BCG

Weekly Brief

September 09, 2025

The Rise of the Smart Robot—and the New Age of Industrial Operations

I have spent a good part of my 28 years with BCG in health care. For more than two decades, I've been fascinated by the rapid evolution and impact of surgical robotics. Across many industries—especially in automotive and electronics—industrial robots have become foundational to automation but constrained by technical feasibility or financial viability.

Physical AI is now powering the next age of robotics. At this time, it is possible to mechanize tasks that were once too variable or costly, as explored in a paper just published by BCG and the World Economic Forum—in collaboration with dozens of leading private-sector and academic robotics experts.

Traditional robots handle repetitive, predictable tasks. With physical AI, robots can see, think, and act—enabling a new level of autonomy and adaptability. These new robots are powered by the convergence of vision systems, AI models, and advanced hardware. They are closing the gap between the digital and physical worlds. Increasingly, robots are trained in virtual environments before reaching the factory floor—making them faster to roll out and more affordable, too.

The change is already visible in warehouses and factories. Amazon runs the world's largest robotics fleet, achieving deliveries 25% faster. Foxconn, the largest global electronics maker, is using AI-

powered robots and digital twins to handle precise tasks such as tightening screws—once considered too tricky for machines to handle—cutting costs by 15%.

Robots used to be confined largely to high-volume, low-variation environments. Today they are operating in high-variation, low-volume settings. Robots can pick specific items from a bin of random objects, check their quality, and move them safely around a factory floor. Robotics are now relevant not just in highly automated industries but also in less automated industries such as food and beverages or textiles.

Beyond the Technology: Implications for Leaders

Identifying use cases for robots isn't enough. A new technology AI stack must be integrated into the existing manufacturing toolchain. Success requires collaboration among manufacturers, suppliers, and researchers. Cloud providers, simulation platforms, training environments, and hardware vendors must be part of ecosystems. New entrants ranging from AI-first startups to tech giants are joining traditional players in this transformation.

The human side matters just as much. Physical AI is transforming jobs. Operators are becoming robot supervisors. Logistics staff are turning into fleet coordinators. Engineers are moving from managing rigid systems to adaptive ones. Strategic workforce planning is essential. Companies need a structured approach that identifies future roles, maps required capabilities, assesses skills gaps, and develops training programs.

Done right, workforce planning enables highly automated operations. Amazon, for example, has created 30% more skilled roles in robotics-enabled sites, while Foxconn has retrained engineers in digital twin and AI-based automation. These kinds of transitions show that leaders need a clear view of which roles will evolve, which new ones will emerge, and how to prepare people for both.

Physical AI has the potential to usher in a new era of major productivity gains, cost reductions, and decreasing labor shortages. To realize that potential, companies need to build the right

technology infrastructure and supporting change agenda.

Until next time,

Christoph Schweizer
Chief Executive Officer

Further Insights

Physical AI: Powering the New Age of Industrial Operations

New tech breakthroughs are redefining automation. Tasks once too complex or costly can now be done both practically and profitably.

DRIVE THE NEXT SHIFT

The Future of Physical Intelligence

By combining robotics and AI, companies can transform automation and manufacturing.

WATCH AUTOMATION EVOLVE

Can AI Deliver Fully Automated Factories?

As technology advances, the shift toward fully automated, lights-out factories will hinge on economic factors, with agile manufacturers poised to lead the way.

STEP INTO THE FUTURE