

DORST COMPACTCAST 300 – easysell®: Innovative Production System for Sanitaryware

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Already in 2018, DORST Technologies presented a prototype of a unique production system with groundbreaking potential for the shaping of ceramic sanitaryware during ceramitec in Munich/DE. Following an extensive process of industrialization, the production system has now reached market readiness. As of now the production system will be available for the market under the DORST type designation COMPACTCAST 300 with easysell® mould technology.

Introduction

The COMPACTCAST 300 high-pressure casting machine uses the completely new developed easysell® mould technology including isostatic mould closure. In the casting unit the moulds are closed and tightened by the ambient isostatic closing pressure, which tracks the internal casting pressure in the moulds with a difference of only 0,2 bar up to 0,5 bar.

The high-pressure casting machine COMPACTCAST 300 and the easysell® casting moulds form an integrated and independent production system. The easysell® casting moulds are not compatible with conventional high-pressure casting machines using a directional hydraulic-mechanical closing system of the moulds. Vice versa, conventional high-pressure casting moulds are not applicable on the COMPACTCAST 300 high-pressure casting machine.

Currently, DORST Technologies operates one production system in the DORST Technology Center in Kochel am See as a ref-

Tab. 1 Technical data of the DORST COMPACTCAST 300 (CC300)

Isostatic closing pressure	max 20,0 bar
Casting pressure (slip pressure)	max 19,5 bar
Mould block size (L × W × H)	max 1575 mm × 860 mm × 400 mm
Mould parts	2-parts moulds (incl. additional insert wedges)
Moulds and cavities	max 3 moulds (1 cavity each)
Target article portfolio	Wash basins, shower trays, squat pans, kitchen sinks, water tanks



Fig. 1 Overview DORST COMPACTCAST 300 (Single Cell)

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erence for customers. A second production system is placed in the factory of a customer as a pilot line. The customer operates the production system and produces the casting moulds for the pilot production system independently, based on a license agreement. The experience in the Technology Center and with the pilot production system in the market shows, that the anticipated advantages of the production system can be put in action in production.

Focus on product and casting

The isostatic mould closure with a constant differential pressure of only 0,2 bar up to 0,5 bar between the closing pressure (ambient pressure) and the casting pressure (slip pressure) within the moulds allows to minimise the elastic deformation of the moulds during the casting cycle.

Even at very high casting pressure, the casted articles experience hardly any clamping in the moulds during and after pressure

decrease. Consequently, even articles with very steep and angular geometry demould easily and without additional stress on the article.

An evenly distributed drainage and supply system close to the active surface of the casting moulds supports the outstanding casting and demoulding behaviour of the production system.

Additionally, the manufacturing process of the easysHELL® casting moulds enables almost any arrangement of the internal circuits in the moulds for rinsing water and compressed air for demoulding. The manufacturing process itself is based on CAD/CAM methods, which leads to a previously unattained level of precision and repeatability.

Additionally, the CC300 high pressure casting machine allows inclining (max 10°, one side) and rotating (max 95°, counter-clockwise) the moulds. Inclination and rotation are freely programmable during all steps of the casting cycle. Especially during filling and emptying of the moulds, and post-solidification of the articles this creates the potential first, to reduce slip and hollow-casting connections of the articles and moulds, and second, to create entirely new designs of hollow-casting areas in the articles.

Thereby, the innovative machine control supports the operator in all process steps. It provides all required adjustment options to optimize the casting cycle for each article. At the same time the visualisation as well as predefined group and ramp functions keep it clear and easy to navigate at any time. The unique combination of the casting and demoulding behaviour, the mould drainage, the options for inclination and rotation of the moulds and the innovative machine control results in completely new design options for sanitary ware articles. These design options are not reflected by the articles in the market today.

Flexible lot sizes

In addition to the advantages in the casting process, the isostatic mould closure enables a very thin-walled design of the easysHELL® casting moulds. The weight of the casting moulds is significantly lower compared to conventional high-pressure casting moulds and it has positive impact on the demoulding process, mould change and mould costs.

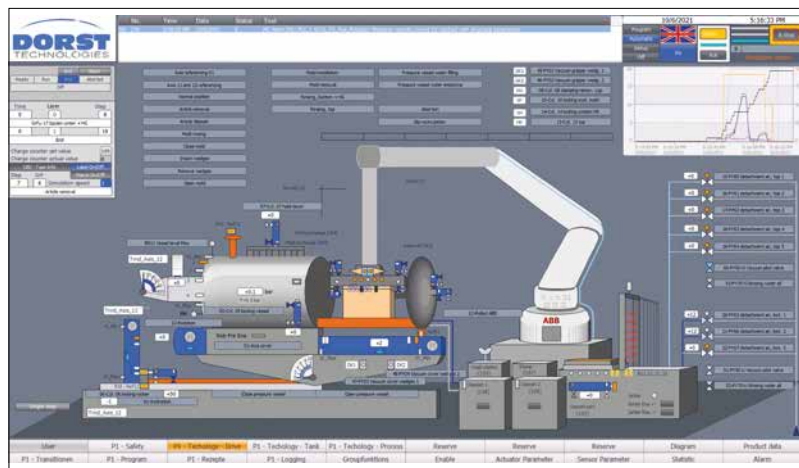


Fig. 2 Innovative machine control system of the DORST COMPACTCAST 300

For the demoulding of the casted articles and the mould change between two different articles DORST Technologies has developed an innovative connection concept for the casting moulds in the production system. A central robot handling unit executes both processes fully automatic.

Except from the first setup an adjustment of the production system for a specific article all further changes in production do not require any manual connection works within the production system. The machine control provides the required programs for casting and mould change. In case of any adjustments of the casting parameters the machine control additionally supports the simulate of the complete casting cycle to check for any potential mistakes. Following this process, the required

time for mould change, from the end of the cycle of one product to the start of the cycle of the next product, is approx 10 min.

The mould costs of the easysHELL® casting moulds are significantly lower compared to conventional high-pressure casting moulds, primarily due to the lower weight and reduced amount of porous resin, but also due to the more efficient manufacturing process. In addition, due to the evenly distributed drainage and supply system of the easysHELL® casting moulds, DORST also expects a higher lifetime.

Combining the factors described above, many articles can be produced by high-pressure casting economically already in very small lot sizes. At the same time the production system is equally capable of mass



Fig. 3 Robot unit of the production system during demoulding of an article from the DORST COMPACTCAST 300



Fig. 4 Robot unit of the production system during mould change on the DORST COMPACTCAST 300

production in large series. Consequently, the production system opens a much wider range of application for high-pressure casting technology, compared to conventional high-pressure casting machines.

Additionally, the efficient manufacturing process of the easysell® casting moulds reduces the time required from a new article design idea (model) to production in high-pressure casting (Time-to-Market). The potential reduction of the Time-to-Market is up to 50 %, from approx 3–4 months down to 6–8 weeks.

Total cost of ownership

The production system COMPACTCAST 300 with easysell® mould technology provides high quality, output and lifetime of the

moulds and components, maximum degree of flexibility, automation, and digitalization as well as significant savings in media consumption in production.

The potential shortening of the cycle time based on increased casting pressure is of particular note. With the easysell® casting moulds increasing casting pressure does not result in increasing clamping of the casted articles in the moulds. In actual production conditions, depending on the geometry of the articles and the slip properties, the applied casting pressure is often significantly higher than 15 bar, without negative effects on demoulding. In return the realised cycle time is frequently up to 30 % lower than with a conventional high-pressure casting machine.

This is added with the significantly lower media consumption of the production system compared to a conventional high-pressure casting machine, in particular compressed air (approx 10–20 % less) and water (approx 10 % less). The main reason for the reduction of the media consumption being the thin-walled, shell-type design of the easysell® moulds and the operation of the COMPACTCAST 300 high-pressure casting machines without hydraulics and related cooling systems. Additionally, the easysell® casting moulds are fully recyclable.

In production environment two COMPACTCAST 300 high-pressure casting units are combined with one central robot unit in a Twin Cell. In this setup the central robot unit can serve the two casting units in an efficient and optimum way. At the same time, the setup allows the complete automation of the transport of setters, casted articles, and casting moulds to and from the Twin Cell. Overall, the Total Cost of Ownership (TCO) of the production system consisting of the COMPACTCAST 300 high pressure casting machine, easysell® mould technology and the central robot unit is up to 30 % lower than with a conventional high-pressure casting system, depending on its application.

DORST Mould Lab

At the present time, DORST Technologies keeps one fully equipped production system COMPACTCAST 300 ready in the DORST Technology Center in Kochel am See for demonstration of the system to customers and subsequent demonstration of the easysell® mould technology with customer models. For this task, the easysell® casting moulds are manufactured in the newly built DORST Mould Lab, which is closely connected to the DORST Technology Center. This facility also supplies the initial casting moulds needed for pilot production lines at customers.

In the long term, the manufacturing process of the easysell® casting moulds can be transferred to customers for their self-sufficient mould production in an efficient and reliable way. A team of experienced engineers and developers is available for demonstration of the production system, mould testing and subsequent projects at any time.



Fig. 5 DORST Technologies Mould Lab

(Figs.: DORST)