

## Case Study: Track-Mounted Robots Tackle Dangerous Steel Fabrication Application

Application: Material handling  
Robot Model: Kawasaki Z series high payload robots

### OVERVIEW

Used to package everything from vegetables to lubricant to bug spray, steel cans are such a common packaging solution that few people give them much regard. But the manufacture of the thin gauge steel and tinplate used to make these cans can be dirty, dull and dangerous work – which makes it perfect for robots.

ArcelorMittal came to the same solution for a particularly inefficient and risky phase of its steel processing operation. The company transports steel sheeting through the various stages of its West Virginia plant by winding it around cylindrical metal sleeves. These sleeves help prevent damage to the innermost layers of rolled steel when the material is raised on a crane's lifting beam, or when the spool is slipped on and off mandrels during progressive processing steps. Without the sleeves, the first few inner layers of steel sheet would need to be a thicker gauge to prevent damage to the rest of the roll. But that would also make those layers unusable and produce a significant amount of wasteful steel scrap.

Maneuvering steel sleeves from a stack onto the first two mandrels in ArcelorMittal's manufacturing process was the dirty, dangerous, dull – and inefficient – job that the steel manufacturer hoped to automate. The company spoke to several robotics suppliers before deciding that only Kawasaki Robotics and Güdel offered the hardware, expertise and flexibility to provide the best solution.



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- John Weber, Kawasaki Sales Operations Leader



### CHALLENGES

- Robot had to work in tight space
- Dangerous application required human operators

Before Kawasaki and Güdel got involved, transport of sleeves onto the first set of mandrels required the coordinated efforts of an overhead crane operator and a spotter located on the ground – or, more specifically, in a narrow pit with the mandrels. “While they were moving each sleeve, the crane operator couldn't be doing anything else,” said Bob Rochelle, account manager for the US Southeast at Güdel. “And when they were ready to move another sleeve, the crane operator might have already moved on to another task. The process was neither efficient nor cost-effective.”

Nor was the process safe. Each sleeve weighs more than 500 pounds, and there is little room in the pit for a spotter to maneuver. “Anytime you had an operator in that pit, especially when a guy with a crane was trying to load something into and out of it, there was no room for error,” said John Weber, sales operations leader for Kawasaki Robotics. “If something goes wrong, you'll kill someone.”

The weight of the sleeves and the narrowness of the pit presented a challenge for robots as well. The application clearly called for a heavy-payload model. But the pit left little room to accommodate the bulk of most heavy-payload robot arms – at least not without help from Güdel's TrackMotion technology.

“There's two mandrels in the pit, and they're far enough apart that there's no way to maneuver sleeves on them without using Güdel's rail,” said Weber. “The robot has to physically move side to side to hit both mandrels with a sleeve. Without a rail traversing the pit, we would have had to have used two robots.”

## SOLUTION

- Two 300 kg payload Kawasaki robots attached to an overhead Güdel rail
- Human workers no longer have to complete dangerous steel processing task

The components comprising the solution were two Kawasaki robots, each with a payload capacity for 300 kilograms, and an 18-foot Güdel TrackMotion Overhead (TMO) rail. One robot, mounted on the floor above the pit, is tasked with pulling sleeves from a stack and handing them down to the second bot, which is suspended from a Güdel single-beam rail running lengthwise along the lip of the pit. The suspended robot employs a magnetic end-of-arm tool to securely hold each sleeve – even in the unlikely event of a power outage.



As expected, Güdel's single-beam track was instrumental in meeting several of the application's criteria. In addition to supporting the weight of a heavy-payload robot as well as each sleeve it carries, the track allows the bot to make small lateral movements, enhancing its ability to articulate and maneuver the heavy sleeves onto each mandrel. Another way that Güdel engineering made good use of the space was by enabling its TMO rail to double as a walkway along the length of the pit. "Some competitors hang the robot carriage from the topside of their overhead tracks," said Rochelle. "Because Güdel's TMO technology hangs it from the bottom, it left the top of our rail clear for foot traffic."

"Güdel did something else with its track that was a first for me," Weber said. "The rail has pins that mark its location on the floor. So ArcelorMittal can lift the entire traversing unit with the robot attached off of these pins and remove it to other parts of the plant for maintenance or just get it out of the way to maintain the steel-winding equipment. Then they can pick it back up with the overhead crane and set it down on the pins, and it goes right back into position. Since there's no need to reprogram anything, away they go."

No value can be placed on human safety, which is one key benefit that Kawasaki and Güdel helped ArcelorMittal improve through automation. But by redirecting workers out of the pit and ensuring the initial mandrel-loading step proceeded at a steady tempo, the use of a rail-mounted robot also improved efficiency for the steel manufacturer by helping to increase throughput versus manual operations.

The complex criteria of the application called for a custom solution. But until ArcelorMittal talked to the Kawasaki/Güdel team, most options it was presented were standard packages. "We got the job because we sat down with ArcelorMittal, listened to their concerns and tried to find a way to do what they wanted to do," said Weber.

### About Güdel Inc.

Güdel Inc. is the US subsidiary of Güdel Group, a global manufacturer of robotic automation products, systems and services. Güdel supplies linear-motion modules, robot track motion units, gantry robots and components to OEMs, systems integrators and machine builders serving the automotive, aerospace, logistics, heavy industrial and power-generation industries. Güdel Inc. is located in Ann Arbor, Michigan, in a dedicated 45,000-square-foot facility, providing North American customers with engineering, design, production and customer service support.



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