

Material database for predicting binder decomposition and core gases

Aachen and Hilden, April 2019. MAGMA GmbH, specialist in virtual optimization of casting processes, and ASK Chemicals GmbH, one of the world's leading suppliers of foundry chemicals and consumables, are involved in a joint development project on binder decomposition in sand cores and associated gas formation. The aim is to provide the MAGMASOFT® users with validated data on quantitative prediction of process-relevant effects for ASK products. With a new database, joint customers should be even better supported in the interpretation of the venting behavior of sand cores and the prediction of core gas-related casting defects.

During the casting process, gases form and expand in cores and molds amongst others due to the decomposition of binder components and other volatile components. This is closely related to the basic sand binder mixture used and its compaction as well as its specific gas permeability. Different volumes of gas are produced at different times depending on the type and quantity of the volatile components, the thermal exposure and the respective decomposition behavior. Relatively high gas pressures at the interface to the melt can result in gas inclusions in the casting. In the cases of complex cores or even core packages, it is difficult in practice to determine if core gases are the cause of defects due to the numerous and diverse influencing factors.

Newly developed simulation models in MAGMASOFT® virtually depict gas formation, gas flow, and venting through core prints or the penetration into

the melt. This functionality enables accurate prediction of the risk of defects due to gases from cores and molds. The availability of practical quantitative data already during simulation-based design of castings and cores therefore contributes significantly to the prevention of defects.

ASK Chemicals and MAGMA have agreed on a collaboration as part of a development project to quantify the decomposition behavior and gas formation of different ASK binder systems. To this end, ASK Chemicals will carry out extensive research in their laboratories and Technical Center. Respective laws of decomposition behavior and resulting gas formation will be quantitatively determined for different binder systems and heating characteristics. Product-dependent kinetic models will be derived from these data that will make the formation of gas volumes and the resulting effects in MAGMASOFT® quantitatively predictable.

"For MAGMA, this project is an important step in the direction of 'robust process design for casting technology'. The possibility of systematically avoiding core gas-related casting defects through quantitative consideration of different ASK binder systems already at the project planning stage represents a significant benefit for our customers," confirms Dr.-Ing. Jörg C. Sturm, Managing Director of MAGMA GmbH. "We are pleased to have gained a competent development partner with ASK Chemicals, who are interested in quantifying the behavior of their binder systems during casting."

"With the possibility to predict the behavior of our products with any core geometries during casting, we can support our customers in a more targeted manner. Comprehensive customer service therefore already has the highest priority for us in the planning stage of production processes," confirms Jörg Brotzki, Executive Vice President Europe at ASK Chemicals. "The user-friendly integration of our data in MAGMASOFT® is thus decisive for the quality of planning."

Both partners will present the first results of the joint development project at the GIFA trade fair. The collaboration is designed for the long-term.

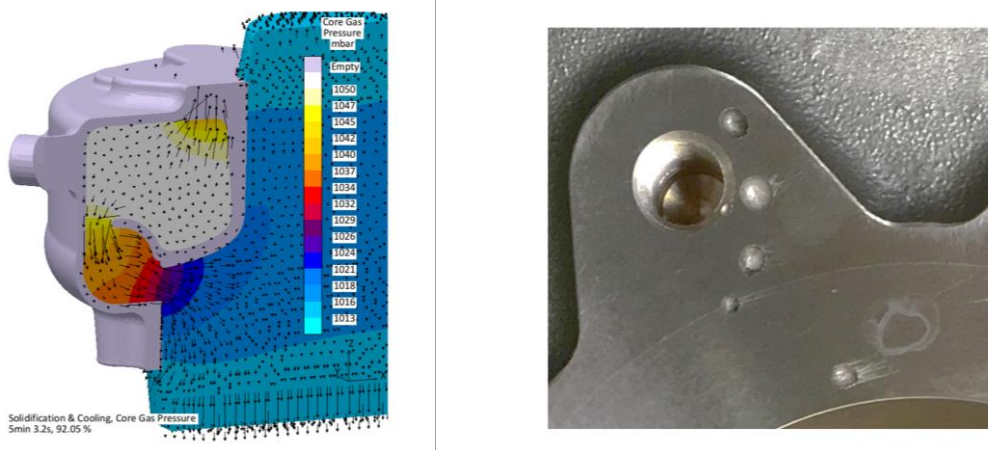


Figure 1: Development of the flow in the core due to binder decomposition and typical core gas-related casting defects

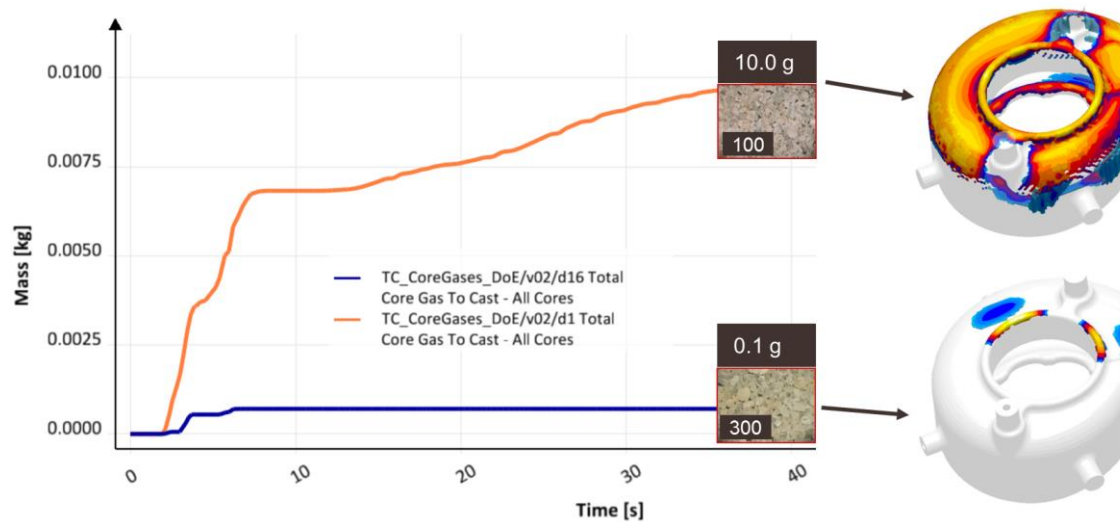


Figure 2: Prediction of the time dependent penetration of core gases into the melt for different mold materials (left) and visualized defect risk within the casting (right)

ASK Chemicals at the GIFA trade fair Hall 12 A22

MAGMA at the GIFA and METEC trade fairs

Hall 12 A19/20 and hall 4 E29

About ASK Chemicals

ASK Chemicals is one of the world's largest suppliers of foundry chemicals and consumables, with a comprehensive product and service portfolio of binders, coatings, feeders, filters, and release agents, as well as metallurgical products including inoculants, Mg treatment, and inoculation wires and master alloys for iron casting. Core manufacturing and development of prototypes, as well as a broad offer of simulation services, complete the range of supply.

With research and development in Europe, America, and Asia, ASK Chemicals sees itself as the driving force behind industry-specific innovations and is committed to offering customers a consistently high level of quality. Flexibility, quickness, quality, and sustainability, as well as cost-effective products and services, are of key importance.

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About MAGMA

MAGMA is a worldwide leader in developing and providing software for casting process simulation and virtual optimization. MAGMA stands for robust, innovative cast solutions and for reliable partnerships with the metal casting industry, including casting designers and buyers. MAGMA's products unite the complexity of the casting process with user-friendliness to create economical solutions for its customers. MAGMA partners with its customers in the integration and effective use of the software, helping them to realize clear cost advantages.

MAGMA's range of products and services includes the simulation software MAGMASOFT® autonomous engineering, for virtual designs of experiments and autonomous optimization of casting processes, as well as comprehensive engineering services for casting design and process optimization. Today, MAGMA's software is used by more than 2000 companies all over the world for cost-effective casting production, reduced quality costs and for establishing robust processes for all applications, particularly in the automotive industry and mechanical engineering.

With the MAGMAacademy, MAGMA provides extensive implementation and educational offerings for all topics associated with casting process simulation. MAGMASOFT® users, together with their colleagues and managers, learn in

trainings, workshops and seminars how they can use simulation and virtual optimization for optimizing casting design processes, lowering production costs and increasing resource efficiency.

MAGMA Giessereitechnologie GmbH was founded in 1988 and is headquartered in Aachen, Germany. A global presence and support are guaranteed by offices and subsidiaries in the USA, Singapore, Brazil, Korea, Turkey, India, China and the Czech Republic. Additionally, more than 30 qualified partners represent MAGMA around the world.

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