

## CASE STUDY

# Jarvis reimagines meat processing with Siemens-enabled robotics, doubling throughput and boosting quality

Industry-leading, next-generation meat processing robotic machines, faster times to market, replicable designs, and a giant competitive advantage.

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**SIEMENS**

For over 100 years, Connecticut-based [Jarvis Products Corporation](#) has manufactured a wide range of meat-processing equipment. The family-owned firm, now in its sixth generation, has built a solid reputation among customers worldwide around innovation, responsiveness, quality, and reliability.

# JARVIS®

- **Customer:** Jarvis Products Corporation, Middletown, Connecticut  
<https://jarvisproducts.com>
- **Challenge:** Making the perfect cut at the fastest line speed possible while setting a new standard in accuracy, hygiene, and reliability under the most demanding conditions
- **Solution:** Siemens Totally integrated Automation (TIA) controls and expertise, plus TIA Portal for software programming and remote diagnostics
- **Results:** Industry-leading, next-generation meat processing robotic machines, faster times to market, replicable designs, and a giant competitive advantage

Globally, Jarvis operates out of 25 offices that serve customers across every region of the world, from global food producers to family-run farms. Yet, despite such a far-reaching customer base, all machinery components — except motors, controls, and commoditized parts — for processing pork, beef, poultry, and sheep meats are manufactured and assembled at its state-of-the-art facilities in Middletown, CT.

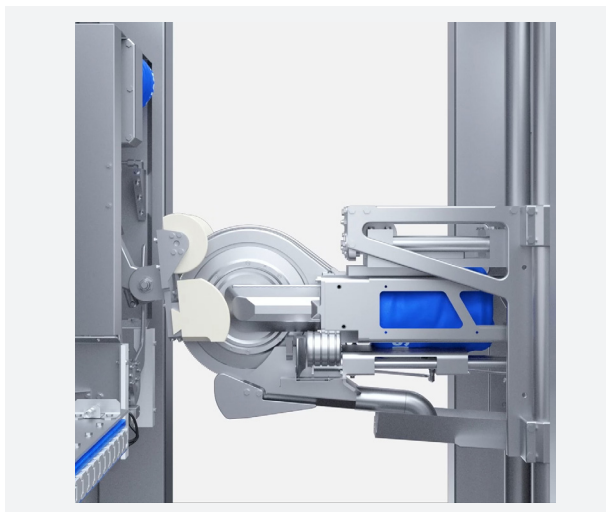
Reed Jarvis, director of Control Engineering for the Jarvis Robotics division, points to the newly released [JLR-900 linear pork splitting robot](#) as an example of what's now possible with the use of intelligent design, sophisticated engineering, and advanced technology.

"The JLR-900 is the fastest pork-splitting robot ever made, with an amazing throughput," he says, adding that a beef splitting robotic prototype is now being tested. "The JLR-900 can cleanly split up to 900 pork carcasses an hour, despite each weighing several hundred pounds and varying in size and shape. That's more than double the speed of manual operations."

## **Challenge:** Making the perfect cut at the fastest line speed possible while setting a new standard in accuracy, hygiene, and reliability under the most demanding conditions

The company has already sold more than 20 of these seven-axis machines, which are designed to be as hygienic as possible and self-cleaning using the same water that cools the saw blade. “Sales didn’t really take off until the global pandemic created a labor shortage in the world’s meat-processing industry,” Jarvis says. “Meat-packing plants struggled to find skilled, experienced technicians they need to keep up with the demand from wholesalers and supermarket chains, forcing them to reconsider investments in robotic automation.”

That’s where the JLR-900 came in. “Its throughput, precision, and hygiene are hard to beat when the best a manual operator can achieve is about 400 head per hour with much less consistent accuracy and cleanliness — with the potential for more waste,” Jarvis says. “Not only can the JLR-900 process more than twice that, but the cuts are cleaner, so less meat goes into lower-grade — and lower-margin — products.”



With the use of Siemens components and engineering expertise, the self-cleaning, seven-axis Jarvis JLR-900 linear pork-splitting robot is capable of making consistently perfect cuts through entire carcasses, handling up to 900 head per hour.

Jarvis explains that even automation can have its shortcomings. “Previous linear carcass-splitting robots used a complex, air cylinder-driven system to operate the stabilizing module, which inhibited complete alignment of the carcass before a cut,” he says. “What we’ve done is develop a new stabilizing module that runs on a z-axis servo motor and works in three stages to position the carcass against the saw with more precision than any other of its kind.”

After the carcass length is measured with a light curtain, the in-feed conveyor outside the machine matches the speed of the line to smoothly transition the carcass into the JLR-900. “Large rollers extend on a servo motor-powered arm, preventing any motion of the carcass, while carefully moving it towards the saw side of the machine, as leg spreaders hold the hocks in place and the body grabber secures the lower half of the carcass,” Jarvis says.

Designing and engineering such a complex robotic machine as the JLR-900 had many challenges, especially in programming its seven-axis kinematics. That’s why, early in the design phase, Jarvis contacted Siemens to tap into its SIMATIC Totally Integrated Automation (TIA) portfolio, use TIA Portal software for programming the machine’s many interdependent processes, and importantly, take advantage of Siemens engineering expertise, especially in motion control. For software programming assistance, Jarvis also engaged [DMC](#), a Siemens Solution Partner and motion-control specialist with multiple certifications based in Chicago with offices across the U.S.

## **Solution:** Siemens Totally Integrated Automation (TIA) controls and expertise, plus TIA Portal for software programming and remote diagnostics

According to Jarvis, Siemens offered many advantages to his family's OEM company compared to alternative suppliers. "The Siemens highly integrated portfolio of automation and control products are unmatched — its PLCs, HMIs, distributed IO, servo motors, power supplies, even push buttons — in their performance, reliability, and especially how well they work together," he says. "We were able to reduce the number of subsystems and tremendously simplify our design. Combined with the TIA Portal's common software engineering platform, our controls engineering work was also much easier and faster."

He added that the Siemens global footprint with direct service and support in most countries was another deciding factor. "Even with our successful efforts to simplify the JLR-900's systems and operation, each of these robots must work in extremely demanding conditions, so product disruptions will occur, with every hour of downtime potentially being quite costly," Jarvis says. "But the triple-play of our global offices, Siemens direct service and support just about everywhere, and remote diagnostics will minimize downtime."

### **Key innovations**

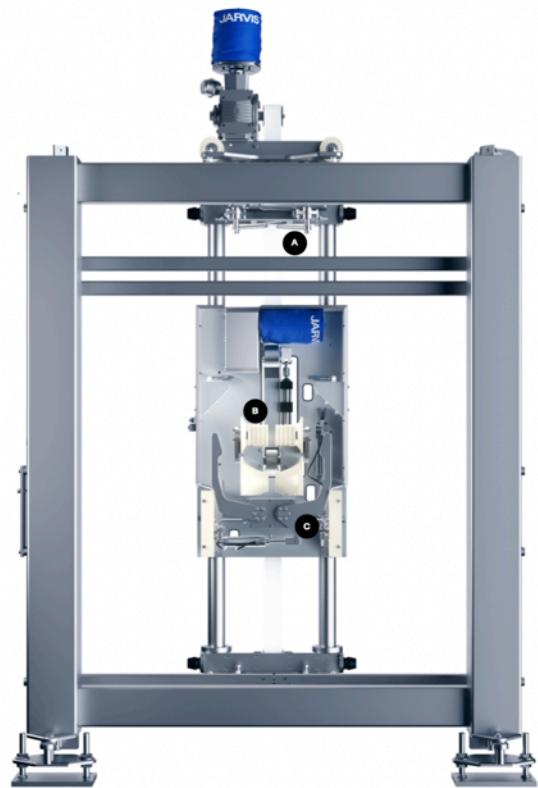
The JLR-900 has raised the bar on what a meat-processing robot can do. Here is a sampling of its performance enhancements:

- **Maximum throughput:** Up to 900 head per hour versus 300-400 head manually.
- **Maximum yield:** 85–95% versus 45-50% manually.
- **Preventative maintenance:** Quarterly versus daily (prior-generation linear robot).
- **Clean-up time:** 10 minutes by 1 person versus 4 hours by 2 people (prior-generation linear robot).
- **Water consumption:** 2.6 liters per cut versus 5.2 liters per cut (prior-generation linear robot)

Jarvis notes that in prior-generation linear robots, the cutting saw modules required testing and constant maintenance of the oil sump lubrication system, which kept the gearbox running. "So, to reduce the need for preventative maintenance from daily to once every three months, we replaced that system with a robust spiral head reduction with grease," he says.

"We also combined custom stainless-steel components with our innovative saw-head design, which eliminates pump failures and oil testing completely."

As another example of the JLR-900's innovation, Jarvis and his engineering team designed and engineered low-flow laminar wetting tubes above the saw transmission module. "These tubes coat the module in a protective liquid barrier while jets rinse the stabilizing module and blade after every cutting cycle as bone dust and debris are funneled away from the carcass," he says. "Stainless steel pipes recycle the motor cooling water that keeps the system running without failure into jets on either side of the assembly. This closed-loop sanitizing system uses about half the amount of water as earlier machines, saving our customers resources and lowering our customers' total cost of ownership."



Three principal moving parts of the JLR-900 linear pork splitter: (A) leg spreaders to position the carcass for a precise cut; (B) stabilizing plastic rollers to align and totally control carcass movement; and (C) the body grabber that gently closes around the lower half of the carcass to further ensure a precise cut.

Key Siemens components used in the JLR-900 robot include:

- **SIMATIC S7-1500 TF programmable logic controller (Soft PLC)**, designed to provide both operational and motion control as well as safety integrated, so customers don't need to buy and maintain a separate safety system. Safety integrated is an especially critical feature in keeping operators safe around a 900-head-per-hour carcass-splitter.
- **SIMATIC ET 200SP**, a highly scalable and flexible IO system that communicates with the PLC and other components via PROFINET.
- **SIMATIC WinCC Advanced RT**, the latest visualization system from Siemens, which provides the JLR-900's supervisory control and data acquisition (SCADA) and human-machine interface (HMI) systems.
- **SIMATIC HMI IFP PRO**, a 15-inch, color touchscreen with IP67 protection. In the JLR-900, it's mounted in a NEMA 4X-rated 304 stainless steel electrical enclosure and features a completely redesigned interface with operator, engineer, and maintenance specific screens programmed for seamless setup and operation. It provides an intuitive control center with everything users need in one place and, because the S7-1500 TF PLC has an onboard web server, remote operation and diagnostics are possible via any web-enabled device. In all use cases, run-time statistics like cycle rate, cycle times, saw speed, and chain speed — plus machine diagnostics including active alarms and alarms log — are easily accessible.
- **SINAMICS S-1FT7 servomotors and SINAMICS S120 servo drives**, an ideal pairing of technologies to control the JLR-900's robotics motion and speed, including carcass positioning and cutting saw blade. The S-1FT7 servomotors are ultra-compact, permanent magnet synchronous motors with IP67 protection. Its digital DRIVE-CLiQ interface with electronic rating plate provides an optimum connection to SINAMICS S120 drives, which provide high-performance, coordinated motion control for the JLR-900's multi-axis operations.
- **SIMATIC TIA Portal**, the drag-and-drop, common software engineering framework that was used to program all of these components. It can also be used to perform software diagnostics remotely, a big advantage for Jarvis and its customers around the world to maximize availability and minimize downtime in case of disruptions.

## **Results:** Industry-leading, next-generation meat processing robotic machines, faster times to market, replicable designs, and a giant competitive advantage

From an OEM standpoint, Jarvis sees Siemens not just as a supplier but also a strategic partner in their global business.

A big part of the relationship involves how Siemens interacts with the Jarvis company resonates with how the Jarvis company interacts with its customers. "Sure, the Siemens TIA portfolio and TIA Portal are exceptional in so many ways but having the expertise and responsive support of Siemens made a big difference in getting our JLR-900 linear pork splitting robot designed, engineered, built, and tested, saving us months in getting it to market," Jarvis says. "Plus, the Siemens sales engineer assigned to us was the best — smart, creative, collaborative, and always available. He really became part of our team. If we ever needed to escalate any issues, he knew who to call."

In fact, much of the JLR-900's design, engineering, and programming have been used in the beef splitter prototype that's now being tested. "Of course, beef carcasses weigh much more, which takes their handling to a whole other level, but we were able to adapt the pork splitter's design and engineering and save weeks, if not months, in bringing this new product to market, too," Jarvis says.

Now, with the JLR-900 available worldwide, Jarvis says his company enjoys a competitive advantage in the meat-processing equipment industry. He also finds that the strategic partnership with Siemens helps drive the JLR-900's sales.



*When we tell our customers and prospects that we use Siemens technology, they are even more inclined to buy because they know they can trust the performance and reliability of Siemens components and that parts, support, and service is just a phone call away."*

**Reed Jarvis**  
Director of Control Engineering for  
the Jarvis Robotics division

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