

Background information:

Environmental pollution can result from the passenger cars' CO₂ emissions. Therefore, the decline in these emissions, as shown in Fig.1, is regarded as an important and vital future requirement.

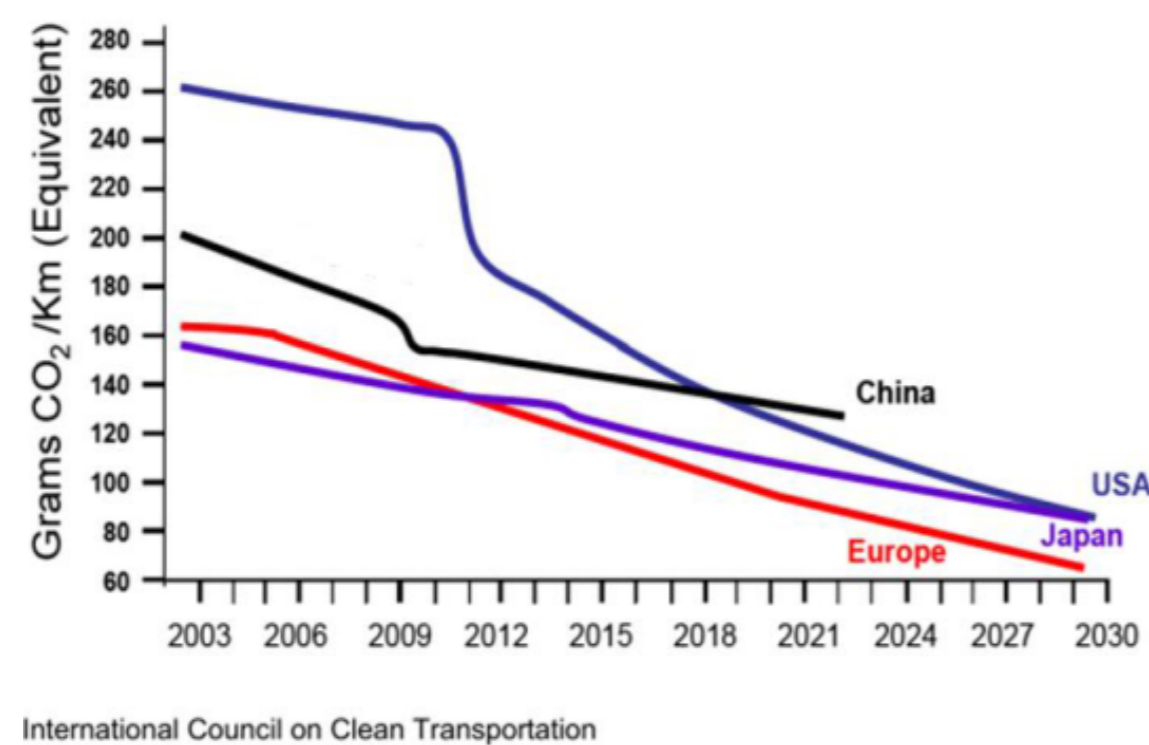


Fig.1: The current and future CO₂ emissions requirements

Decreasing the weight of the body in white (BIW) is considered as one of the solutions, which might have a great impact on the emissions' reduction potential.

This weight reduction can be achieved by the integration of lightweight materials, such as Aluminum, in the vehicle body structures, in the form of castings.

In addition to the weight reduction potential of the Aluminum castings, function efficiency and easier assembly process can also be achieved.

Fig.2 provides an overview about the different BIW sections, which were considered as lightweight metal candidates within the multi material light weight (MMLV) vehicle project. From this figure, it is evident that shock towers, rear rails, torque boxes and hinge pillar reinforcements were regarded as good Aluminum casting candidates.

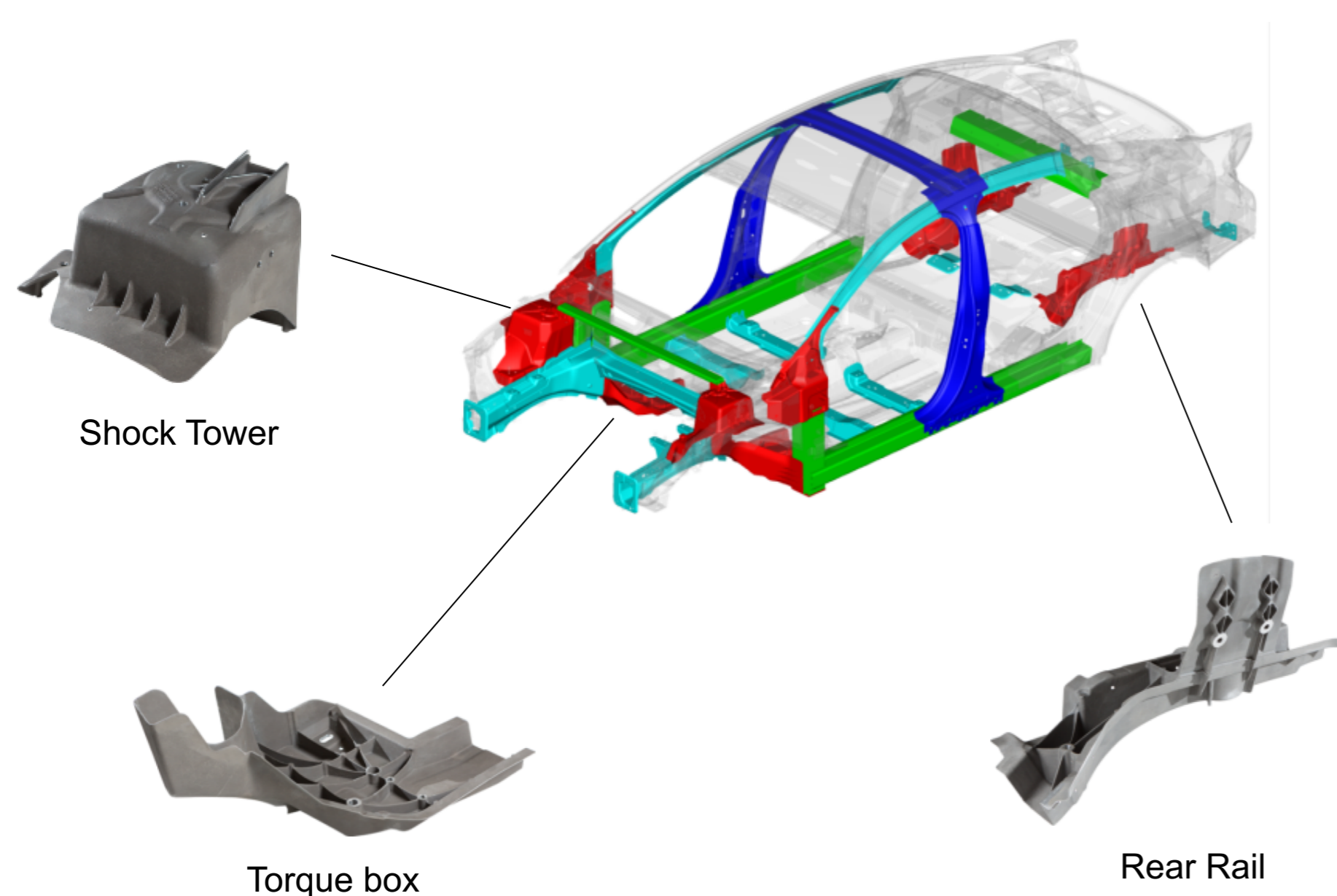


Fig.2: MMLV BIW design

Aluminium alloys for HPDC

HPDC is an advanced technology for the mass production of complex shaped parts. However, their production costs are rather high in comparison to the sheet stamped parts.

The advanced generations of Aluminium alloys should:

- have good casting performance
- achieve good strength together with elongation without heat treatment
- have good corrosion resistance and durability
- have good weldability
- have low price and high availability in the market

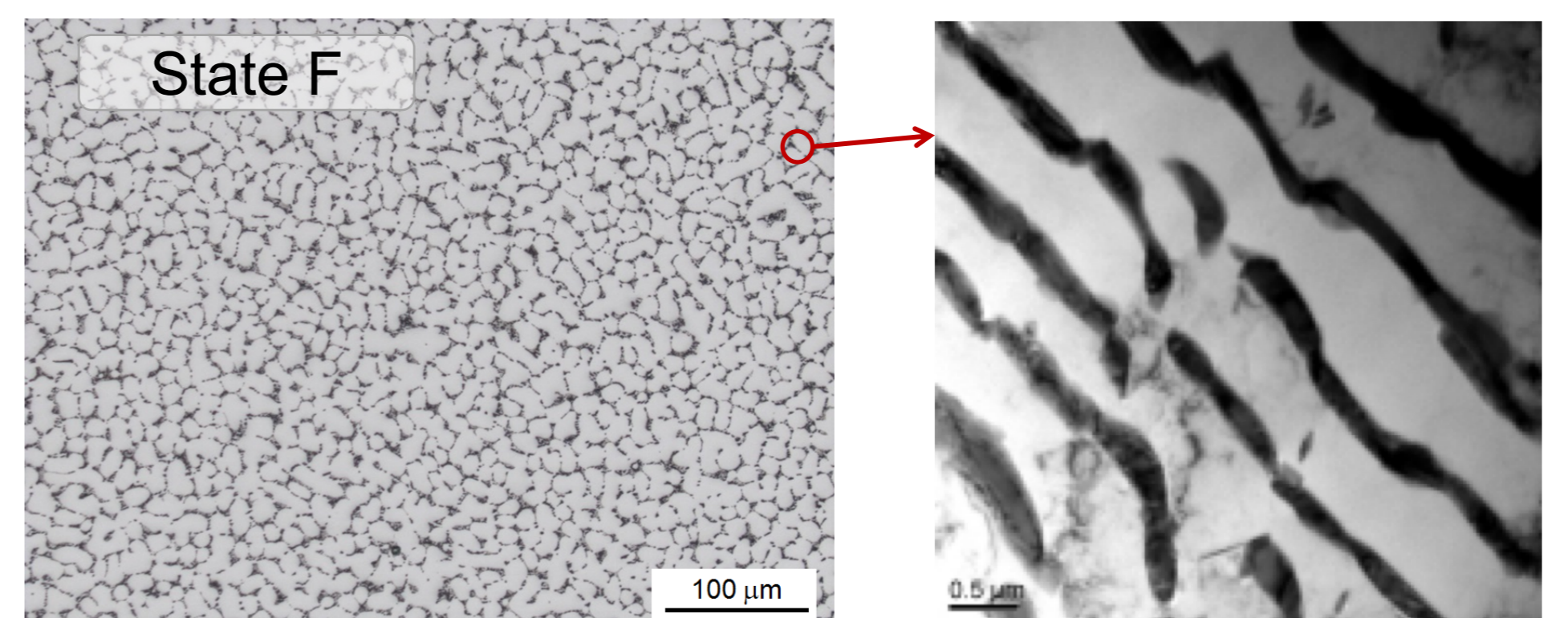


Fig.3: Rusal alloy (Al-Fe-Ni system)

Al alloying

High performance characteristics of a new alloy are achieved through the implementation of the structure containing aluminum solid solution and evenly distributed compact particles of eutectic origin.

An example of new generations of Aluminium alloys that can be applied for the HPDC process include Al-Fe-Ni and Al-Zn-Mg-Ca systems.

Aim of the Project

The main aim of this project is to develop a cost efficient process route for the mass production of structural Aluminum body castings (500000 - 1000000 parts).

This can be achieved by the design and the choice of advanced Aluminium alloys with reduced heat treatment cycles and improved performances.

Furthermore for the optimum process route to be reached, different aspects and factors, other than the feeding material, have to be optimized including:

- The heat treatment
- The casting process
- The Vacuum condition

Partners

