PILLAR CASTINGS

Multi-Piece Stamped Construction



1-Piece Cast Construction



Consolidated
To One



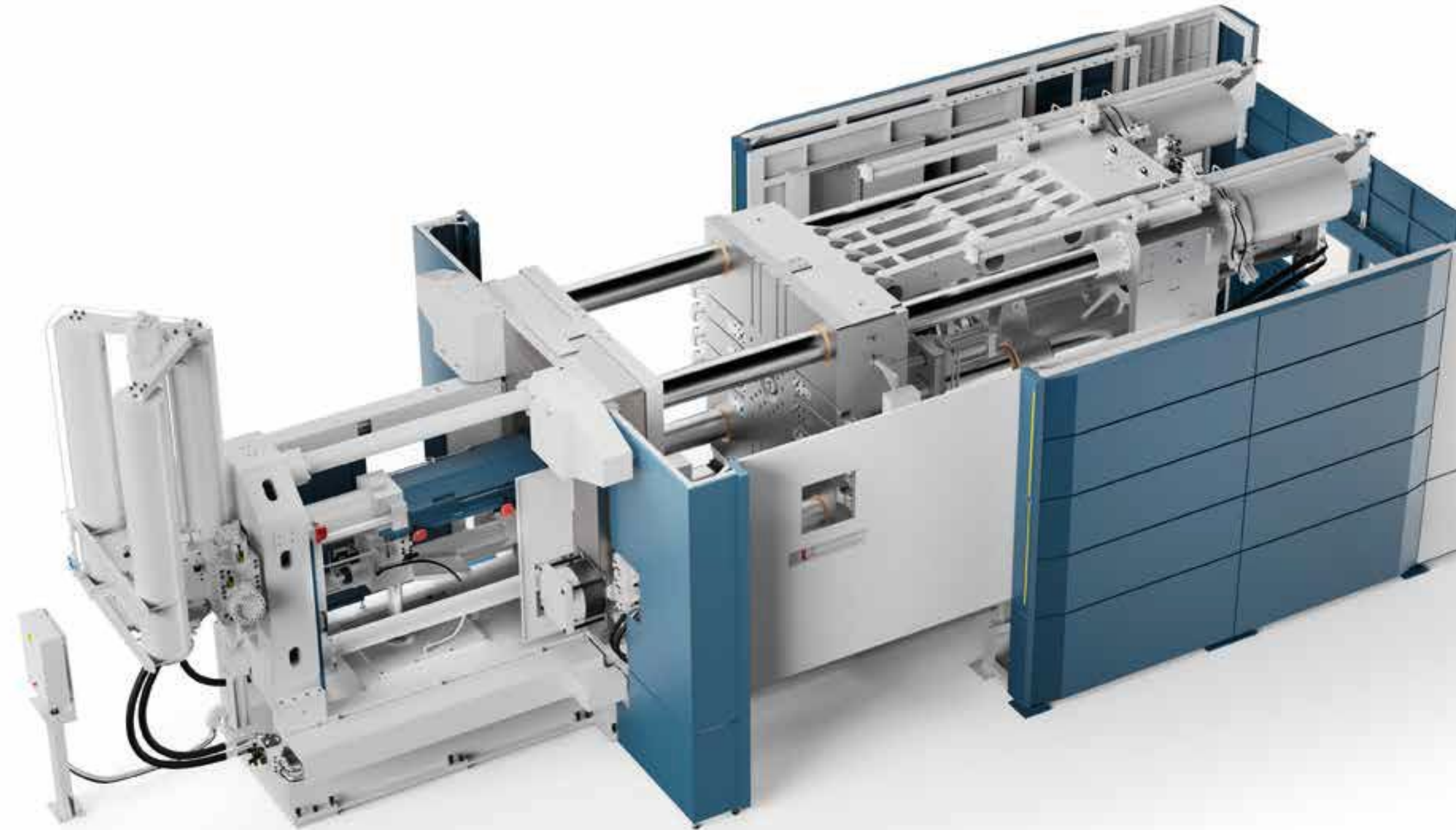
USE OF ALUMINIUM IN VEHICLES

Preliminary conclusion

- **Aluminium structural parts** will continue to grow at a higher speed than in the past. There are still several OEMs that are not using aluminium structural parts on their subframes. Besides, also small-medium cars will need to be lighter. Trends will be for bigger parts.
- **Fuel and diesel engines** will continue to be utilised, but they must be lighter, using aluminium cylinder blocks and not cast iron. This is the Fiat case for example.
- **Hybrid engines** are a solution. These engines are small but powerful, with more aluminium content. Two small engines, one of which electric. More sophisticated parts that will require a more reliable production process.

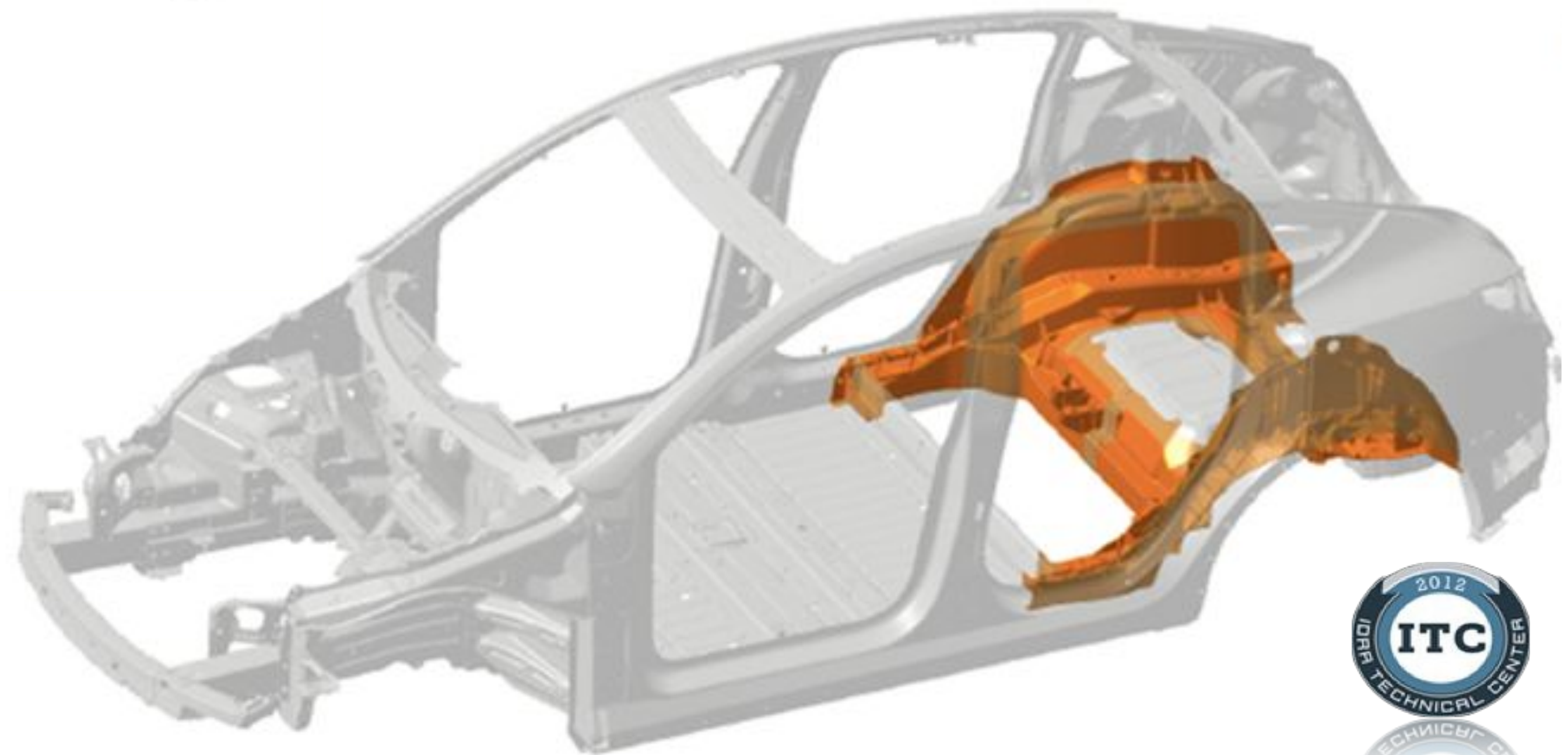
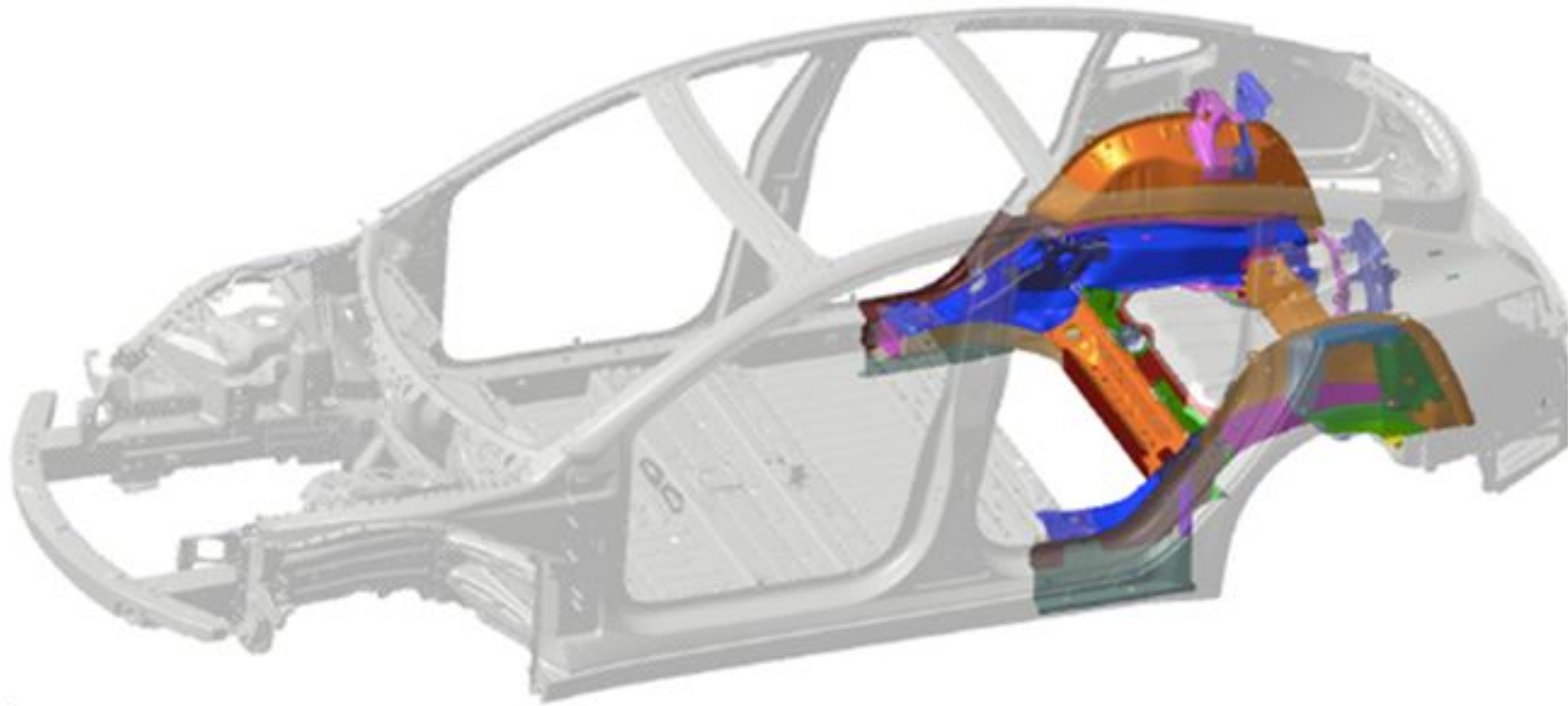


OVER-the-EDGE
EFFICIENCY and
ECO SUSTAINABILITY.

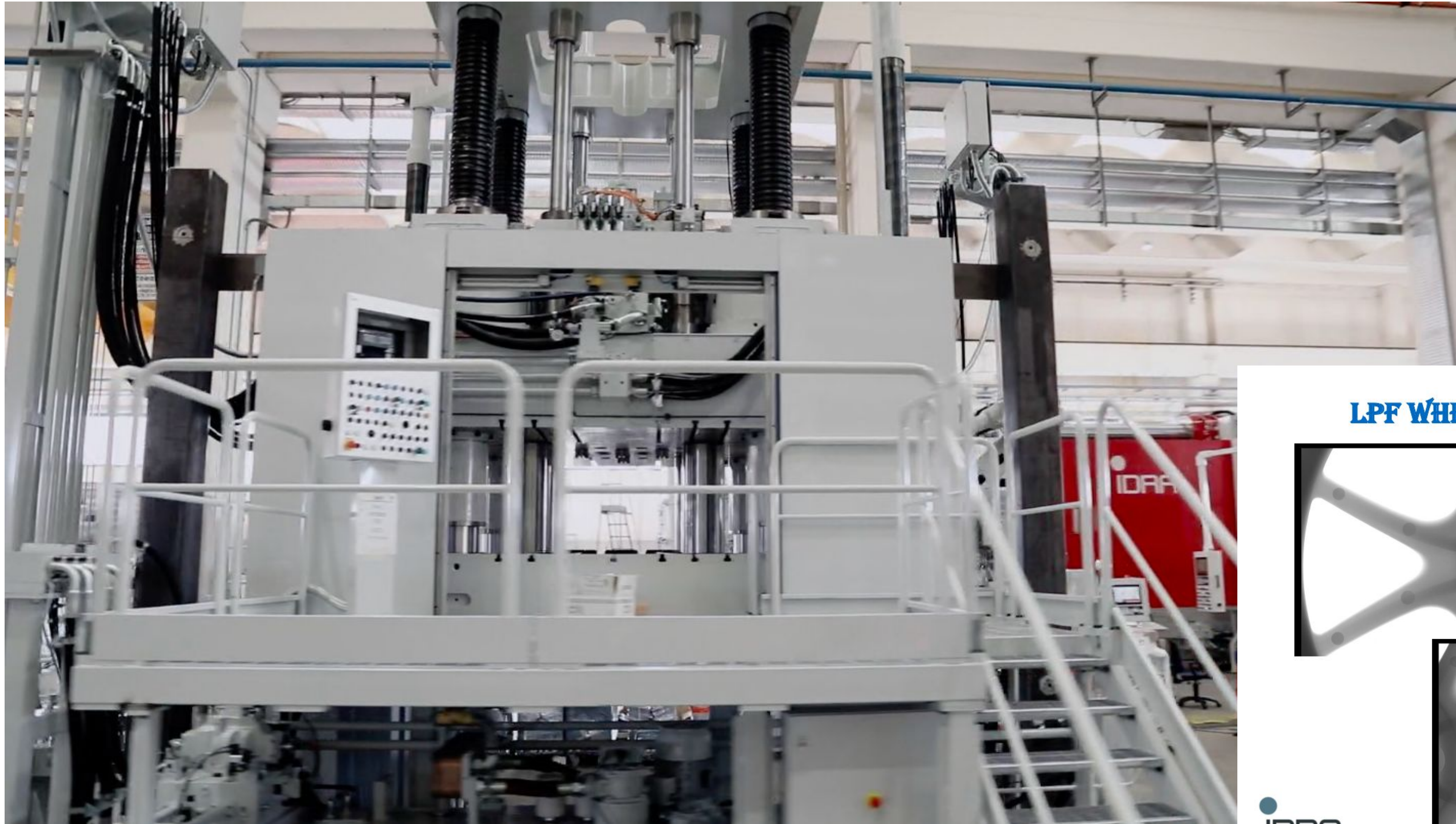


WHY **BIG** IS THE WINNING SOLUTIONS?

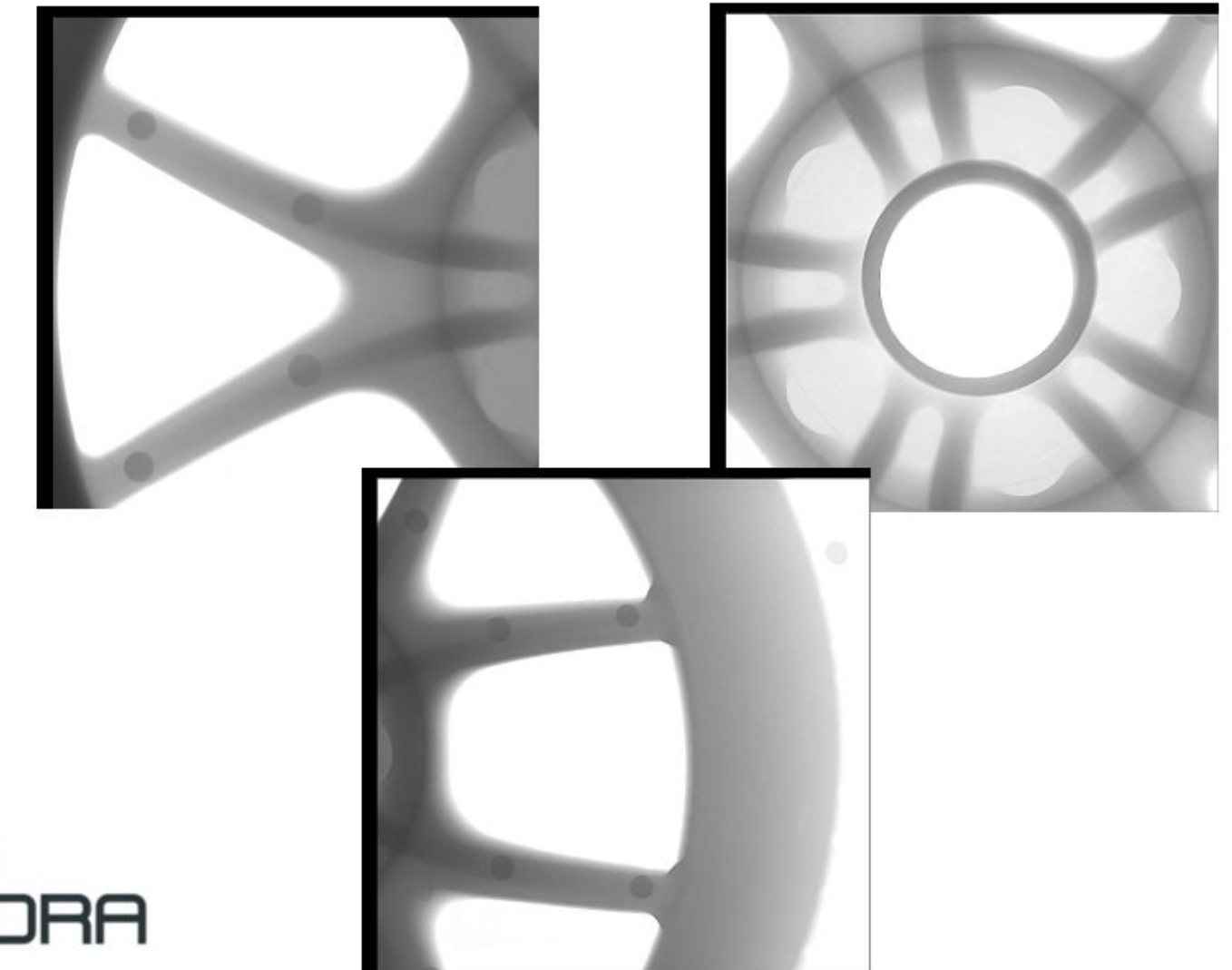




INNOVATION FOR SUSPENSION AND WHEEL SUB GROUP LOW PRESSURE FORGING (LPF)



LPF WHEEL X-RAY RESULTS



- **CAR CHASSIS AND BODY & WHITE: LARGE USAGE OF AL BUT BIGGER PARTS (HPDC WILL GROW)**
- **SUSPENSION AND WHEEL: LARGE USAGE OF AL BUT LIGHTER (LP AND LPF WILL GROW)**
- **LOW ENERGY COST OF CAR MANUFACTURING PROCESS NEED SIMPLER ASSEMBLING.**
- **OEE% FOUNDRY PROCESS MUST GROW AND BE EQUIVALENT OF STAMPING**
- **RETURNS MUST BE MINIMIZED.**

“Simplicity is
complexity resolved.”

Constantin Brancusi