



Professor Fehlbier and his team at the Bühler training directly on-site.

Since its founding in October 2012, the Center for Casting Lightweight Materials and Engineering, GTK, at the University of Kassel has been successful in building bridges between university-based research and industry-oriented applications. The center is headed by Professor Martin Fehlbier who leads a team of 15 associates and ensures that students receive an education that is well-founded in both theory and practice.

In practice, close cooperation has been developed with various partners from the industry – besides well-known OEMs also from the areas of plant construction, casting die production, materials specialists and software developers – mainly from Germany and Europe.

Carat System for Research

Close collaboration with various partners from the industry over the past few years has made it possible to furnish the laboratory and the machine shop of the casting technical center with modern equipment. This has also been of great benefit to the students during their training. Around 25 industrial companies, including Bühler, rank among the partners. As a result, a Carat die casting cell with a locking force of 1400 tons was installed and became operational in mid-2016. The decision to use the Bühler two-platen system was made

based on its ideal locking force which allows for its application both for research as well as basic projects. This unit not only allows for casting standard samples, it is also large enough to cast structural components or gearboxes in small batches. “Bühler’s willingness to cooperate makes it possible to not only carry out joint projects, but to also discuss current tasks and future technological challenges at the highest level, and to tackle them jointly” stated Prof. Fehlbier. “In general, we can say that as far as our collaboration is concerned, our expectations were exceeded, as was the case with all of the other partners.”



Carat 140 cell in Kassel.

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Shaping the Future of Die Casting Together

“It is important for Bühler to contribute to projects that promote die casting in general and particularly promote our present and future customers” said Hartmut Schmidt, Manager of Bühler Die Casting Germany. “Professor Fehlbier has made it possible for us to take a very exciting approach that brings research and practice together. It is essential for the future that the die casting industry continues to develop and finds innovative paths to follow. This is where a combination of basic research and industrial research projects plays an important role.”

There is no shortage of ideas for future collaboration; particularly projects related to all aspects of the casting process are planned with the goal of significantly increasing the efficiency of the entire plant.

Focusing on Minimizing Costs and Increasing Efficiency

The Center for Casting Lightweight Materials and Engineering is mainly focused on these practice-oriented subjects: minimizing costs by, e.g. completely new process technologies within die casting and increasing efficiency. These two factors are essential to further strengthen the competitive position of the die casting process as compared to other processes. The potential to achieve is seen mainly in the following areas: Industry 4.0, light construction based on ultra-thin wall castings, together with optimized component design, die spraying from the inside out or spraying of minimal quantities from the outside in while coating the dies at the same time, intelligently controlled die cooling systems with heat recovery as well as reducing the gating system by means of hot runner technology in cold chamber die casting. This is why the center is focusing its research on these areas.

Exciting Topics for the Future

In the future, current trends such as e-mobility, alternative mobility concepts, CO₂ regulations and developments in the area of big data and the Internet of Things will play a crucial role in the die casting industry. One might wish to be somewhat provocative and ask the question whether cars might even still be driven 30 years from now, or if other solutions might assert themselves, particularly in urban areas. This leads to additional questions, e.g. which cast components for



Professor Martin Fehlbier and Hartmut Schmidt in front of the Carat die casting cell at the Center for Casting Lightweight Materials and Engineering in Kassel.

motors will still be relevant in the future? Could magnesium play a larger role? Is the focus moving to hybrid components that will expand the use of joining and gluing technology? Which innovative structural casting components will grow in demand in the future, e.g. battery or electronic housings?

It is essential that these kinds of questions are included early on in the research and practical applications in order to maintain and promote the competitiveness of the die casting industry. Joint research projects for today help us tap into new technologies that will help us reach our full potential tomorrow. Universities, students as well as commercial enterprises will all profit from close cooperation.

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