

TM-Robot:

A Story of Quanta's Effort To
Transform Internal Automation
Into A World-Class,
Commercially-Available
Collaborative Robot (Cobot)

Background

Quanta Storage, a subsidiary of Quanta Computer, is one of the major suppliers of storage products to leading computer manufacturers like Apple, Dell and other famous brands around the world and is the parent company to Techman Robot or TM Robot. Relentlessly focused on innovation, Quanta revolutionized its own manufacturing processes and continually seeks to improve quality, efficiency and control throughout its shop floor.

To gain the maximum competitive advantage, Quanta explores cutting-edge machine automation solutions and -- even before it became industry-accepted -- embraced Industry 4.0 & IoT concepts like cloud-connected robots to streamline its own production

lines. Its automation systems were so effective, in fact, that they felt the market could benefit from some of their innovations. Quanta Storage formed TM Robot, which then became a new line of business within the organization. TM Robot was able to build on Quanta's experience and foundation of outstanding engineering capabilities to create a breakthrough in collaborative robots – or cobot - technology. They launched TM Robot to answer the call from their customers in the Computers, Communications, and Consumer Electronics (“3C”) industries who were demanding solutions to streamline their production and who see the [TM-Robot as the game-changing answer in the effort to create a Smart Factory](#).

Challenges and Requirements

TM Robot needed a disruptive breakthrough for its cobot solution in order to quickly catch and then to leapfrog the competition, and it had a plan.

When TM Robot formed, most cobot companies focused on safety and cobot “training” functions, which reduce the need for a programming pendant. But cobots still required integration with other hardware and software like vision systems and sensors to ensure that tasks completed successfully.

TM Robot felt it could gain competitive separation by offering a cobot that was [smarter, simpler, and safer](#). Further, TM Robot knew that pre-integrating cloud-connectivity, open standards (like EtherCAT) and machine vision directly to the robot arm would create game-changing advantages:

Smarter. Equipping the robot arm with a camera could give a unique perspective to perform enhanced pattern recognition and then patterns could be triggers to perform tasks most efficiently. Without vision, cobots are blind and can only move to fixed positions.

Simpler. TM Robot sought to replace the traditional robot programming pendant with the smartphone or tablet and wanted to include the camera images and pattern recognition in the flow control. In other words, the project could be completed by shop floor workers that didn't have programming experience.

Safer. Without force limiting features, robots are dangerous for workers and require a safety cage. Cobots detect resistance and immediately stop if a human interfered. EtherCAT was vital because the addressing safety didn't require a second fieldbus.

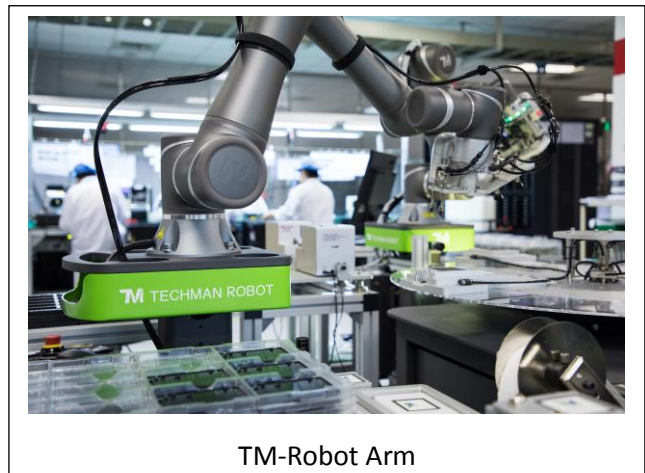


Solution

To address its requirements, TM Robot built a breakthrough machine automation platform geared towards advancing production facilities from automated (the outcome of the 3rd Industrial Revolution) to become fully-functional smart factories, which is the fulfilment of the 4th Industrial Revolution, also known as Industry 4.0.

The organization began by investigating digital fieldbuses. As stated above, EtherCAT immediately stood out as the best option because it had the strongest ecosystem of drives and IOs. In the research process, TM Robot discovered the KINGSTAR Machine Automation Software Platform, which provided the benefit of EtherCAT, the required RTOS with RTX64 and requisite scalability and quality. Because KINGSTAR uses the Windows Visual Studio development environment, a familiar interface, they knew they could be immediately productive and get to market much faster.

Importantly, because the KINGSTAR platform is open and “plug and play,” TM Robot could develop its own components for motion, vision, and EtherCAT Master. But because KINGSTAR also offers pre-integrated components, they also gained the ability to quickly add third party components as a fall back if necessary. This flexibility and confidence played a large role in their final solution selection.



Results

By using KINGSTAR to build its new robotics product line, TM Robot exceeded all of their time and budget go-to-market goals. The organization delivered breakthrough innovations, especially around safety and vision integrations, while not only catching up to the competition, but outperforming them. Due to the Windows RTOS and KINGSTAR architecture, the TM Robot is cloud-enabled and ready, and will easily integrate into the shop floor or automation. It has become a real success and example of an Industry 4.0 Smart Edge Device.

With KINGSTAR, TM Robot changed the landscape for productivity. As just one example, the cobot cut the time required to get a robot operational from hours to just five minutes.

Not only did TM Robot produce a cutting-edge product on time and on budget, but also was able to significantly reduce costs by using KINGSTAR. With soft motion and soft vision, TM-Robot saved over \$3K per robot when compared to the traditional hardware approach.

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