



## AI Vision Enhances Cobot Solution for Improved Accuracy and Safety:

### The Paul Mueller Company Case

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Collaborative robots, or cobots, are increasingly being used to assist in manufacturing processes and have proven especially effective for simplifying material removal activities, such as sanding, grinding and polishing. Automating these tedious and dangerous tasks alleviates human workers from debilitating work, improving safety and morale.

With new artificial intelligence capabilities and visual detection systems, cobots can be taught to adjust their actions according to what they “see.”

The positive impact of this new technology for small- and medium-sized manufacturers has been demonstrated by [Kane Robotics](#), a leading developer of collaborative robotic solutions, in its work with Paul Mueller Company, a Missouri-based stainless steel equipment manufacturer.

### A case for cobot weld grinding

Paul Mueller Co. fabricates large tanks used for chemical, beverage, oil & gas and other types of processing. After welding steel tank parts together, a technician manually grinds the weld seams with a heavy, handheld grinding tool to achieve a smooth finish. For long welds on the 12-ft to 20-ft. diameter tanks, this activity is time-consuming and grueling. Workers suffer shoulder, wrist, back and neck injuries and fatigue, causing downtime and high turnover.



In 2023, the company was seeking a more sustainable method for weld grinding. Kane Robotics offered its mobile, low-cost and versatile [GRIT™ cobot](#) that combines a robotic arm with a variety of end-of-arm tools that are preprogrammed to perform various types of material removal tasks, including metal grinding.

The integration of GRIT into Paul Mueller’s manufacturing line offered Kane an opportunity to not only demonstrate the cobot’s ability to improve efficiency and safety but also to test

and perfect Kane’s new GRIT Vision System. The proprietary AI-powered visual system incorporates cameras and machine learning software to teach the GRIT cobot to follow a weld seam or other uneven surface while grinding, sanding or polishing.

## Implementing the cobot solution

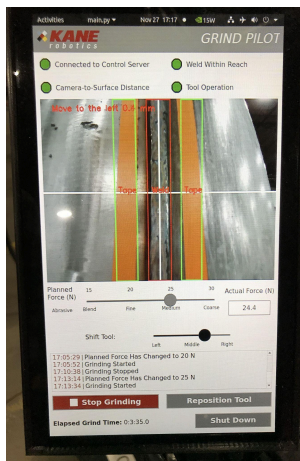
Kane Robotics engineers first introduced the [GRIT XL cobot](#) into Paul Mueller's tank fabrication processes. The mobile solution easily integrated into the assembly line, with its 110V electrical connection and flexible configuration. Kane equipped GRIT's robotic arm with an end-of-arm tool purpose-built for weld grinding and preprogrammed the cobot to apply the appropriate speed and force over the correct area and duration to grind weld seams on the tanks.

Kane engineers quickly taught human operators to configure the cobot. Since most of the programming was already done, technicians only had to learn a few simple commands on GRIT's user-friendly interface. Installation was complete in a matter of hours, with the system up and running within days.

## Enhancing the cobot solution with AI vision

GRIT had already proven to double weld-grinding efficiency in other use cases. The installation at Paul Mueller offered an additional benefit – the new GRIT Vision System could make automated weld-grinding even more accurate by tracking uneven weld seams and redirecting the GRIT's robotic arm accordingly.

The advanced vision system includes a camera attached to the cobot's arm. A human operator positions the camera, and then the AI software performs live object detection on the weld seam. The camera captures dozens of frames per second as the weld seam passes by on one of Paul Mueller's rotating tanks. The camera moves slightly left and right, following the imperfect seam, and the software automatically recalibrates the robotic arm's movement to direct the weld-grinding tool along the correct path. The intelligent system learns to "see" the varying weld seam even as it disappears, as it has been taught to differentiate between an unfinished weld and a finished weld.



As engineers capture more and more visual data for different types of weld seams, they teach the GRIT Vision System to grind seams on various-sized tank shells and parts. Over time, the cobot solution learns to detect variations in welds and improve its accuracy.

With Kane Robotics's collaborative system, the robot does 80% of the taxing and debilitating work, while humans perform the remaining 20% that requires judgment and decision-making. The cobot performs the physically demanding work of holding the grinding tool, and the vision system does the tiring job of detecting the wavering weld seam. The human operator adjusts the grinding speed, the appropriate force level

for the selected abrasive and the number of grind passes needed to achieve the right finish.

## Results

After implementing the GRIT cobot solution and GRIT Vision System, Paul Mueller reports some positive results:

- **Decreased injuries and downtime.** Technicians have reported fewer repetitive motion injuries and less downtime due to worker fatigue.
- **Greater job satisfaction.** Manufacturing teams express being more satisfied with their work since incorporating the cobot solution.

The Paul Mueller team continues to relay data to Kane as they assess the new GRIT Vision System in real time. They have suggested improvements, such as including an option in the AI interface for the operator to specify the liftoff distance before and after grinding.



While the GRIT Vision System is still in the testing and training phase at Paul Mueller, the company is pleased with its design, the AI interface's intuitive nature and the system's overall performance.

The positive performance of Kane's intelligent, AI vision-equipped cobot solution at Paul Mueller Company is one example of how smart automation for material removal is transforming manufacturing processes by reducing fatigue-related injuries, enhancing efficiency and improving working conditions.

## About Kane Robotics

Kane Robotics was founded in 2019 by industry experts determined to simplify material removal processes through automation. Its [GRIT™](#) system was the first collaborative robot (cobot) designed for sanding, grinding, and finishing, and today, manufacturers of all sizes and types employ the solutions. The turnkey, easy-to-operate [cobots](#) are configurable for specific material removal tasks and include an AI-powered computer vision system for more advanced material removal in weld grinding. For more on how Kane's compact, mobile and affordable solutions can improve productivity by 50 percent or more, visit <http://kanerobotics.com>.