

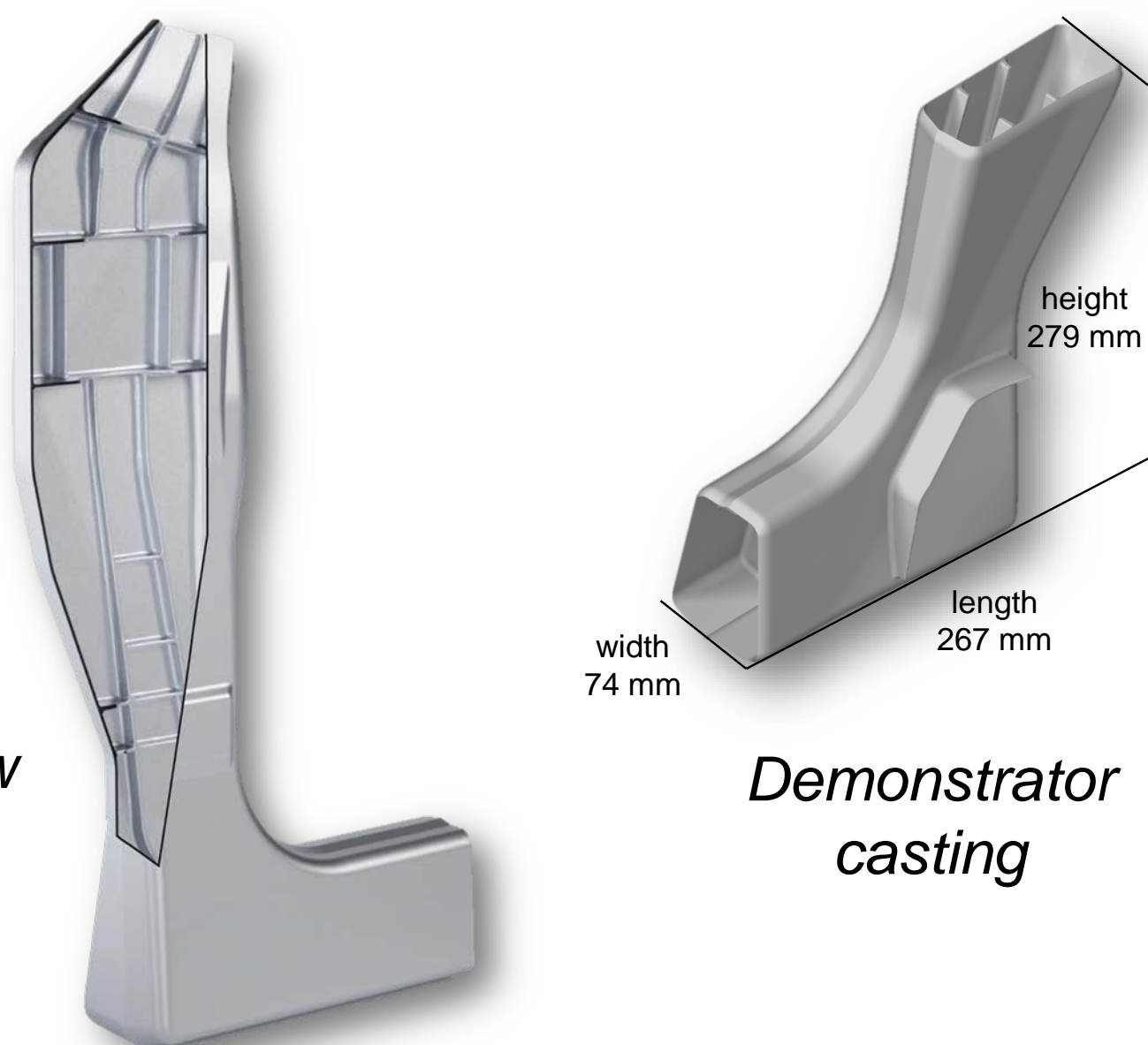
Motivation

Many of current serial passenger car's body-in-white (BIW) are designed in steel. A substitution of formed steel by a hollow die cast aluminum structural component (SC) is supposed to offer following benefits:

- Increased stiffness and function integration at a lower unit weight in comparison to the conventional steel approach
- Lower weight reducing fuel consumption/ CO₂ emissions
- Improved driving dynamics and performance without loss of safety
- Enhanced performance, handling and NVH of the vehicle

A-Pillar Design / Demonstrator Casting

- Hollow structure A-pillar designed with enhanced crash worthiness by topology optimization
- Weight reduction up to 36.9% in comparison to steel component
- Down-scaled demonstrator casting to prove technical feasibility



Design for hollow die cast A-pillar

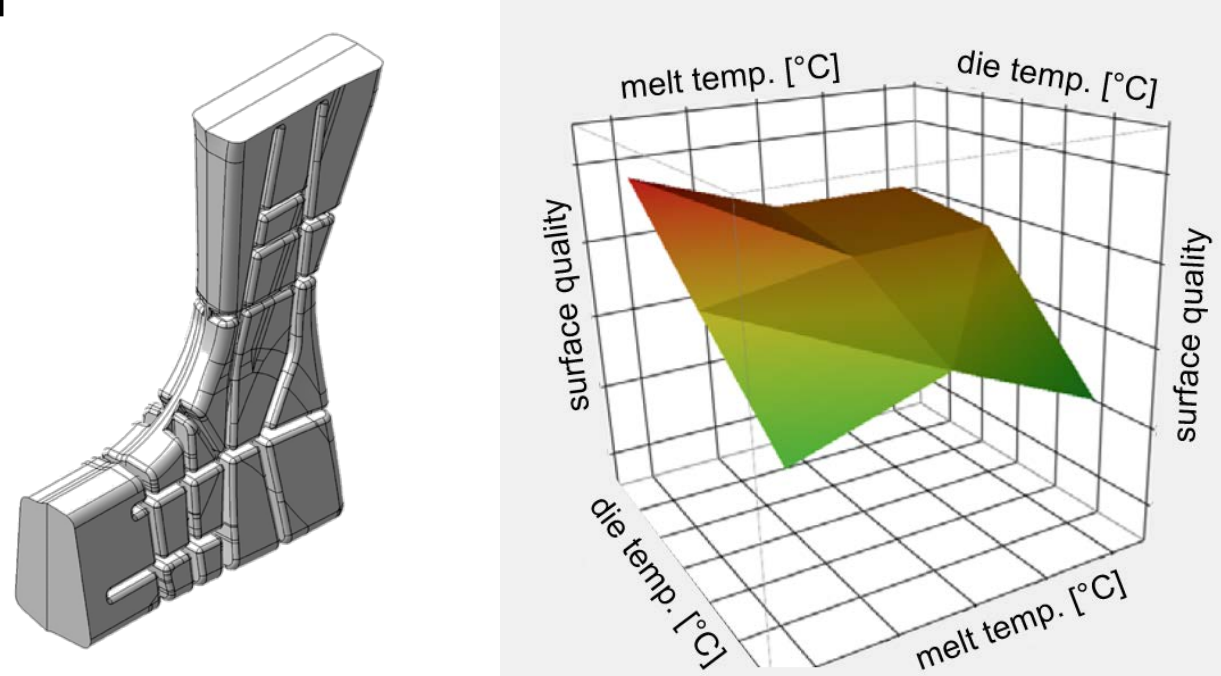
Demonstrator casting

Salt Core for High Pressure Die Casting

Due to the high Al-melt velocity during mould filling cores have to provide high strength and rigidity

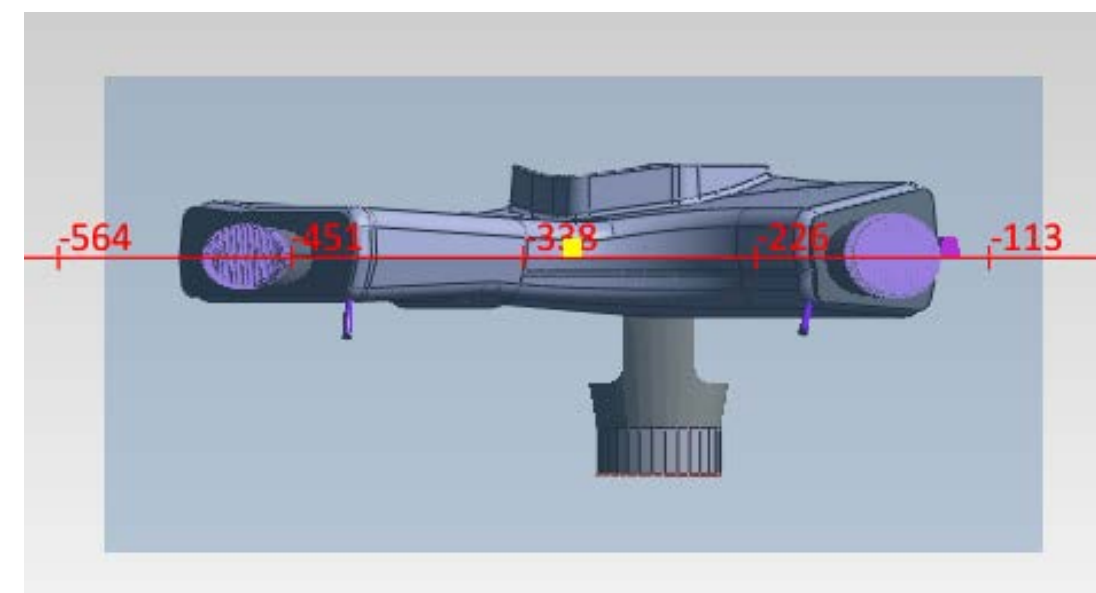
- Develop salt composition according to casting process requirements
- Generate understanding of production- and material-related parameters considering the complex design
- Avoid crack formation, flow defects and provide good surface finish

Salt core for demonstrator

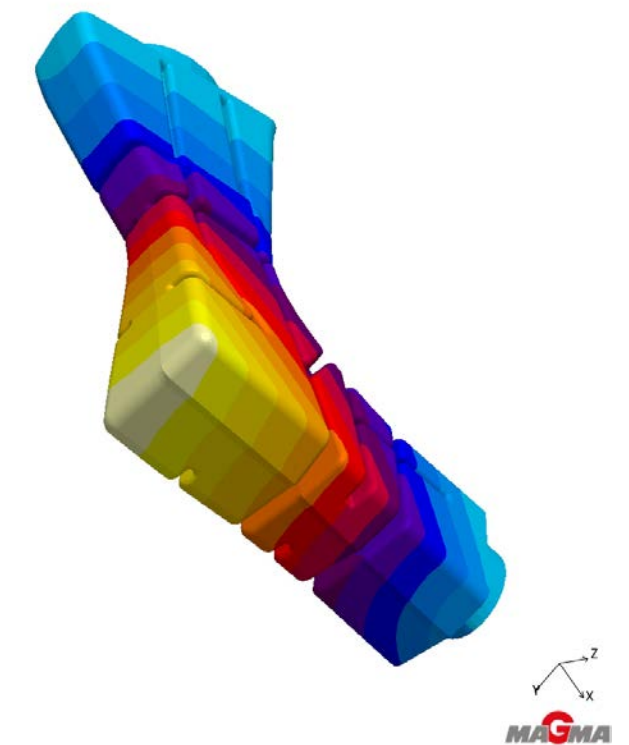


Simulation salt core manufacturing

- Software to be developed to simulate salt core manufacturing process (casting)
- Predict behavior/ properties of salt cores in the HPDC Al casting process (control displacement, avoid failure, etc.)



Simulation – Core Displacement



Component Casting/ Decoring

- Adapt the HPDC process to use complex salt cores
- Develop production parameters
- Understand production-related restrictions considering the complex casting design
- Salt removal and reclamation

Joining

- Select appropriate joining process
- Verify the joining process on microstructure and mechanical properties
- Create a specification book for the joint of the Al-SC and remaining steel BIW
- Optimise process parameters to achieve high quality at low cost

Jointed Aluminum with steel



Main Goal

Enable a new process chain for the integration of hollow, complex HPDC Al-structural components in a passenger car's body-in-white.

Project Consortium

