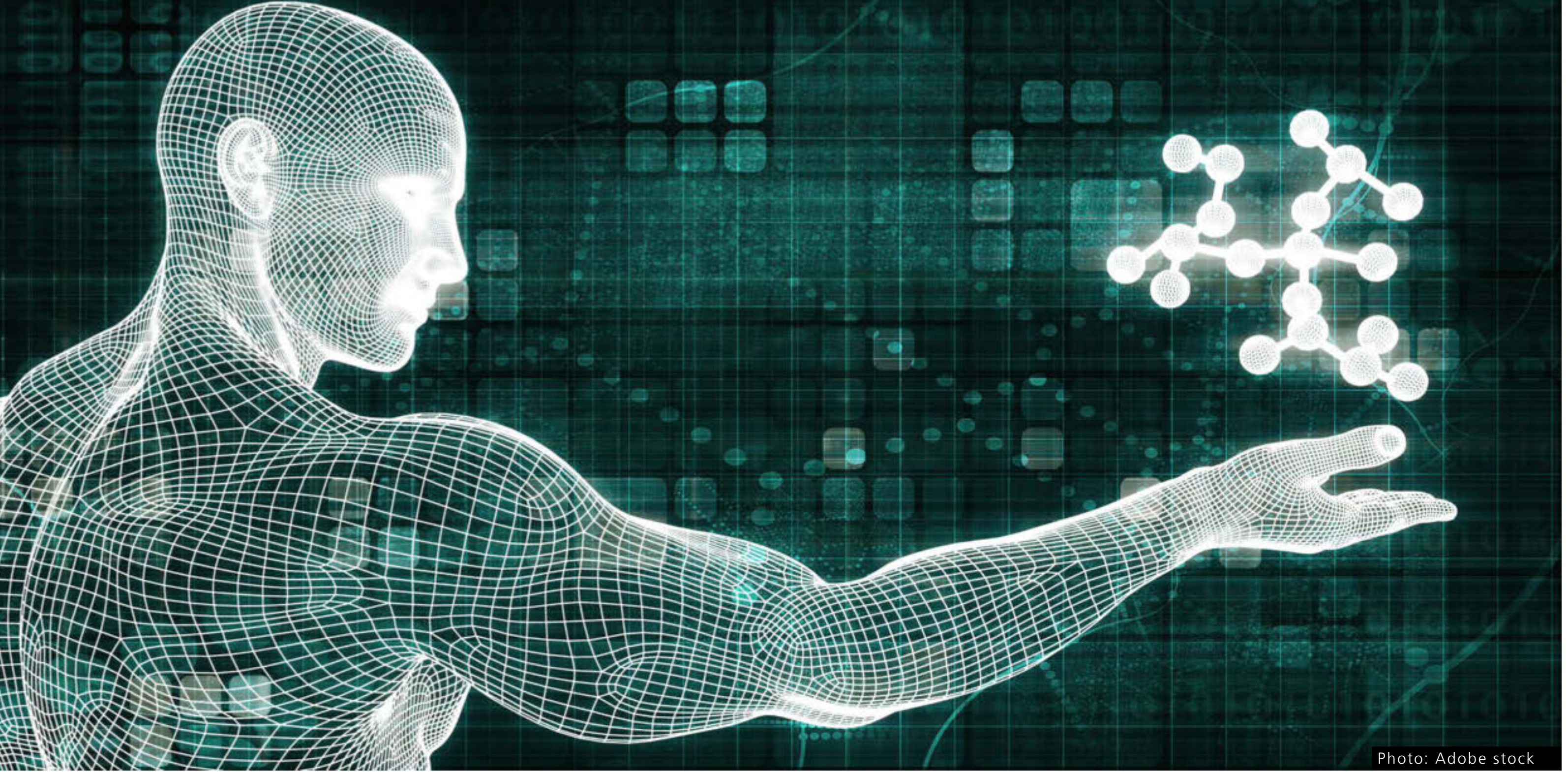
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Making machines smart

Artificial intelligence: AI models for injection moulding simulation

Artificial intelligence (AI) is also relevant in plastics processing. ARBURG is working intensively on AI, particularly with regard to the smart GESTICA control system and self-optimising machines. The aim is to make injection moulding processes more intelligent and ensure efficient, high-quality production. The today editorial team spoke to Werner Faulhaber, Vice President Development.

today: What is the motivation behind ARBURG's work in the field of artificial intelligence?

Werner Faulhaber: We are currently experiencing a shortage of skilled workers, and components and injection moulding processes are becoming increasingly complex, which requires enormous expertise. Yet our customers naturally want to produce their plastic parts as economically as they can, with minimal defects and to the highest possible quality.

today: That's a huge challenge. How can AI help here?

Werner Faulhaber: AI-based systems can learn correlations independently, build on them and predict how the process will develop. We have a vision of a self-optimising machine that knows the part it is producing.

today: Machines today process the parameters that are entered, but don't know the part they are producing, right?

Werner Faulhaber: Exactly. To make our ALLROUNDERs smart, so to speak, the main thing they need is an intelligent control system that manages the processes and also recognises the three domains of machine, material and mould.

today: What can the innovative GESTICA control system already do?

Werner Faulhaber: In 2021, together with our partner Simcon, we made mould simulation data available for ALLROUNDERs for the first time and linked the three domains. Using the GESTICA control system and associated aXwControl FillAssist, the machine now "knows" which material it is processing and which component it is producing. The next advance is the Varimos tool, which uses AI to replace time-consuming individual simulations. This enables the machine to predict the effect of a parameter variation even before a component is produced.

Werner Faulhaber, ARBURG Vice President Development, is proud of the GESTICA control system, with which an AI-supported filling simulation is already possible today.

today: So you need process expertise, domain knowledge and lots of data. What's the problem here?

Werner Faulhaber: The computing power and data analysis methodology are there, but the elaborately learned rules and algorithms only apply to just this one application. The process knowledge that has been acquired can't be transferred wholesale to a differently equipped machine, a different component geometry or a different material quality. This is where we are now.

today: What are the next steps?

Werner Faulhaber: Due to the sheer volume, creating a separate AI model for every possible injection moulding process is of course not feasible. This is why our application technology and software development engineers are working on classifying the three domains in a meaningful way and developing corresponding algorithms and models.

today: And how are models like this intelligently trained?

Werner Faulhaber: The models can be provided to the customer via GESTICA and further trained during the ongoing process, and the data can then be shared. This is what is known as machine learning. However, the data can also remain with the user and the model can be trained "on-premises", i.e. with the user's existing machines, materials and moulds.

today: Can anonymised process data also be used?

Werner Faulhaber: Yes. An MES could collect anonymised data and make it available for model analyses. With what is known as "federated learning", no process data is transferred at all, but a locally (further) trained model is made available to a central system. This generates a unified model from the models of several machines provided and restores this next generation again.

today: How is ARBURG advancing the development of AI?

Werner Faulhaber: First of all, we need to build trust! We want to create real added value in co-operation with research partners. In addition to the GESTICA control system, customers will also be able to use our ARBURG host computer system ALS and the arburgXworld customer portal in future to create a common basis for smarter, self-optimising injection moulding processes.