Computer models reduce production costs

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Credit: University of Twente

Researchers at the University of Twente are working on computer models that can make industrial production processes significantly more accurate and therefore cheaper. The models help to detect anomalies in the metal forming process at an early stage. Initial simulations with the models have produced promising results.

The use of sensors and IT in industry is increasing rapidly. Factories are

becoming 'smarter' and processes are now almost fully automated, resulting in products of consistent quality. However, such consistency is difficult to achieve in metal forming processes (transforming sheet metal into an intermediate or final product). Products are seldom identical due to a variety of process-related factors. A defect may be caused by the varying properties of the metal in question, wear and tear in the machinery or variations in the blend of lubrication used. Such defects are generally discovered relatively late in the production process, meaning some of the products will fail to meet specifications and will have to be re-machined.

Adjustments

Jos Havinga, a mechanical engineer at the University of Twente, has studied how the production process can be corrected at an earlier stage. Such an intervention can prevent the production of faulty pieces that fail to meet specs. This means that time-consuming re-machining is no longer necessary. For his research, Havinga used a punching machine to collect a large amount of data during the metal forming process. He looked at whether measurements of the forces exerted on the metal could be used to predict defects in the finished products. His research shows that there is a clear correlation between the force exerted and defects in the final product. Havinga demonstrated that the machine operator can use information from the test assembly to adjust the equipment earlier in the process, resulting in accuracy gains in the range of 10%-20%.

Significantly cheaper production

Havinga is now working in his research department on developing computer models for the metal forming process. Eventually, these models can by used by industry for more efficient and cheaper

production methods. "Once we've fine-tuned our models, we'll be able to monitor the production process very closely, which will be a huge step in the right direction," states Havinga. "This will mean less waste due to products that fail to meet specifications, along with less re-machining, which is an expensive process in and of itself. All in all, these computer models will lead to significantly cheaper production methods in the future."

Havinga studied mechanical engineering at the University of Twente. On 30 June he will defend his PhD dissertation based on his research into the optimization of metal forming processes. Havinga is a member of the Nonlinear Solid Mechanics department of the University of Twente's Faculty of Engineering Technology (CTW).

Provided by University of Twente