



SOUNDCAST

VACUUM-ASSISTED HIGH PRESSURE DIE CASTINGS WITH REDUCED POROSITY AT LOW COST

D5.1: Validated demonstrator

Instrument	Collaborative Project – Research for the benefit of SME		
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Dissemination Level (choose the suitable option)	
X	PU Public
	PP Restricted to other programme participants (including the Commission Services)
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	CO Confidential, only for members of the consortium (including the Commission Services)

DOCUMENT MODIFICATIONS CONTROL

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1. Introduction

The present document reports the components produced during the demonstration activities carried out at the HPDC foundries RUFFINI and Schmale & Schulte showing images and details of the produced parts, as high mechanical properties demonstrator and high weldability demonstrator, respectively. In both demonstrators VDS vacuum equipment and Chem-Trend die lubricants were used. The demonstration trials were performed with the collaboration of all industrial partners and all RTDs. Soundcast procedures described in Deliverable 5.3 were followed for all the demonstration activities. RTDs assisted HPDC foundries in the demonstration trials and also trained specifically them in order to transfer the knowledge acquired in the project as it is described in Deliverable 6.6 (Training and demonstration for SMEs).

2. Ruffini – High mechanical properties demonstrator

2.1 Component selection

RUFFINI select a component for the demonstration activity of the SOUNDCAST Project according to the requests of project:

1. A component currently under production with two available dies, in order to have one to be modified for vacuum assisted HPDC and another to continue the standard production.
2. A component with requirements of low porosity in which vacuum assisted die-casting may represent a competitive advantage.
3. A component with a geometry that allow the extraction of tensile specimens as well as X-ray tomography analysis.

The component finally selected, taking into account the beforehand defined criteria, is presented in Figure 2.1. The component is the transmission cover of a gear box



Figure 2.1 3D CAD image of the component selected by RUFFINI for the demonstration activity of Soundcast project (High mechanical properties demonstrator).

2.2 Demonstrator fabrication

2.2.1 Casting equipment

The die casting machine is one of the smallest machine in foundry equipped with the necessary auxiliary elements:

- Die casting machine
- Crucible furnace
- Metal dosing feeder
- Tempering unit
- Vacuum unit: VDS PLC 350



Figure 5.2 Die casting machine, 700tn and Vacuum unit VDS PLC 350.

The casting parameters are the necessary to obtain a good components with the additional parameter of vacuum level that was around 40-50mbar.

2.2.2 Produced components

Around 100 parts were produced with a combination of plunger velocity and 3rd phase pressure. Some of the components produced were selected for their subsequent characterization, by X-ray tomography, microstructural analysis and tensile testing. The validation results are summarised at Deliverable 5.2.

3. Schmale & Schulte – High weldability demonstrator

3.1 Component selection

Schmale & Schulte selected a component for the demonstration activity of the SOUNDCAST project according to the requests.

❶

Corresponding die casting tool owned by ifs, TU Braunschweig. Applied to the die casting machine at Schmale and Schulte for SOUNDCAST demo activities

❷

Corresponding die casting tool generally used by Schmale and Schulte

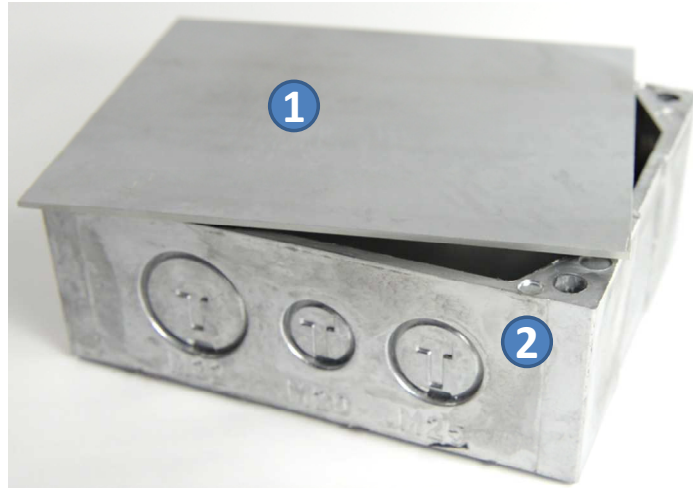


Figure 3.1: Terminal box of Schmale & Schulte for Soundcast welding demonstrator

3.2 Demonstrator fabrication

3.2.1 Casting equipment

The component “frame” was produced with the FRECH high pressure die casting machine of Schmale & Schulte and its auxiliary elements.

- Die casting machine:
- Furnace
- Spraying system
- Metal dosing feeder
- Tempering unit
- Degassing unit



Figure 3.2 HDPC production unit of Schmale & Schulte

The component “cap” was produced with another high pressure die casting machine. The die casting machine is the largest machine in the foundry of Schmale & Schulte, equipped with the necessary auxiliary elements.

- Die casting machine
- Furnace
- Spraying system
- Metal dosing feeder
- Vacuum system
- Tempering unit
- Degassing unit



Figure 3.4 HDPC production unit with of Schmale & Schulte

Generally, the part “frame” features the standard casting parameters of Schmale & Schulte. For the part “cap”, TU-BS standard casting parameters were adapted to the die casting process at Schmale & Schulte.

3.2.2 Produced components

A total of 56 parts were produced in two different days of production. Some of the components produced were selected for their subsequent characterization of their weldability. The validation results are summarised at Deliverable 5.2.