The Future of Medical Manufacturing

New technology trends in medical devices

Matthew Jaster, Director, Editorial Content

Humanoids and cobots are rapidly serving the needs of the warehouse, logistics, material handling and packaging sectors allowing skilled workers to turn their attention to more pressing matters on the shop floor. According to MasterControl (matercontrol.com) digital transformation is revolutionizing life sciences manufacturing, driving key trends in the pharmaceutical and medical device industries.

As consumer demand for personalized therapies and greater control over health choices grows, manufacturers are embracing paperless manufacturing and advanced manufacturing execution systems to enhance agility and compliance. These digital solutions, often cloud-based and AI-supported, enable companies to streamline operations, accelerate innovation, and bring life-changing products to market faster.

Kuka Robotics Introduces Two Advanced Medical Innovations

Kuka Robotics recently announced two advanced medical innovations designed to reduce work-related injury for healthcare workers and cut time-to-market for medical device OEMs.

Sonographers and ultrasound technicians commonly experience musculoskeletal disorders such as tendonitis and rotator cuff injury due to the repetitive nature of their work that requires them to apply pressure with abnormal arm and shoulder positioning. Using robot technology such as Kuka's LBR iisy cobot, however, can take the strain off technicians by precisely conducting these repetitive exams autonomously. Equipped with a Haply Inverse3 Hapatic Feedback Teleop Device and an OptoForce FT Sensor, the LBR iisy robotic arm can be controlled and manipulated to apply the proper amount of force to the imaging head for a proper reading.

The FT sensor accurately measures the forces applied by the six-axis LBR iisy cobot to the ultrasound probe

and relays a scaled down force reading to the haptic feedback device. As a result, the ultrasound tech receives a sense of touch input while avoiding unnatural pressure and strain on their arm, hands and shoulders.

Kuka's Robot Development Kit, a collaborative effort between Kuka, Northern Digital, Inc. (NDI) and custom medical device cart manufacturer MPE. The development kit allows OEMs to streamline development of unique medical device solutions, one being a robot-assisted brain tumor biopsy demo cell using a Kuka LBR MED cobot. Equipped with NDI optical cameras and trackers, the Kuka LBR MED assists in the deployment of the biopsy needle while making any necessary adjustments via dynamic tracking for safe, precise operation.

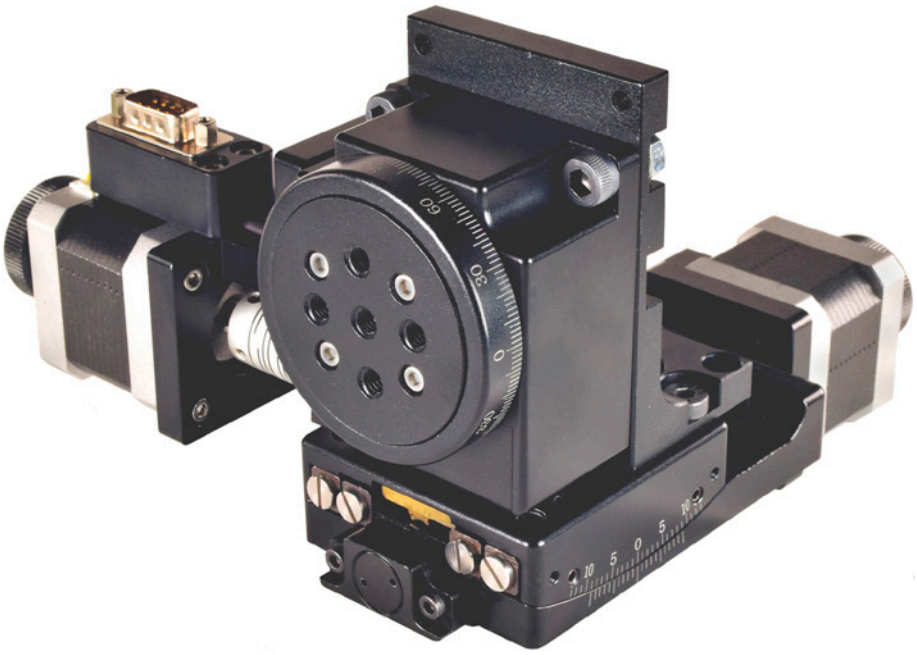
Based on the sensitive Kuka LBR iiwa robot, the LBR MED is HRC-compliant with redundant integrated torque sensors, giving it robust haptic capabilities, the ability to perceive external influences and safe collision detection. The seven-axis lightweight robot is flexible and easily integrated into a variety of medical solutions and activities.

kuka.com

Medical Motors and Encoders

Optimal Engineering Systems (OES) has introduced the AK110-10-60V Series of Dual-axis Goniometer and Rotary Stages. This series of motorized, dual-axis goniometers and vertically mounted rotary stages can measure angles, identify crystals, position an object for inspection, and point a camera or laser. The lower goniometer stage features ±10 degrees of rotation, and the upper vertical rotary stage features a 60 mm table with 360 degrees of continuous rotation in clockwise and counterclockwise directions.

The resolution for the goniometer (lower) stage of the AK110-10-60V dual-axis stage is 0.0007 degrees, repeatability is ± 0.01 degrees, and accuracy is 0.05 degrees, and the resolution for the rotary stage is 0.002 degrees, repeatability is ± 0.01 degrees, and accuracy is 0.05 degrees with a 10 steps-per-step microstepping motor driver. They are ideal for: Examining cutting edges of medical instruments, measure of radiation patterns of LEDs, estimating hyperspectral bidirectional reflectance and gloss measurements, directing lasers, aligning mirrors, and manufacturing quartz oscillator plates using quartz cutting X-rays.



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Electromate adds the Netzer Precision VLP-13 to its catalog—a miniature, absolute rotary encoder engineered for space-constrained motion systems where size, precision, and reliability are essential.

As demand grows for smaller, lighter, and more precise motion control systems across robotics, aerospace, medical, and automation sectors, the VLP-13 fills a critical gap. Its ultra-compact design and high-resolution absolute feedback enable engineers to embed reliable position sensing where previously only larger encoders could fit. The contactless capacitive technology ensures durability and long-term stability, ideal for mission-critical or long-service-life applications. The features and benefits include:

- **Ultra-compact footprint:** Outer diameter 13.5 mm, height 10.9 mm, total weight only 2g (including 250 mm cable).
- **High-resolution absolute feedback:** Up to 19-bit resolution (single-turn), providing fine positional granularity.
- **Contactless capacitive sensing:** Eliminates wear-prone mechanical components, immune to magnetic interference, shock, and vibration—offering long-term reliability.
- **Standard digital interfaces:** Supports SSI and BiSS-C outputs over differential RS-422 communication.
- **Robust environmental performance:** Rated for industrial conditions (shock, vibration, EMC), suitable for demanding applications in robotics, aerospace, and automation.

The compact size and robust design of the VLP-13 make it suitable for miniature motors and small-form-factor servo systems, articulated robotic joints where space and weight are constrained, precision motion control in automation equipment and small industrial machinery, aerospace or harsh-environment systems requiring high reliability and immunity to EMI, aerospace actuators, UAV servos and space-constrained mechanisms, medical equipment and surgical robots and high-precision automation in tight-factor devices.

electromate.com

The Evolution of Laboratory Automation

Laboratory automation integrates automated technologies to streamline and enhance lab processes, significantly improving efficiency, reproducibility, and throughput; this automation is also transforming how research is conducted and how quickly patients receive care. Portescap offers several components in medical devices used in lab automation:

- **Point-of-Care Devices:** Located in clinics or urgent care centers, these devices perform rapid tests near the patient, enabling quicker diagnosis and treatment. This rapid turnaround enables healthcare providers to make immediate decisions about treatment, improving patient outcomes.
- **Stand-Alone Automation:** These systems automate a single process or a group of processes within one machine, such as sample preparation or fluid transfer. They're typically used in mid-sized labs where full automation may not be feasible, but efficiency is needed.
- **Total Lab Automation (TLA):** TLA systems use software and robotics to automate the entire sample evaluation workflow, from intake to results. These systems are commonly found in large testing labs and research institutions where high throughput, traceability, and data integrity are critical. They reduce manual handling, improve consistency, and allow labs to operate 24/7 with minimal human intervention.

Implementing automation in laboratories offers a wide range of benefits:

- **Increased productivity:** Automation handles repetitive and time-consuming tasks, freeing lab personnel to focus on higher-value activities like data interpretation, troubleshooting, and innovation.
- **Improved data quality:** Human error is a major source of variability in lab results. Automated systems ensure consistent sample handling, analysis, and timing—leading

to more reliable and reproducible data.

- **Reduced costs:** Automation reduces reagent waste, minimizes the need for repeat tests, and optimizes labor costs. It also extends the operational hours of the lab without requiring additional staff.
- **Enhanced safety:** Automation reduces the need for human interaction with hazardous chemicals, infectious samples, or repetitive manual tasks that can lead to injury. This creates a safer working environment and helps labs comply with occupational health and safety regulations.
- **Faster turnaround times:** Automated systems can process samples continuously and in parallel, significantly reducing the time from sample receipt to result delivery. This speed is critical in clinical settings where timely diagnosis can directly impact patient care and outcomes.

Motion control is the backbone of lab automation, enabling precise, reliable, and efficient operation of automated systems, understanding the different motion technologies is key to optimizing performance.

With the increasing demand for higher throughput, BLDC motors stand out due to their high-speed capabilities and precise speed control. These motors facilitate rapid sample movement throughout the process. The slotless design offers low inertia, enabling quick acceleration and stopping, which is crucial for efficient sample transfer. Portescap's 16ECP motors, available in various lengths and coil options, provide an ideal solution for such applications.

Minimizing the overall footprint of workstations is vital in lab environments. Coreless DC motors are practical due to their high-power density, allowing for compact and efficient designs. Various diameter options enable the customization of each workstation axis to perform tasks within the smallest possible space. Portescap's 16DCT and 22DCT series offer multiple coil options and mechanical customizations, making them versatile choices for different lab automation needs.

Precise positioning is critical as samples move through automated processes. Stepper motors excel in this area, providing the necessary accuracy and control. Their mechanical construction and ease of control make them suitable for both horizontal and vertical movements. Portescap's 26M can stack and 20DAM linear stepper motors offer robust rotary and linear solutions to meet high accuracy demands.

portescap.com

Digital Health

OTO Fertility, a digital health platform developed by OTO Coach, is redefining reproductive care with patented biometric and AI-powered technology designed to bring clarity, precision, and confidence to fertility treatment. At the Consumer Electronic Show (CES) 2026 in Las Vegas, OTO has debuted Cira, its newest wrist-worn fertility biosensor, marking a major advancement in how patients and clinics understand and support reproductive readiness.

Built to support every path to parenthood, from natural conception to IVF and IUI, the OTO Fertility solution combines real-time physiological data with precise guidance that help patients and fertility care teams make better-informed decisions at the moments that matter most.

OTO's technology is rooted in more than 40 years of bioscience and space medicine, originally developed by NASA for astronauts and later refined for elite human performance. With the launch of Cira, this level of physiological precision is now delivered through a comfortable, wristband paired with OTO's FDA-approved app. Together, they monitor more than fifty biometric markers in just minutes, including heart rate variability, nervous system regulation, and stress response, translating complex biology into a clear, actionable OTO Fertility Index.

This index identifies when the body is in an optimized "Fertility Zone," offering insight that goes beyond traditional fertility measures such as age, BMI, or AMH. For the first time, women can clearly see when their body is truly ready to conceive, restoring autonomy, confidence, and control in a process that has historically been defined by uncertainty.

"Until now, fertility care has existed without visibility into the most fundamental factor: how the body is responding to and recovering from stress in real time," said Caleb Evans, founder and CEO of OTO. "With Cira and the OTO Fertility platform app, patients gain clarity and agency, while clinicians gain a critical new layer of physiological context to guide care. We don't replace existing fertility protocols, we make them smarter, safer, and proactive."

Globally, one in six women experiences infertility, and despite decades of innovation, fertility treatment success rates have plateaued. In fertility care, time is the one resource that cannot be replaced. Every cycle, every intervention, and every decision carries emotional, physical, and financial weight. OTO Fertility is the first platform built to help reduce avoidable loss, poorly timed interventions, and the risk of proceeding without understanding whether the body is truly prepared, bringing a new standard of care to reproductive medicine.

otofertility.com

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