



The Future of Medical Device Manufacturing Automation: 3 Trends to Anticipate and Prepare for in 2026

By Raghu Vadlamudi
Chief Research and Technology Director

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1. Molding and machining

Advanced technologies optimize molding and machining

Molding and machining are two of the cornerstones of medical device manufacturing, especially for high-volume Class I and Class II products. From syringe components and catheter hubs to surgical instrument components and orthopedic screws, these two manufacturing methods have been relied on for decades to produce repeatable medical devices and components.

As technology evolves, manufacturers can leverage integrated sensors, digital twins, AI-driven simulations and data analytics to refine products faster and more efficiently.

These technologies also allow manufacturers to produce increasingly smaller molded and machined parts with extraordinary precision and consistency. Not long ago, producing a component as thin as a human hair or as small as a grain of salt was groundbreaking – these are enormous compared to the microgeometries that are achievable today.

Machining is also undergoing its own digital transformation. AI-driven tools, embedded metrology and real-time compensation

capabilities make it possible to measure parts as they're being produced and automatically adjust the process. This enables tighter tolerances, greater accuracy and faster turnaround – all while freeing skilled staff to focus on higher-value work instead of manual corrections.

Molding and machining remain distinct yet complementary core competencies. Digital advances – like a digital twin simulating both molding and machining processes to optimize workflow – are enabling their convergence and driving medical device manufacturing forward.

A critical caveat: It can be easy to get swept up in new technologies, but manufacturers must first master the fundamentals. You can't skip ahead – advanced technologies are integrated into the basics to transform the variability. These technologies are digitizing prototyping and converting data into process intelligence, enabling optimization and correction without human intervention.

This shift isn't about replacing fundamentals or humans – it's about elevating them and setting the stage for the next era of medical device manufacturing. Those who don't evolve with technology risk being left behind.

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2. Microfabrication

Microfabrication moves rapidly from exception to standard

It seems like only days ago microfabrication was considered a niche competency. Only a limited number of medical device manufacturers dared to invest in the expensive, still-maturing set of processes. And they reserved it primarily for the most innovative micro- and nano-scale device components and features.

Fast forward. Soon, thanks to rapidly advancing technology, microfabrication will become a strategic differentiator for manufacturers. Those who have it – and can demonstrably use it to produce feature designs for medical devices with precision, consistency and scalability – will set themselves apart from the rest.

How do we know? Because the demand for miniaturized, high-functionality components – like microfluidic platforms and bioresorbable or implantable drug delivery systems – keeps growing.

This growth is driving advancements in the technologies that make microfabrication possible, including additive manufacturing, micromachining and micro injection molding.

Indeed, manufacturers are now moving from micro- to nano-scale precision, producing components with features measured in microns and tolerances in the sub-micron range.

Even that won't be enough to stay ahead. When parts are smaller than a third of the thickness of a human hair, manufacturers will need to integrate metrology, closed-loop controls and fully autonomous feedback systems that measure and correct parts in real time.

In other words, microfabrication will no longer be just about having the right tools – it'll be about embedding intelligence and precision into every step of production. This also requires the expertise and judgment of skilled engineers and operators.

Put simply, it's time to begin building your microfabrication capability if you want to catch up with early adopters, scale for the future and stake your claim in the next era of medical device innovation.

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3. AI-assisted and virtual reality training

AI-assisted and virtual reality training helping humans keep pace with technology

As factories get smarter with advanced technologies, sensors and AI capabilities, they still need people to run them. Already, we're seeing AI-assisted and virtual reality training on university campuses and at medical device manufacturing facilities – and more organizations will follow suit.

One clear advantage of this approach over traditional methods is it can be tailored to the individual. A single instructor or team won't have to find a common denominator, unnecessarily pushing or holding back some trainees. Instead, the training programs can the skill level and progress of each person, providing a personalized learning experience.

Another clear advantage is manufacturers

investing – whether in-house or through external partners – in this approach can save valuable resources. Employees can learn new product manufacturing techniques without taking up time with in-house equipment or personnel needed for production. Similarly, design engineers and toolmakers can use simulations to develop prototypes and address product flaws in a virtual environment, rather than consuming materials or adding wear and tear to physical machines.

Personally, I never thought I'd see this exciting progress in my lifetime. As more organizations adopt AI-assisted and virtual reality training, they will help ensure human capability keeps pace with technology.

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About the author

Raghu Vadlamudi is our Chief Research and Technology Director. He has more than 25 years of experience in the medical device manufacturing industry managing process development groups, directing and coordinating process validation activities utilizing knowledge-based manufacturing practices. Raghu is an ASQ certified Medical Device Auditor, Certified Metal Cutting Professional, Certified Medical Device Compliance Professional, and a Certified Process Validation Professional.

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