SVENJA FISCHER

An invisible assistant that helps machines do jigsaw puzzles in reverse

All of a sudden everything grinds to a halt. The imposing TruLaser Center 7030 fully automated laser machine from TRUMPF suddenly stops fetching and cutting new metal sheets and removing cut parts from the scrap skeleton – and the whole laser machining process comes to a complete standstill. It's a situation everyone dreads, but fortunately it can be prevented. The solution involves a combination of human expertise, intelligent programming and artificial intelligence (AI).

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>
> Dr. Mathias Kammüller, Chief Digital Officer and member of the TRUMPF Managing Board

"AI can help industry achieve major leaps in innovation and significant productivity gains," says Dr. Mathias Kammüller, Chief Digital Officer and member of the TRUMPF Managing Board. "Artificial intelligence is our key to reaching the next level of Industry 4.0."

It is hardly surprising that the fully automated laser machine sometimes takes a moment to get hold of the parts it has just cut and successfully remove them. After all, they come in a constantly changing selection of sizes and thicknesses and a bewildering array of different shapes. Tackling this situation requires top-notch jigsaw puzzle skills, but in reverse. The trick here is to constantly find new ways of removing parts from the scrap skeleton.

Product architect Christoph Blömker explains how AI is used in the L26.

The secret to success in this case is experience. To maximize their chances of choosing the right strategy for each part, TRUMPF machines rely on an invisible assistant: AI. Even before the cutting process begins, the laser machine knows which method will be most suitable for removing each part.

Of course gaining experience also means making mistakes. If the machine's 180 pins fail to push the part out of the scrap skeleton at the first attempt, it can autonomously choose to repeat its efforts however many times are necessary, jiggling and shaking the part until it comes loose. And even these efforts rely on a clearly defined strategy, with the machine running through eight different retry procedures until it finally succeeds in removing the part.

Encouraging imitation

Whenever part removal fails at the first attempt but then subsequently succeeds, this produces data – and TRUMPF uses AI to analyze this data in a centralized process. The accumulated experience gathered by all the company's fully automated laser machines worldwide gradually teaches the AI system the best ways to extract different shaped cut parts from the sheet. So when a similar part comes up in a subsequent job, the machine can tap into this shared knowledge to increase its likelihood of removing the part at the first attempt. The machines learn from each other, making it less likely that they will come to a standstill when the same problem occurs a second time.

TRUMPF product architect Christoph Blömker explains why working with AI is such a fascinating experience.

Christoph Blömker explains why he thinks working with AI is cool.

SVENJA FISCHER
TRAINEE