

HPDC Coffee Talk 2: "Where is the journey going?" on current topics with the decision-makers in the industry

The global development of the aluminium die casting industry is currently in a turbulent environment and is at a historic milestone. At no time in the last 50 years have so many challenges and significant events occurred simultaneously as is currently the case.

In a series of 3 Coffee Talks, Johannes Messer Consulting discusses economic, technological and international topics in the context of the current challenges with 4 decision-makers from the HPDC industry

The topic of the second talk:

"Where is the technological journey going for the European aluminium die casting industry?"

Messer: We already talked about the success story of aluminium die casting in our first Coffee Talk. You highlighted the substitution of parts from other processes and materials in aluminium casting. But compared to the other aluminium casting processes, sand and gravity casting, die casting is also growing faster. What do you think are the reasons?



Johannes Messer, Johannes Messer Consulting



Eric Müller, CTO HPDC Casting Divisions Gnutt Carlo Group

Müller: Development steps such as minimum quantity spraying, mould coatings, optimised mould steels or printed part inserts have significantly increased mould service life. Depending on the application, this development makes die casting economical in terms of lifetime costs, even for small batches.



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Heinrich: This is true, but it is often not always so well known. The main influence here, as explained by Mr Müller, is the technological development of the mould. In addition, the production times and costs of a new mould have been significantly reduced in recent years after adjusting for inflation. As a result, die casting is often the most economical solution when using just one mould for the entire requirement. In addition, the technological advancement of the simulation programmes in combination with optical measurement technology has significantly improved the quality of the initial moulds.



Siegfried Heinrich, CEO SF Tooling group GmbH



Cornel Mendler, Managing Director Die Casting Bühler AG

Mendler: We are convinced that with innovation and “new” processes, such as rheocasting, we will be able to manufacture many more components using the die casting process in the future. I am sure that the proportion of die-cast parts in future vehicles will increase massively.

Wiedenegger: Of course, the other aluminium casting processes, with their individual advantages such as greater design freedom, will continue to have their place in the future. However, it can be seen that OEMs are already trying to design new products in the direction of the most economical process during the development phase. Process expertise is also the guarantee of success here.



Dr. Armin Wiedenegger, Managing Director voestalpine Additive Manufacturing Center GmbH

Messer: You have already mentioned the topic of technological development. I once said in another round that we Europeans are world champions in development, the others in industrialisation.

Wiedenegger: I also believe that our main problem is not a lack of innovation. We often find it more difficult to industrialise innovations. As an example, I would like to mention the use of additively manufactured mould inserts. In many cases, the technological and economic advantages are obvious (service life, cycle time, quality, ...) but the customer cannot always be convinced.



Heinrich: This is not an unknown topic to me. We mould makers also have the problem that we are unable to market the benefits of technological and economic innovations in our moulds.

Müller: From discussions with all of you, I know that we see the issue in a similar way. We foundrymen are also often convinced by innovations and new technologies. However, the challenges are often higher investments and additional effort (resources) during the introduction, as well as, of course, a “residual risk of success”.

Messer: Then that's exactly where we need to start. The question is how.

Mendler: I agree with that. The challenges mentioned by Mr Müller must be solved. As the topics mentioned are highly relevant to the company and the expected results of significant innovations have a major impact on the company's results, this topic can only be addressed and decided with the involvement of top management. Projects must be jointly defined, tested on a small scale on pilot plants and then implemented in the production environment.

Messer: With the changing product portfolio and a necessary short-term focus on improving the company's results (OEE → EBITDA), I currently see the following technology and innovation topics in focus: additive manufacturing, minimum quantity spraying, alloy development and rheocasting. Do you agree with this statement?

Heinrich: As far as I can tell, these are the most important technology topics now. With the ever-increasing size of the moulds, the issue of thermal balance is of course extremely important. The technologies mentioned, additive manufacturing and minimal quantity spraying, are very important for the temperature balance of the moulds. However, the conditions in the foundry must also be created if these technologies are to be used successfully. In my opinion, an often-underestimated example of this is the preparation of corrosion-free decalcified water.

Wiedenegger: I agree. These are the key issues. The technologies are not new, but especially in relation to the current economic challenges and the individual requirements of the rapidly growing market for structural components, these are the key technology issues that we should address as a top priority.

Müller: In addition to the technologies mentioned, I am missing topics such as salt cores and gas injection with regard to our product portfolio. It remains to be said that these technologies can only be successfully realised if the end customer involves the foundry in the development stage. This is the only way to ensure successful industrialisation.



Mendler: There will certainly be colleagues who would like to mention one or two other technologies. As already mentioned, I see great opportunities in the area of rheocasting, on the one hand to optimise existing processes and on the other hand to produce new parts, such as chassis parts using the die casting process. The investments in our test laboratory have been finalised and are ready for joint trials.

Regardless of the topic, I am convinced that speed is the key factor and lever for success - let's tackle it together!

Messer: Speed and flexibility beat tradition. Asia beats Europe. Is that true, Mr Mendler?

Mendler: We will see in a few years whether Asia will beat Europe. I think that there will be a global redistribution. It is undisputed that the agility, flexibility and willingness to take risks is significantly greater in China than in Europe. The developments and investments in Asia, especially in China, over the last 20 years symbolise the situation in a very impressive way.

The transformation to electromobility was recognised as an opportunity in China many years ago. Breaking through the dominance of traditional OEMs globally is therefore being systematically realised.

Messer: I deliberately did not include artificial intelligence (AI) among the short-term success levers. How do you see this topic?

Heinrich: I hesitated briefly and did indeed want to add it. But you're probably right. In the medium term, however, I see artificial intelligence as a key lever for success in die casting.

Müller: Topics such as AI or Industry 4.0 are very quickly spoken about and discussed when the perspective is still abstract. Industrialising these technologies in the manufacturing industry, or in this case in the die-casting foundry, with so many process-influencing variables is definitely a major challenge. Nevertheless, it is the future.

Wiedenegger: We will only be able to industrialise artificial intelligence in die casting if we work together. All companies that can supply process-relevant data according to the respective task must be integrated. A lot of data already exists, but not all of it. When we think of OEE optimisation, for example, mould data (such as temperature, pressure, etc.) is particularly important and is often not available.



Heinrich: We see the challenge. The topic of the 'intelligent' die casting mould is moving into focus. The complexity and costs of the mould will increase, but the expected earnings leverage will more than compensate for this. Here too, success lies in close cooperation between the caster, machine manufacturer, mould maker and material supplier.

Mendler: AI is a big term. AI can make an important contribution in the future, particularly in the area of supporting production employees and increasing the number of "good parts".

However, the process data already mentioned must first be available and processed accordingly. In the area of the die casting machine and the peripheral devices within the die casting cell, this data is already available and could be analysed accordingly, which is unfortunately only partially used at present. Surprisingly, very little data has been collected from the mould so far. The "intelligent" die casting mould mentioned by Mr Heinrich is essential for the use and success of AI in die casting.

Messer: Let's talk about GIGA casting. Tesla will probably stick with three underbody parts for the time being and not develop in the direction of one part as originally announced. Does this mean that the explosive development of clamping forces mentioned by Mr Mendler in our last round has been stopped for the time being?

Mendler: Ultimately, the economic advantages of body-in-white production are decisive. The so-called "unboxed process" currently appears to offer maximum flexibility in vehicle assembly.

The development towards even greater clamping forces only makes sense if there are further technological and economic advantages. In other words, we can only answer this question together with our customers. Total cost of ownership is the most important key figure here. Of course, we are in dialogue with the OEMs and Tier 1s on this.

Personally, I believe that the current casting machine sizes still offer a lot of opportunities and that we should definitely utilise them.

Heinrich: Through multiple casting and rheocasting, we will expand the potential future product portfolio and make GIGA-Casting technologically and economically interesting for many other applications.



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