Future-oriented product development with artificial intelligence

For more than 20 years, invenio Virtual Technologies GmbH (invenio VT) has been following a vision: the realization of a 100% digital product development in all industries. Through the passion that drives invenio VT every day, piece by piece, a digital world is created in which hardly any physical prototypes are needed.

As the complexity of product development has been growing rapidly for years – just like the amount of data – invenio VT announces the beginning of a new era in digital product development: the first invenio product with artificial intelligence (AI) in the 3-D environment! However, the AI not only benefits customers, but also invenio VT uses it in its own projects and thus increases the quality and efficiency.

Only the combination of humans and Ki will be forward-looking for virtual product development.
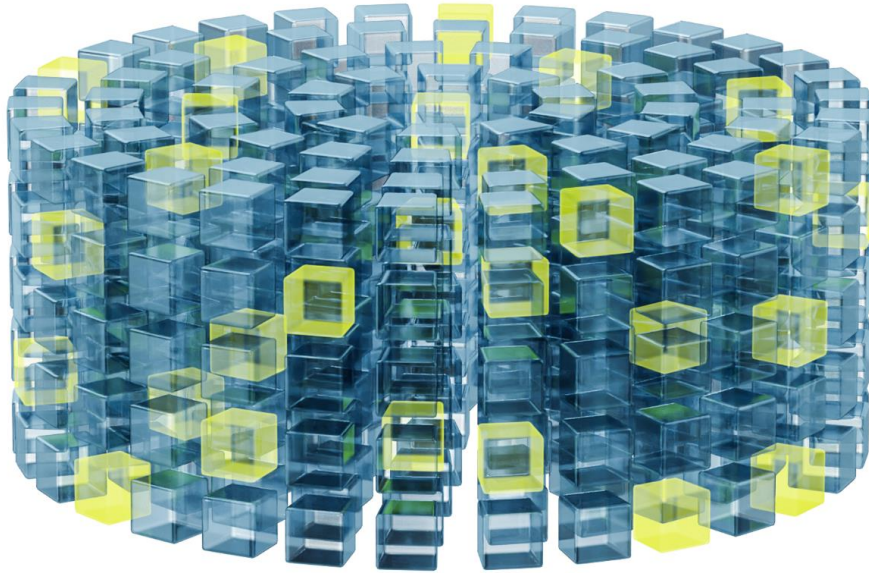
The history of invenio AI

The core business of invenio VT has been high-performance algorithms for decades. Together with its customers, invenio VT pursues one goal: to get the most out of the data with intelligent algorithms. The algorithms are used, for example, to calculate collisions and distance violations within virtual product development. Huge amounts of data can be calculated on a daily basis. Extremely fast algorithms also produce huge amounts of results and these can only be evaluated by experts. More specifically, we are talking about 55 million component pairings, which are calculated fully automatically overnight for a customer of the automotive industry. The invenio VT software already reduces the results to the point where there are only 50,000 potential problem spots left – however, these are still several thousand hours of manual analysis daily. This enormous number of results could no longer be evaluated in normal ways – the resulting costs would be disproportionate and the consequences would be possible relocations of jobs to low-cost countries. This is exactly where invenio VT has taken up the initiative and created efficiency and cost savings through the development and targeted use of AI and helped to ensure that jobs in Germany can continue to exist in the future.

2014 was the start of the research and development of the invenio AI – with some setbacks. The AI should learn from huge amounts of customer data, with the aim of making its own and reliable decisions – but unfortunately this was not the case. The analysis of the data and the situation then brought the long-awaited solution: invenio VT has found that the data lacks information, and that is exactly the knowledge that is hidden in the minds of the engineers. With ambition and passion, invenio VT research has developed its own intelligent algorithms that calculate the missing additional information and which have been added to the data as an ingredient. The huge customer data and the intelligent additional information developed by invenio VT were the key to successfully training the AI.

Now that the AI has been trained on the complete data, it was able to successfully support the user in the evaluation process – the starting point for automating manual processes piece by piece. Before the use of the AI, several manual steps were necessary, such as loading the components, zooming in on the problem area and setting a cut. With a new, intelligent representation of the results, the expert receives automatically

generated views and sees the problem area from various perspectives, including a meaningful intersection plane. As a result, the user receives automated images at the push of a button – exactly as an expert would implement. This outstanding result led to the fact that the AI technology has been used successfully at an OEM since 2019.

Huge amounts of data are enriched with the invenio additional information to make the data AI-capable.

Up to 40 percent increase in efficiency

invenio was on the right track – and now wanted to create an AI product that can be used nationwide regardless of customers and industry. At the beginning of 2020, the first generic KI was integrated into the existing invenio product 'Quality-Monitor'. The 'Quality-Monitor' has been extended in two stages with its own invenio-AI. The first generic AI level allows the user to work extremely faster and more efficiently. But that's not all, because with the second stage, invenio research has once again achieved a breakthrough: AI is now making decisions on its own – we are already talking about a 40 percent increase in efficiency! However, the user has complete control over the AI at all times – via a so-called trust level, the extent to which the AI is allowed to make independent decisions is defined in advance. If the AI decision is below the specified level of trust, the user must evaluate it himself. The AI then only makes a recommendation and supports with all the necessary information, so that the expert can capture the problem site and decide on it within seconds. Without the use of AI, this process would take up to ten minutes. The new AI product has also found a prospective customer: An OEM, which already uses the old 'Quality-Monitor', now makes its work even more efficient.

Humans and AI – hand in hand on the way to an intelligent future!

Only the combination of humans and AI will be forward-looking for virtual product development. Although invenio already has a generic AI product on the market, which is already implementing a 40 percent increase in efficiency, the company continues to invest in AI research. Currently, the invenio experts are developing a scenario in which service processes can already be examined on the development data in the future.