

## Innovative control and real-time quality prediction for the casting production of aluminum alloy structural components

*Thin-wall structural parts produced by high pressure die casting (HPDC) are designed and applied in the automotive production sector. The Audi strategy is the application of lightweight alloy components produced by HPDC in the structure of future car bodies. One of the key components of this strategy is the shock tower. The research of smart control strategies in order to improve the quality and production efficiency of these parts is a main objective of the technical center for HPDC of AUDI AG. An optimized cognitive method is therefore introduced and integrated in a single centralized control system. The shock tower use case is the selected demonstrator for testing and validating the cognitive control system. Based on an intelligent sensor network, communication with all devices, process data management and a quality prediction in terms of filling and solidification defects, a vast improvement of the casting production process is expected.*

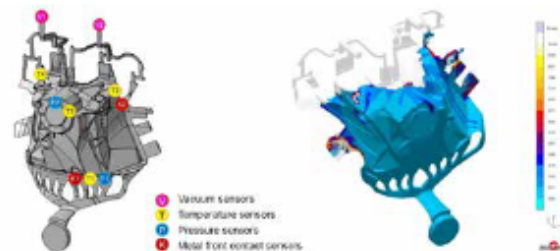


Fig.1 - Sensors in the cavity of the die and simulation to define the sensor locations

### Introduction

EU regulations for achieving long-term climate goals involve the development of cost effective CO<sub>2</sub>-reducing technologies, both for use in cars and for the production of cars. A weight reduction leads to a performance improvement and a lower fuel consumption, which makes a substantial contribution to achieving the objectives and future challenges of the automotive industry.

The technology in automotive lightweight construction has developed to a highly integrated overall concept with innovative materials and intelligent design principles and production processes that conserve resources. Innovative lightweight concepts such as space frame technology can only be applied using high pressure die casting (HPDC) parts for structural purposes in the car bodywork. The production of these large-scale and thin-wall high tech parts requires high levels of investment on manufacturing means in order to provide stable and controllable process conditions.

Process-accompanying quality measurements ensure that information is fed back to the central production process and that inaccurate machine settings and unnecessary rejects are avoided. Reliable information about the quality of a part immediately after the production process can help the worker to implement measures in a timely manner to readjust the parameters of the production process.

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