Major manufacturing steps include soldering processes, assembly processes, potting processes to seal the ERT® modules, and final testing before products are released to the supply chain.

PC-based control upgrades assembly cells for production of gas and water meters

Streamlined assembly production with complete traceability

Itron is a globally operating technology and services company that develops solutions for the resourceful use of energy and water. To meet the high demand for its metering products, the company has upgraded many of the assembly cells in its Waseca, Minnesota plant to PC- and EtherCAT-based control technology. The lean and highly integrated control system architecture makes the factory more productive, reduces hardware costs, and simplifies the data handling for product tracking and tracing.

To keep up with the growing market demand for these meters, also known as ERT® (encoder receiver transmitter) modules, Itron had to continuously increase its production volume by adding new production cells to the plant. "The existing control platform that consisted of a PLC for machine control and a separate PC for the HMI proved to be an obstacle to production expansions, and simply adding new machines of the same design was not a permanent solution," says Adam Moyer, principal controls engineer at Itron. "This is why we decided to upgrade assembly cells to PC-based control."

Complete production history, from the factory to the field

Major production steps at the Itron factory include soldering processes, assembly processes and potting processes to seal the ERT products (including curing after the potting material is dispensed). The company puts great emphasis on the quality of its products in each stage of the manufacturing process. Accordingly, each production step is tracked, from the individual components and their assembly to the shipping and installation of the finished product. For every component that goes into Itron products, a wide range of parameters are logged, such as the lot code, the manufacturing date, the component manufacturer's name, the installation date, as well as all settings and configurations of the machine on which the module was manufactured. More production data is generated by the extensive tests which Itron performs for each product. These include visual inspections as well as RF tests, programming tests on ERT microprocessors and more. Each of these steps, which are either fully or semi-automated, is controlled via the PC- and EtherCAT-based control system from Beckhoff. "Our quality assurance system tracks the complete history of

To meet the rising demand for gas and water metering devices, Itron has upgraded the assembly cells in its Waseca, Minnesota plant to PC- and EtherCAT-based control systems.

each product down to the smallest component and section of code," says Adam Moyer. The serial numbers for all ERTs are stored on a Microsoft SQL server along with every production step and quality test.

"This comprehensive product traceability was a major factor in the decision to switch to PC- and EtherCAT-based control technology," says the control technology expert. "PC-based control helped us establish connectivity between the automation system and remote databases while managing the incredible volumes of data to implement complete traceability."

Scalable control platform enables custom-tailored solutions

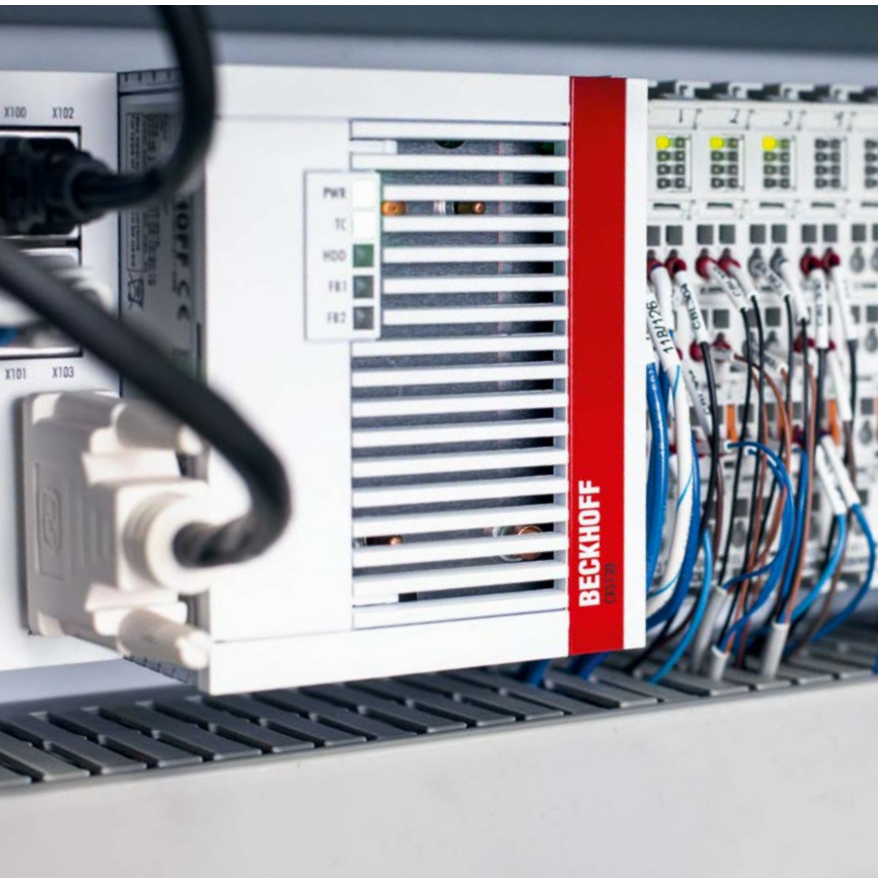
Itron employs a compact CX5130 Embedded PC as its control platform for new assembly cells. Equipped with a dual-core Intel® Atom™ processor, it can handle PLC, motion control and HMI all on one device. The Embedded PC runs TwinCAT automation software as well as LabVIEW for the assembly cell HMI. "By running the HMI software on the Embedded PC, we significantly reduced the control cabinet space requirements in the assembly cells," explains Adam Moyer. Some of the soldering and assembly steps utilize 4-axis articulated robots from Stäubli, which are also networked via EtherCAT and controlled by Embedded PCs and TwinCAT software from Beckhoff.

The benefits of this integrated control solution extend beyond cost savings in terms of hardware. They also require less engineering time, because Itron no longer has to write and manage code revisions in two separate systems. This also eliminated the need to develop complex mechanisms that enable communication among hardware components from different manufacturers.

Everything under control

Itron's assembly cells interface with the SQL database so production data can be transmitted easily from the factory floor. The Embedded PCs send a variety of data and parameters to the database, which authorized Itron production managers and operations managers from all over the world can access via their mobile devices or laptops to check the status of each assembly line. The connectivity from the Beckhoff controller to the database is central to capitalizing on the data. The setup enables Itron to have everything under control, from complete track-and-trace of manufactured product down to the component and exact time of each manufacturing step, to yield data, to real time data for product quality.

All communication protocols in the Waseca plant were converted to EtherCAT. As a result, EtherCAT is used as the network for vision systems, solenoid banks



Itron uses the compact CX5130 Embedded PC from Beckhoff as its control platform.

In order to maintain world-class ERT® product quality, Itron emphasizes comprehensive traceability.

and even articulated robots. EtherCAT has increased data transmission speeds while reducing cycle times. Starting up the assembly cells with TwinCAT automation software is much faster now. It recognizes all connected EtherCAT devices automatically, regardless of vendor.

Itron uses TwinCAT not only for assembly cell control and database connectivity, but also for safety-related applications. The programmable safety functions that are integrated into the standard automation system using TwinSAFE technology from Beckhoff are another key benefit for Itron's assembly processes. "After switching to TwinSAFE, we no longer had to handshake between the controller and the safety system," says Adam Moyer. "This saved a considerable amount of cabinet space while further reducing costs and programming efforts." Specifically, Itron uses TwinSAFE technology to integrate light curtains as well as safety for robotics and other motion control functions, such as pneumatics.

Increased productivity along with space and cost savings

Besides providing more reliable SQL database connections and other enterprise-wide services, Itron has improved its data acquisition and storage operations on the basis of the PC-based control platform. "Assuming the data volume is the same, our overall process cycle time is now 15 to 20 percent faster with the Beckhoff solution," points out Adam Moyer. Itron was also able to drastically reduce the time spent on software development and machine integration and the space taken up by the control components has been reduced by an impressive 25 percent.

Further information:
www.itron.com
www.beckhoffautomation.com