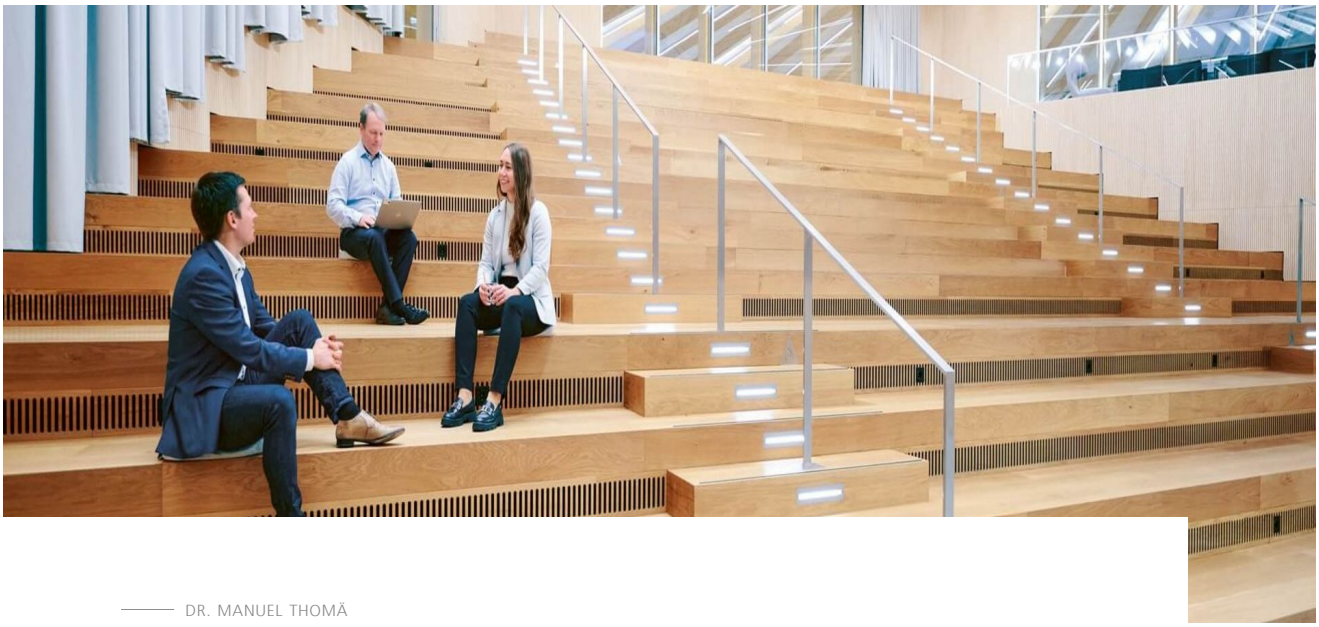

DR. MANUEL THOMÄ

Clever minds and AI: three examples of greater efficiency in manufacturing

With artificial intelligence (AI), lasers now cut and weld with unparalleled precision. Machines can sort sheet-metal parts flawlessly, and customers can optimize efficiency without the need for complex programming. That's why AI has established itself as a cornerstone of TRUMPF's business, enhancing everything from training programs to machine tools and laser technology.

Say goodbye to complex programming: The advanced VisionLine Detect image processing tool harnesses AI to pinpoint the exact spots for laser welding – a task that once required extensive programming expertise and operator experience. The process is now remarkably simple: users upload a few images to the EasyModel AI cloud application and mark weld points on the parts using a mouse. EasyModel AI then generates an AI model, which trains itself. This AI model enables VisionLine Detect to identify welding points automatically and to position the laser with unmatched speed and accuracy, streamlining operations like never before. The EasyModel AI solution is just one example of how TRUMPF is using AI to transform manufacturing processes. By integrating AI into its tools, this family-run business continues to lead the way in innovation.

Team AI: At TRUMPF, Jens Ottnad, Louisa Peters and Florian Kiefer (from left) drive the use of AI in different areas of the company.

Overcoming skepticism about AI

When Florian Kiefer from TRUMPF Laser Technology talks to customers, many express concerns about introducing AI onto their shop floors. However, these doubts often dissipate once they witness AI in action during day-to-day operations. A prime example is the EasyModel AI cloud application, which uses advanced image recognition to identify parts during laser welding. This solution stabilizes production processes and offers significant advantages, particularly in high-volume manufacturing environments like the automotive industry. In the best-case scenario, it increases the volume of parts produced while maintaining the highest data protection standards. Kiefer, who heads up Product Management Performance Solutions at TRUMPF Laser Technology, is firmly convinced this is the way forward.

Traditional image recognition systems without AI often struggle with complex geometries, very small parts and highly reflective materials. These challenges are especially pronounced in tasks like welding battery cells, delicate electronic components, and round reflective cables that require extreme precision. In such scenarios, a laser might perform thousands of welds in a matter of seconds. A single misidentification by a conventional system could have serious consequences – even a minor inaccuracy could render an entire car battery unusable, increasing waste and driving up costs. The AI model developed by EasyModel AI for VisionLine Detect is a valuable tool for meeting this challenge head on.

EasyModel AI: An intuitive and user-friendly online tool that requires no AI expertise. High-quality images of parts are all that’s needed to get started.

Efficiency gains: The best way to dispel customer skepticism is by demonstrating how much more they can produce with AI.

No AI expertise required

As a product manager, Florian Kiefer has spent the past three years leading the development of EasyModel AI. After extensive conversations with customers and in-depth market analysis, he identified the need for a simple, cloud-based solution. The result is EasyModel AI – a tool that requires no prior AI expertise. All users need are high-quality images of their parts. The process is straightforward: users start by uploading images to the application. Using an intuitive, Microsoft Paint-style tool, they then mark the welding positions with color. From there, the AI takes over, training itself on the provided data. Initially, users manually mark weld points on just a few images. Based on this input, the model begins generating its own suggestions for weld positions. Users can then review and refine these suggestions as needed. After training on just 10 to 50 images, EasyModel AI creates a reliable AI model – a process that typically takes only minutes and, at most, a few hours. Once the model is complete, users can download it and integrate it into the VisionLine Detect image processing software. This software ensures precise and consistent part recognition, enabling the laser welding system to consistently apply each weld in exactly the right place.

Jens Ottnad: With a doctorate in mechanical engineering and a background in AI development and research, Ottnad now serves as global training manager. His goal is to transform TRUMPF into a data-driven company.

Data, data – and more data

"From the moment data are generated, we need people who can identify which data are relevant for the company and for the pro duction process," says Jens Ottnad. This is one of the key reasons he took on the role of head of global training at TRUMPF: to equip young employees with these critical skills. "Quite simply, this is the biggest transformation we face – and that's why it's so important for as many people as possible to understand the basics of how AI works."

AI's central role at TRUMPF is reflected in Ottnad's own career path. With a doctorate in mechanical engineering, his work initially had no connection to training. Instead, it focused on AI development and research at the Karlsruhe Institute of Technology (KIT). Today, his mission is to transform TRUMPF into a data-driven company, recognizing that data forms the foundation of artificial intelligence. Having pursued this goal in earlier projects, Ottnad saw a natural progression in preparing the next generation by passing on his expertise to apprentices and dual-study trainees. Today, he focuses his efforts on 300 apprentices and dual-study trainees working in 15 different professions at TRUMPF's Ditzingen site, while also overseeing the ongoing training of all the company's employees.

From the moment data are generated, we need people who understand which of these data are relevant for the com pany and for the respective production process.

Jens Ottnad, head of Global Training at TRUMPF

Figuring out cutting edges

While tiny cables present a challenge in laser welding, optimizing cutting edges poses similar difficulties in laser cutting. "Our cus tomers demand the highest possible part quality, including exact and precise cut edges," explains Louisa Peters, a TruLaser product manager in TRUMPF's Machine Tool division. Peters has spent three years improving the edge quality of sheet metal parts. "It can be really challenging when you're faced with materials or sur faces that aren't optimized for laser cutting, especially if you have limited experience," she says. In such cases, operators from sheet metal processing companies often have to manually adjust cutting parameters one by one to achieve the desired result. This involves selecting the cutting process, testing it on parts, and then subjectively evaluating the edge quality. If the results aren't up to scratch, they must tweak individual parameters repeatedly – a time-consuming process that requires expertise, increases scrap rates, and consumes valuable production time. With skilled personnel in short supply, this approach is not always feasible.

Cutting Assistant: Using a simple handheld scanner, the user scans the cutting edge of the component and the AI-supported assistance system provides a suggestion for adjusting the relevant cutting parameters.

Louisa Peters: The Product Manager for TruLaser machines says customers can reap major benefits from the Cutting Assistant.

To address this issue, TRUMPF experts developed the Cutting Assistant, an innovative support system centered around a simple hand-held scanner connected to the laser cutting machine. Users scan the cut edge of a part they want to optimize, and the system processes this data using an AI-powered algorithm trained on over 100,000 images. The assistant evaluates edge quality objectively and automatically suggests adjustments to cutting parameters. This allows users to achieve better results quickly and efficiently. Moreover, the AI algorithm continuously learns from each adjustment it recommends, improving its suggestions over time.

It offers a fast solution to the customer's problem, and it doesn't require any prior knowledge.

Louisa Peters, product manager for TruLaser machines, explains TRUMPF's Cutting Assistant

Driving innovation through AI

According to Germany's Federal Statistical Office, one in five companies in Germany now uses AI technologies – a figure that continues to grow globally as part of digital transformation efforts. TRUMPF is at the forefront of this trend in Germany, driving innovation through numerous AI-powered solutions. This year marks another major milestone for TRUMPF as it establishes new structures to integrate AI developments across all departments worldwide. The newly formed AI Hub will play a pivotal role in coordinating these efforts and accelerating TRUMPF's company-wide AI strategy.

TRUMPF

DR. MANUEL THOMÄ

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