

Project title: Development of Plastic Liners with Integrated Bosses for Composite Pressure Vessels by Blowmoulding - IntegVessel

Partner: Enesty GmbH
Ph-Mechanik GmbH & Co. KG

Duration: 07/2020 – 08/2022

Funding Agency: Central Innovation Program for Small- and Medium-Sized Enterprises (ZIM) of the Federal Ministry for Economic Affairs and Energy (BMWi)

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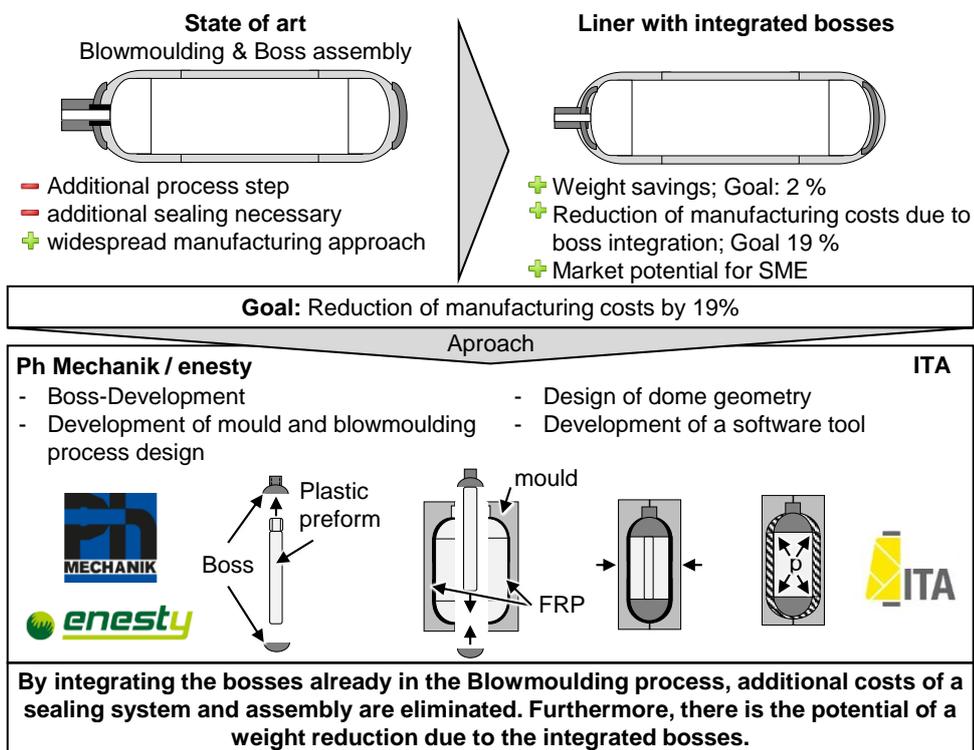
Ref.: TM
19.05.2021

Mission Statement

In order to meet the demand from the German government and society to reduce CO₂ emissions from vehicles, car manufacturers are increasingly turning to alternative drive technologies. Hydrogen fuel cells are a promising solution for reducing greenhouse gas emissions. The hydrogen required for the fuel cells is stored and transported in composite pressure vessels, which are characterized by their low weight. The current generation of composite pressure vessels is the so-called type IV, which consists of a plastic liner (e.g. high-density polyethylene or polyamide) and metal bosses (connection). In order to cope with operating pressures of up to 700 bar with a sufficient safety factor, the liner-boss connection is sheathed with carbon fibre-reinforced plastic (CFRP). In the current configuration, however, the bosses must first be attached to the liner and a suitable seal integrated. The aim of this research project is to reduce the manufacturing costs by up to 19 % by combining the two process steps. In addition, there is the potential to reduce the total weight through the integral construction method. The predicted tripling of hydrogen-powered vehicles by the year 2023 offers particular benefits for suppliers to the automotive industry, who can thus profit from the exponentially growing market for the increasing demand for composite pressure vessels. From an economic point of view, this project will enable SMEs to enter the pressure vessel market, which is dominated by large corporations. This means that SMEs in Germany can benefit from the more cost-effective production of the liner-boss system with an additional turnover of 6.8 million € when they enter the market in 2023.

Approach

ITA designs a suitable dome geometry of the liners based on a process simulation. In parallel, the industry partners develop a blind and a connecting boss in close consultation with each other, which are joined together in the blow extrusion process. Finally, liners with integrated bosses are produced in the blowmoulding process and pressure tanks are manufactured in the multifilament winding process.



Acknowledgement

We would like to thank the Federal Ministry for Economic Affairs and Energy (BMWi) for funding the research project as part of the Central Innovation Program for Small- and Medium-Sized Enterprises.

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