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A compendium of next-generation design, simulation and manufacturing solutions.

A GLIMPSE OF IMTS 2024

Photos courtesy of IMTS



A GLIMPSE OF IMTS 2024

Photos courtesy of IMTS



Editor's Note

Sharon Spielman,
Technical Editor,
Machine Design



The International Manufacturing Technology Show (IMTS) offered more than 89,000 visitors from 110 countries the opportunity to see a range of technologies across 10 different manufacturing sectors. This biennial gathering, produced by the Association for Manufacturing Technology (AMT), ran from Sept. 9-14, 2024, with 1,700 exhibitors in 1.2 million square-feet of space that spanned four halls at Chicago's McCormick Place.

Machine Design was able to attend the show for three of its six days, where we gleaned content for this eBook—a compendium of the articles and videos that were featured on our website during and after the show.

Were you able to attend IMTS? Plan to attend in 2026? We'd love to hear your thoughts.

Email me at sspielman@endeavorb2b.com.

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Courtesy IMTS

CHAPTER 1: A Glimpse of IMTS 2024

SHARON SPIELMAN, Technical Editor, *Machine Design*

The International Manufacturing Technology Show (IMTS) highlighted innovations in manufacturing technology with trends in automation, sustainability and digital transformation, while drawing record attendance and fostering networking opportunities.

As one of the largest manufacturing trade shows, the International Manufacturing Technology Show (IMTS) 2024 displayed the latest innovations and technologies that are shaping the future of the industry.

New product introductions, automation solutions and advanced technologies were among the plethora of exhibits (more than 1,600) at the event. “IMTS 2024 has more of everything,” said Peter Eelman, chief experience officer at the Association for Manufacturing Technology (AMT), the producer of the show.

He wasn’t wrong, and while it would be impossible to include everything that was relevant to *Machine Design’s* audience, we did put together some insights from the show, which readers can find on our dedicated [IMTS 2024 hub](#).

This biennial event will convene again at Chicago’s McCormick Place, Sept. 14-19, 2026.

Mitsubishi Electric Automation, ANCA Celebrate 50 Years

Sometimes, trade shows intersect with company milestones, and that was the case for Mitsubishi Electric Automation Inc. and ANCA CNC Machines this year.

Mitsubishi Electric Automation Inc. celebrated its 50-year anniversary of support to the machine tool industry through service and repair in North America at its gold-themed booth. Visitors got to participate in giveaways, view a demo of machine tending solutions, and preview the M800V/M80V Series CNC controller, with additional functions to the M800/M80 Series, which was released in 2014. These include high-definition 3D machining simulation to minimize trial cutting and a streamlined operator interface.

In addition to their presence in the South Hall, they were also at the Student Summit with their Diamondworks workforce development program and in the conference area with Mechatronics Product Marketing Manager Patrick Varley’s presentation “How Their First

Robot Purchase Enabled a 70-year-Old Company with 11 Facilities on 3 Continents to Profitably Expand their Domestic Manufacturing.”

ANCA CNC Machines also celebrated 50 years in the industry as well as 35 years of operations in the United States, celebrating those twin milestones by exhibiting the first ANCA machine ever bought in the U.S.: a refurbished TG4. Contrasted with the company's latest solutions, this was a striking visual display of the firm's journey in the tool and cutter grinding industry.

ANCA celebrated with partners, customers and industry at a gala dinner event during IMTS. The show also provided the stage to announce awards, including this year's Female Machinist honoree, Stephanie Chrystal from Sandvik Coromant USA. Chrystal was recognized for her exceptional problem solving, leadership in expanding and training her team, and ability to deliver outstanding results under pressure.

Innovation Awareness: Cognizant Joins MxD

Also in conjunction with the timing of IMTS, MxD announced that Cognizant joined as a member, aiming to drive innovation in digital manufacturing solutions. Cognizant will establish a collaboration space on MxD's 22,000-square-foot future factory floor, with methods for improving production operations at scale. Cognizant's Manufacturing Innovation Center opening at MxD took place on Sept. 9, 2024.



Cognizant's Manufacturing Innovation Center opening at MxD took place after the show on Sept. 9, 2024. Courtesy Cognizant

The facility will have cutting-edge technology demonstrations, workforce training and a focus on cybersecurity, which is essential for modern manufacturing. “I am delighted to welcome Cognizant to MxD,” said Berardino Baratta CEO of MxD. “This partnership will accelerate innovation and bring significant value to the industry.”

Cognizant is known for its expertise in modernizing technology and processes. The new Manufacturing Innovation Center will highlight how manufacturers can achieve differentiated results and foster collaboration. Demos will include an innovation lab and operations command centers.

“We are thrilled to introduce our manufacturing Innovation Center at MxD,” said Nishanth Vallabh, vice president of manufacturing at Cognizant. “Our center leverages MxD’s ecosystem to help clients unlock value through technology, data and AI.”

With more than 300 members, MxD remains committed to empowering U.S. manufacturing through technology innovation and workforce development.



At the Emerging Technology Center (ETC), visitors were able to experience technologies aimed at addressing today’s most pressing manufacturing issues, including automation, additive manufacturing, reshoring, the surge in aerospace and defense investment, and raising productivity per worker. Courtesy IMTS

Big Tech, Sustainability

Two noticeable trends at this year's show were the presence of major tech companies and a strong emphasis on sustainability initiatives.

While there was no shortage of state-of-the-art machining equipment at this year's event, between the robots, cobots and tooling were the tech companies—including big names such as Google, Microsoft and AWS—for smart manufacturing and the latest in artificial intelligence (AI) and machine learning as well as predictive and prescriptive maintenance.

These industry leaders, along with a host of other companies presented on the Main Stage, where representatives shared insights that reflect the latest trends and innovations in manufacturing.

As the manufacturing sector faces increasing pressure to decrease its environmental impact, many exhibitors presented solutions designed to create more efficient processes and reduce waste. Technologies that emphasize eco-friendly practices not only support regulatory compliance but cater to a growing market demand for sustainable products and practices.

Inspiring STEM Students, Future Engineers

The Smartforce Student Summit put the latest in manufacturing technology from the highest profile industry exhibit partners on display to provide educators and students with




At this year's International Manufacturing Technology Show (IMTS), the Smartforce Student Summit attracted more than 14,000 students who seemed eager to explore the latest advancements in manufacturing technology. Courtesy IMTS

fun and engaging learning experiences centered around the industry's vision of the "manufacturing technology classroom of the future."

According to [U.S. Bureau of Labor Statistics](#), STEM occupations are projected to grow 10.4% compared with 3.6% for non-STEM occupations. As an increasing number of the nation's youth consider manufacturing careers, the Smartforce Student Summit was designed to inspire students who are seeking an education in STEM that leads to a career path in manufacturing.

As we look forward to IMTS 2026, it is clear that the advancements made today will shape the trajectory of the manufacturing sector and drive it toward greater efficiency, reduced environmental impact and more collaboration across disciplines.

[Check out more coverage from Machine Design's IMTS 2024 content hub.](#)

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Courtesy Kays Engineering

CHAPTER 2:

On the Floor at IMTS 2024: Live Machining and Automation Demos

REHANA BEGG, Editor-in-Chief, *Machine Design*

There was no shortage of advanced manufacturing solution demonstrations at IMTS 2024.

A guide to a handful of the high-production, high-precision machining and workholding solutions booths at IMTS 2024.

Taking place at McCormick Place in Chicago, Sept. 9–14, 2024, the International Manufacturing Technology Show was abuzz with manufacturers and suppliers from around the globe, as the industry gathered to showcase their latest technology advancements.

This sampling highlights live demonstrations from exhibitors in the machining, advanced manufacturing and automation space.

Find the complete [lineup of exhibitors and product categories here](#).

1. Horizontal Multi- and Single-Spindle CNC Machining Centers

SW North America displayed a select grouping of its multi-spindle horizontal CNC machining centers and automation solutions. The [BA 322i](#) is intended as an independent plug-and-play manufacturing cell and is used for machining medical instruments such as forceps and bone plate benders. The supplier noted that the twin-spindle horizontal machining center produces twice the output while using less floor space and less energy. The [BA W02-22](#), a multi-spindle machining center, produces high-quality parts, due to its linear drive technology and patented monoblock design.

In a live machining demonstration, an industry agnostic workpiece is produced, using 5-axis machining with a fine finish. The BA 322i uses a 6-axis robot integrated within the

CHAPTER 2: ON THE FLOOR AT IMTS 2024: LIVE MACHINING AND AUTOMATION DEMOS

machine to load the raw stock for OP10 and the 7-axis overhead gantry robot transfers the part to the BA W02-22 for OP20.

2. Vertical Machining Center

Displayed with an integrated robotic bin picking cell, the fourth-generation version of [DN Solutions](#)' global vertical machining center incorporates performance enhancements to increase machining productivity. For example, significantly faster X, Y and Z-axis rapid traverse rates of 42, 42 and 36 m/min. (1,654, 1,654 and 1,417 IPM), respectively, are an increase from 36, 36 and 30 m/min. (1,417, 1,417 and 1,181 IPM) from the previous-generation machine. The ACC/DEC rates have been increased to 0.7, 0.6 and 0.5 g in X, Y and Z. This is a substantial improvement from the previous generation's 0.47, 0.41 and 0.43 g.

The maximum cutting feed rate has been increased from 15 m/min. to 36 m/min. (590 IPM to 1,417 IPM) in the new DNM 4th Generation machines. Chip-to-chip times have also been improved, from 4.4 sec. to 4.1 sec. with the ATC shutter, and from 3.7 sec. to 3.4 sec. without the ATC shutter.

The lineup comes with many standard features including BIG-PLUS spindles, FANUC controls with upgraded EZ WORK software and grease lubrication for the axis roller guideways, noted DN Solutions, which caters to automotive, aerospace, medical services, energy, IT and construction.



The BA322i CNC machine from SW North America is designed to function as an independent manufacturing cell. This twin-spindle horizontal machining center stores enough workpieces for an entire shift. Courtesy SW North America

3. Precision-Engineered Single Tube Barfeeder

Lexair, associated with high-pressure compressors and stainless-steel valves for the United States Navy, also manufactures hydraulic and pneumatic valves used in demanding fluid power applications. The Lexair booth featured four core products: the [Mini-Rhinobar bar feeder](#), [Gen 3 Collet Closers](#), the [Unload Pro unloader](#) and a [Breuning IRCO PROFimat](#) magazine barfeeder.

The Hydrodynamic Mini Rhinobar is a precision-engineered single tube barfeeder that is suitable for either fixed or moving headstock lathes. It is designed for small-diameter applications. Lexair noted it minimizes material waste with only one bar remnant from a 12-foot piece of material and allows quick changeovers between bar sizes. Available in 6- or 12-ft models the feeder feeds 0.06-in. material and ensures maximum spindle RPM with zero bar damage due to its hydrodynamic bar support.



The DNM 5700 is the next generation of DN Solutions' global vertical machining centers that is purposefully designed with customer feedback and improvements in mind. Courtesy DN Solutions

CHAPTER 2: ON THE FLOOR AT IMTS 2024: LIVE MACHINING AND AUTOMATION DEMOS



With its unique framework, the Lexair Hydrodynamic Mini Rhinobar is touted as a clean and low-cost alternative to its competitors. The company's hydrodynamic barfeeds are designed for use with Swiss-style CNC screw machines and fixed head-stock lathes. Courtesy Lexair Inc.



The DeHoff 20144 is a custom-designed for fusion reactors. It performs gundrilling, pull boring, roller burnishing and thread tapping on aluminum microwave guides. Courtesy Kays Engineering

4. American-made Gundrilling Machines for Nuclear Fusion and Aerospace

Kays Engineering set up gundrilling machines from its three brands: DeHoff, Eldorado and TechniDrill. The DeHoff 20144 is a custom-designed gundrilling machine used to make components for the world's largest nuclear fusion reactor, the ITER Tokamak. The Eldorado M75-30 gundrilling machine features a new design for its counter-rotation fixturing assembly, which improves the accuracy of the gundrilling process, and an upgrade on the gear motor assembly promises more power and durability.


The TechniDrill 2.00-30-48 gundrilling machine, which is used to manufacture airplane aileron actuation cylinders, features an actuation cylinder that starts as a solid bar. The gundrilling machine drills the large primary hole in a single pass, without the need for a pilot hole. Secondary processes are then utilized to finish the cylinder.

5. Multifunctional Turning-Boring-Milling Center

WFL showcased live machining at the M50 MILLTURN with 4,500-mm center distance. The company notes that its advantages are in the wide range of tools that can be used in powerful drives, "in the rigid connection of prismatic tools on the B-axis, in good ergonomics at the operator station and in various tools and cycles implemented on the control panel to increase productivity and process reliability."

Customization options are available through many technology modules. The corresponding WFL cycles on the control support the customer in generating a productive workflow. Special attention has been paid to ergonomics, including user-friendly front access to the standard tool magazine and the large viewing windows.

[Check out more coverage from Machine Design's IMTS 2024 content hub.](#)

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A GLIMPSE OF
**IMTS
2024**



All photos in this chapter courtesy Sharon Spielman

CHAPTER 3:

Discovering the Future of Manufacturing at the International Manufacturing Technology Show

SHARON SPIELMAN, Technical Editor, *Machine Design*

From rapid additive manufacturing to advanced fault detection, IMTS, the “largest manufacturing show in the Western Hemisphere,” offered a glimpse into what is shaping the manufacturing landscape.

After three days at my first International Manufacturing Technology Show (IMTS), I was inspired by the multitude of innovative advancements in manufacturing technology showcased throughout the event. Although I wasn't be able to return for the remaining three days, I was grateful for the incredible insights gained during my visit. The variety of exhibits and the solutions presented by so many companies highlight the exciting future of this industry.

Let's look at a smattering of the companies leading the way in the manufacturing industry. Among them, SPEE3D displayed cutting-edge additive manufacturing techniques, particularly focused on materials designed for defense applications—including nickel aluminum bronze and copper nickel—to bolster the U.S. Navy's capabilities. Its unique rocket nozzle technology allows for rapid production of complex parts, a game-changer in the maritime industrial sector.

Also in the materials realm, 6K Additive got attention for its metal powders that are specifically engineered for additive manufacturing.

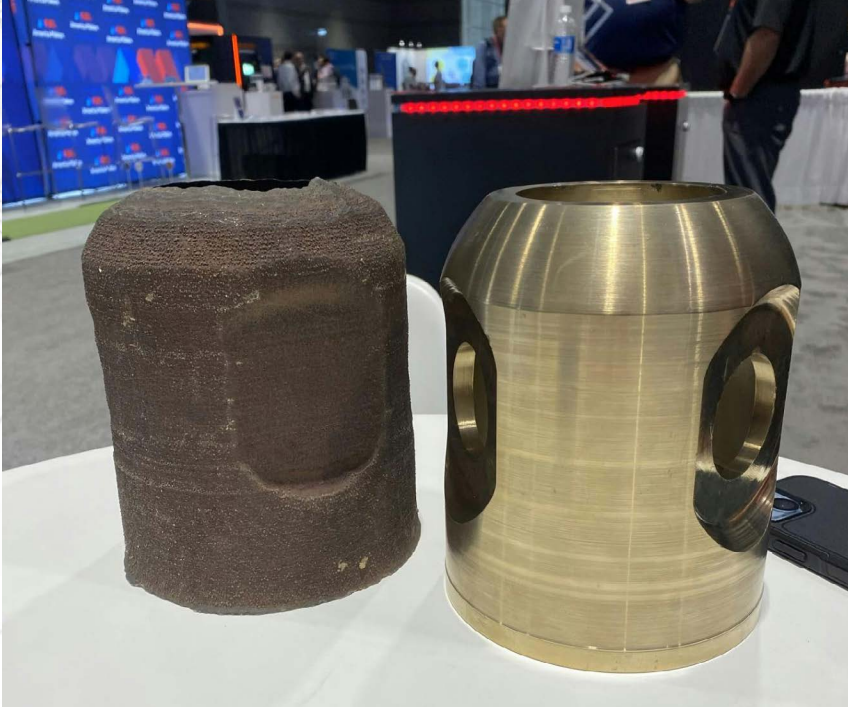
TDK SensEI presented an impressive fault simulator leveraging its advanced sensor technology, which utilizes integrated AI to monitor machine conditions in real-time, providing continuous operational oversight akin to having a service technician on hand 24/7.

CHAPTER 3: DISCOVERING THE FUTURE OF MANUFACTURING AT THE INTERNATIONAL MANUFACTURING TECHNOLOGY SHOW

Meanwhile, Zimmermann showcased its smallest machine, the FZU 22, adept at processing various materials essential for aerospace and automotive sectors.

Following suit, FormAlloy announced the launch of its Application Development Center and its novel DED Smart Path technology, tailored for directed energy deposition. This module aims to be the future of part repair and manufacturing, offering significant efficiency gains and quality control enhancements.

Here is a more in-depth look at each.



Materials for Maritime Additive Manufacturing

This year, [SPEE3D](#) has focused on developing materials like nickel aluminum bronze and copper nickel for the U.S. Navy, aimed at enhancing the maritime industrial base. Using a rocket nozzle to heat air enables the firing of material particles at high velocities to create parts quickly—up to a pound in a few hours compared to days using traditional methods. Key features of their manufacturing process include:

- **Materials:** They work with several materials, including nickel aluminum bronze and copper nickel, and their system is open-source, allowing experimentation with different alloys.
- **Rapid production:** Parts can be printed significantly faster than with other metal technologies, such as laser or wire arc methods.
- **Application:** The printed components, like a variable pitch propeller housing, can be used in submarines and other marine vehicles, noting that nickel aluminum bronze is advantageous in corrosive saltwater environments.

Once printed, parts undergo heat treatment to minimize voids and are then traditionally machined to achieve final specifications. Mark Menninger told *Machine Design* that SPEE3D is also developing a new platform, the Titan Speed, in 2025, enabling the production of much larger parts (up to 4,000 lb), moving from their current range of 90 lb. They also have created an expeditionary manufacturing unit to deploy technology in field operations, where printers can be set up on-site to produce and machine parts as needed. Overall, SPEE3D aims to support both military and commercial sectors with their advanced manufacturing capabilities while fostering innovation through their open-source system.

Metal and Angular Metal Powders

Bruce Bradshaw and Brian Morrison from [6K Additive](#) said visitors to their booth



talked about the demand for education about these materials, particularly their high-performance alloys like nickel-based super alloys and titanium alloys, which are used in applications ranging from medical implants to aerospace components.

The company introduced its angular metal powders, designed for thermal spray, cold spray and metal injection molding, which differ from its usual spherical powders but maintain high purity levels.

The said 6K's unique "unit melt process" allows them to utilize flexible, sustainable raw material sources, such as scrap and machining chips. This process creates spherical powder particles via injection into a high-temperature microwave-generated plasma stream.

Fun fact: Bradshaw said the name "6K Additive" refers to the plasma's temperature of 6,000 degrees Kelvin, which is also the temperature of the sun's surface, "adding a marketing twist."

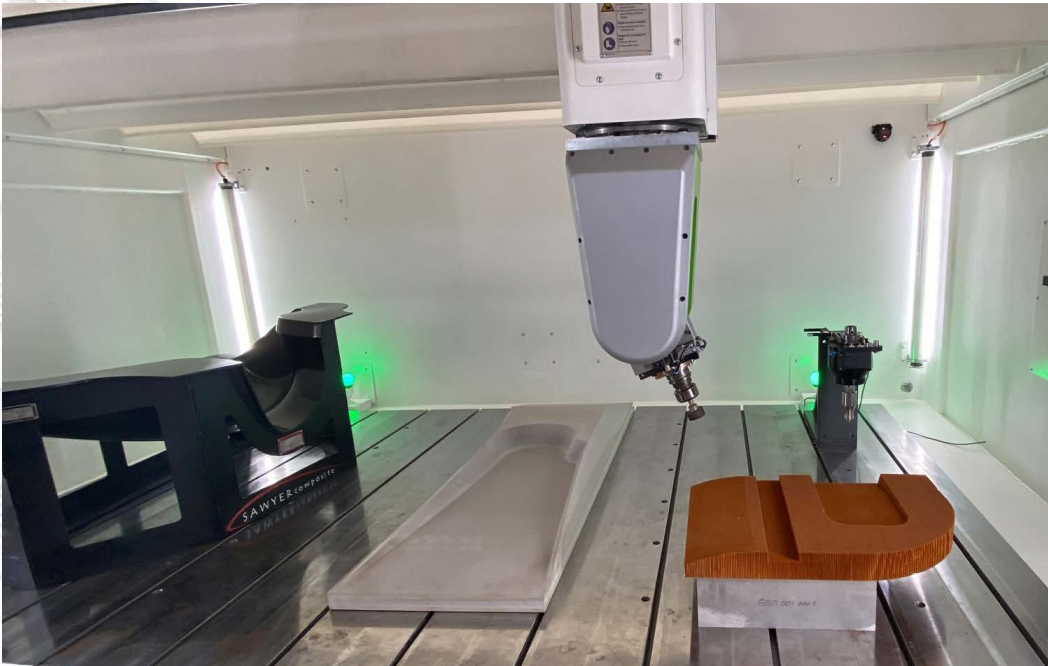
Integrated Fault Simulator

The fault simulator showcased how TDK sensors, specifically its device with an integrated accelerometer, gyroscope and artificial intelligence (AI), can monitor machine conditions and detect faults during operation. The AI processes sensor data in real-time on-site, eliminating the need for cloud data transmission. When the machine is powered on, the AI initially confirms normal operation. Users can simulate various faults, such as vibrations from the motor, gearbox or chains, allowing the AI to identify and classify issues accurately, even from a distance. Sang Lee, [TDK SensEI's](#) chief commercial officer, told *Machine Design* this continuous monitoring mimics the presence of a service technician, providing 24/7 oversight of the machine's condition.



Modular Machine

The new [Zimmermann FZU 22](#) machine can handle materials like Nomex honeycomb—commonly used in aerospace—and is suitable for ultrasonic cutting of both honeycomb and foam. Additionally, it can process RAM port model board material for creating molds, particularly in automotive applications. The machine can also produce molds for composite parts, enabling trimming and finishing of these components.



Development Center Opens and More

Melanie Lang, co-founder and CEO of [FormAlloy](#), made two significant announcements at IMTS: the opening of the company's new Application Development Center and the introduction of a new technology module called DED Smart Path.

The company specializes in metal additive manufacturing, particularly directed energy deposition, which allows for creating and repairing parts. The Application Development Center, which opened at the end of July, is designed to help customers test and validate this technology for various applications. It offers R&D, prototyping and low-rate production services while also providing educational opportunities and intern programs. Lang reported that Rep. Sara Jacobs (D-Calif.) attended the event and praised the center's positive community impact, highlighting its importance for defense customers like NAVAIR, which reported significant cost savings through more efficient repair solutions.

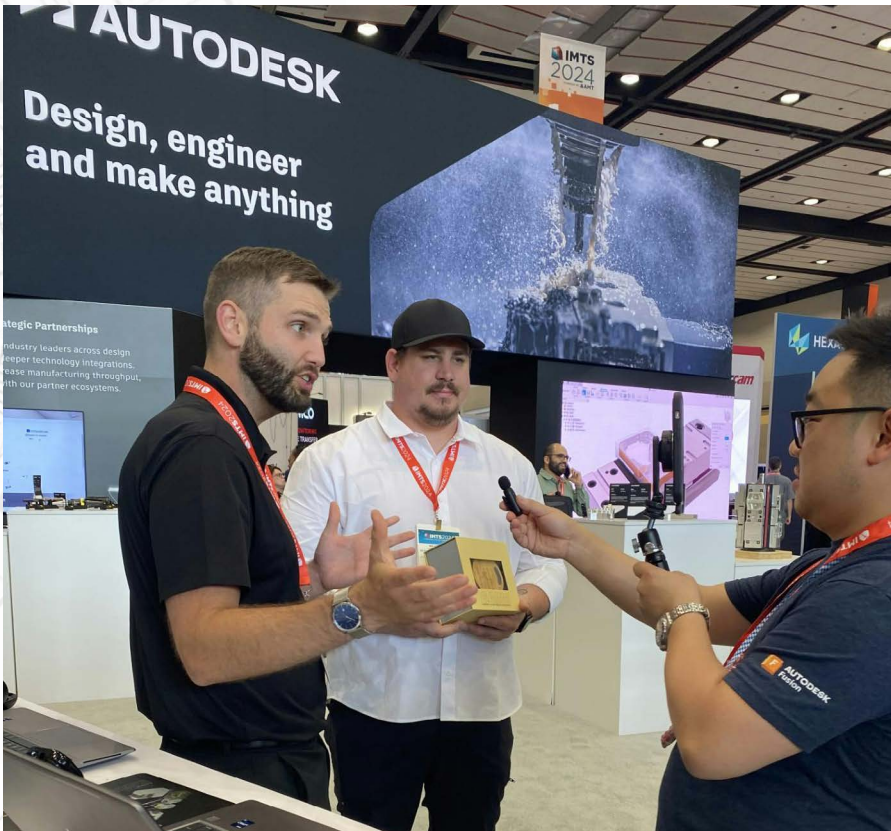
Lang also talked about the importance of data collection during manufacturing to ensure quality and speed up



the transition to end-use applications.

The second announcement featured DED Smart Path technology, which allows users to scan existing parts or substrates to automatically generate tool paths, eliminating the need for traditional CAD models and manual slicing processes. She said this technology is especially beneficial for applications like turbine blade repair, where each blade may have unique wear characteristics. There are two integration options for this module: It can operate as a separate unit outside the machine or be fully integrated into existing machines,

allowing for greater workflow flexibility. This technology serves multiple industries, including defense, aerospace and consumer goods.



Kevin Strom (@dev.mfg on Instagram) accepts his engraved Bluetooth speaker from Autodesk, a reminder that he took back to California for winning the company's deburring contest in the booth at IMTS 2024.

A Personal Connection Amidst Industry Innovation

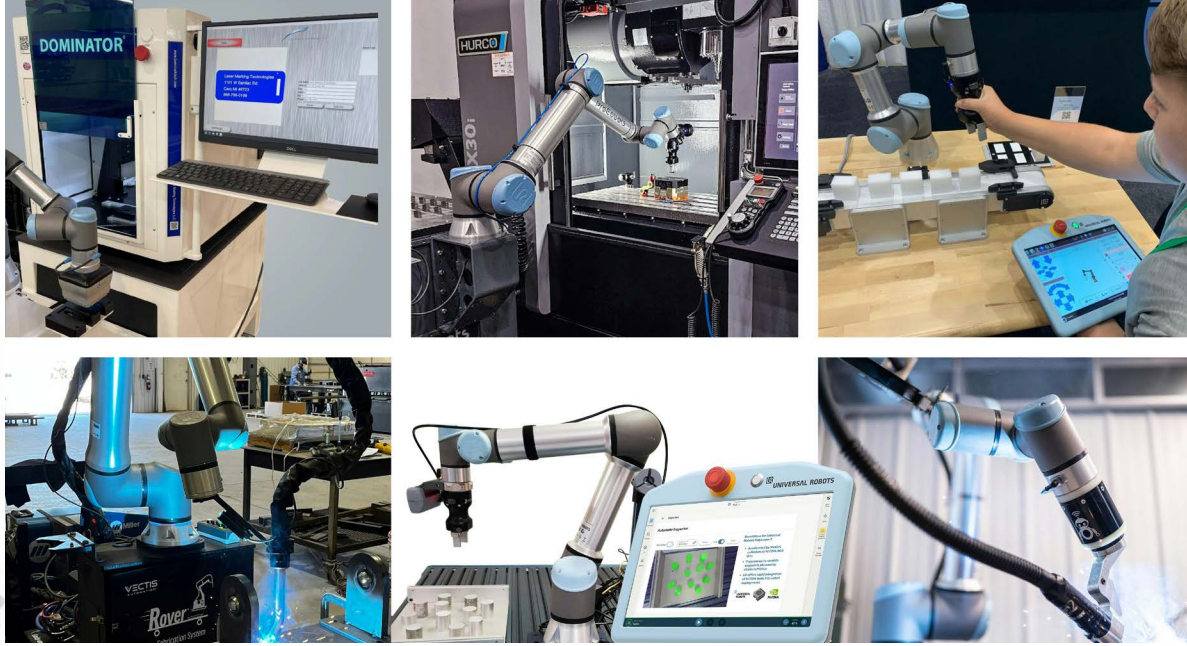
Among the incredible displays and advancements at the show, I felt a special pride when I learned that my nephew Kevin Strom, a CNC machinist who was attending the event, participated in the deburring contest at the Autodesk booth (#133310) and clinched the win.

His achievement of deburring the part in 1 min., 26 sec. secured him bragging rights and a Bluetooth speaker engraved with Autodesk's logo. It also put a spotlight on the hands-on talent in the manufacturing industry as well as highlights the excitement and engagement that events like IMTS provide to those in the industry. It's a great reminder that the future of manufacturing is not just in technology but in the passionate individuals ready to embrace it.

[Check out more coverage from Machine Design's IMTS 2024 content hub.](#)

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Courtesy UR

CHAPTER 4:

Robotics at IMTS 2024: Show Launches, Market Ripples, Partnerships and More

REHANA BEGG, Editor-in-Chief, *Machine Design*

Explore new robot
functionality: precision
machining and measurement,
Robots-as-a-Service, PLC
functionality, laser tracker
technology, 360-deg.
sensing and much more.

When it comes to automation, manufacturers face multiple challenges. The call to upskill, to optimize, and to be more productive, competitive and sustainable never ends. At IMTS 2024 manufacturers either answered this call or found out how to do so effectively. IMTS is one of the world's top exhibitions for the machine tool industry, showcasing innovative digital technologies in the manufacturing industry, including processing, assembly, logistics and inspection.

This compendium looks at 10 solutions, mostly straddling robotics and automation.

1. Partnership Supports Robots-as-a-Service (RaaS)

Providing full-service models to scale is an ongoing challenge for robotics and automation companies. A partnership between Ricoh North America and [Agility Robotics](#) should make market ripples with their collaboration in support of automated warehouse solutions and managing humanoid robot fleets. Ricoh is extending its Service Advantage program (a lifecycle management solution) to help broaden Agility Robotics, creator of the leading bipedal Mobile Manipulation Robot (MMR) Digit, expand its footprint and services.

Ricoh will support Digit robots and Agility Arc, Agility's cloud automation platform for deploying and managing Digit fleets. Designed for multi-purpose logistics work, Digit is a human-centric robot capable of performing repetitive tasks. Agility Arc simplifies the deployment lifecycle, from facility mapping and workflow definition to operational management and troubleshooting.



Agility Robotics' humanoid robot, Digit. Courtesy Agility Robotics

www.ricoh.com

2. Streamline Quality and Assembly with High-Accuracy Measurement of Large Components

Officially, Hexagon's Leica Absolute Tracker ATS800 will not be available until 2025, but Hexagon's Manufacturing Intelligence division gave IMTS attendees a preview of the new laser tracker technology, which combines laser tracking with laser radar functionality.



Hexagon's Leica Absolute Tracker ATS800 delivers accurate measurement of key features from a distance. The solution streamlines inspection and alignment for aerospace and other large-scale manufacturing sector applications. Courtesy Hexagon

Delivering accurate measurement of key features from a distance, particularly for meeting the demands of inspection and alignment in aerospace and other large-scale manufacturing sectors, the new system replaces two pieces of hardware with a single device. Using Hexagon's patented PowerLock technology, the ATS800 automatically "locks on" to a reflector and tracks its movements in real-time, providing an absolute reference. The ability to measure target reflectors also greatly simplifies robotic automation processes, noted Hexagon, by allowing precise positional referencing within a wider coordinate system when mounting the tracker on a linear rail or an autonomous mobile robot (AMR).

This is a versatile measurement tool:

- An aircraft fuselage can be quickly inspected;
- Guided assembly processes use up-to-date digital measurements during 3D assembly and mating operations; and
- The accurate high-speed measurement of holes, fastenings and edges can keep up with high-volume automotive production.

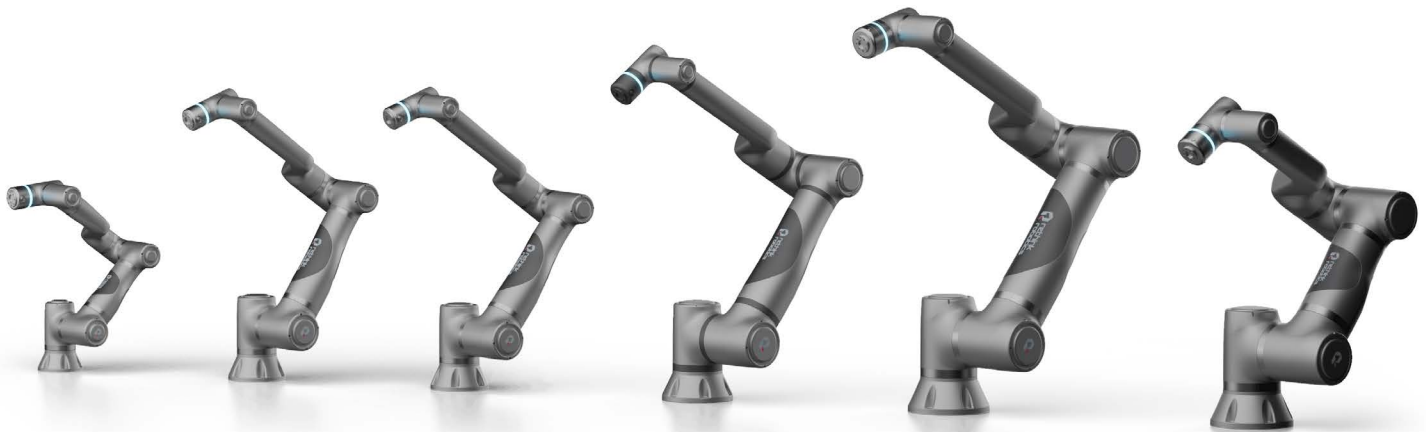
Hexagon noted that the ATS800 is highly portable, IP54 rated, designed to plug into existing workflows and can be operated wirelessly and integrated with common robotics control systems.

[hexagon.com](https://www.hexagon.com)

3. Mobile Manipulation Performed at New Levels of Efficiency

Boston-based Rethink Robotics made a comeback by relaunching its brand at IMTS this week. Founded in 2008, the company pioneered robotics collaboration, later developing groundbreaking robots such as Baxter and Sawyer. By 2018, the company was shuttered [reportedly as sales fell short of expectations](#).

Rethink is back with a fresh lineup of seven collaborative robots (cobots) designed for machine tending, palletizing and bin picking. The new models (RE 07, 09, 13, 16, 21, 30 and 30L) can handle payloads ranging from 7 to 30 kg (15–66 lb) and offer highest precision with ± 0.03 mm (about 0 in) pose repeatability. In addition to improved design, the cobots promise reliable and robust hardware, all of which is supported by an IP65 rating for use in wet and dusty environments. The cobots come with connectivity to a range of accessories, including



Rethink Robotics returns to the market with its Rethink Reacher (RE) line of collaborative robots (cobots). Courtesy Rethink Robotics



The Rethink Ryder AMR line features multi-detection technologies with 360-deg. sensing for analyzing and responding to real-time changes in the environment, ensuring workplace safety. Courtesy Rethink Robotics

grippers, vision systems, rails and other end-of-arm and peripherals.

Rethink Robotics also unveiled its autonomous mobile robot (AMR) and mobile robotic manipulator (MMR) platforms at the show. Two models are available: the light-duty MRE 550 model handles payloads of up to 550 kg (1,212 lb) and the heavy-duty MRE 1400 model handles payloads of up to 1,400 kg (3,086 lb). Both robots come with an integrated lift function. Other features include a compact design, multi-detection technologies with 360-deg. sensing for analyzing and responding to real-time changes in the environment, and an independent, detachable battery box.

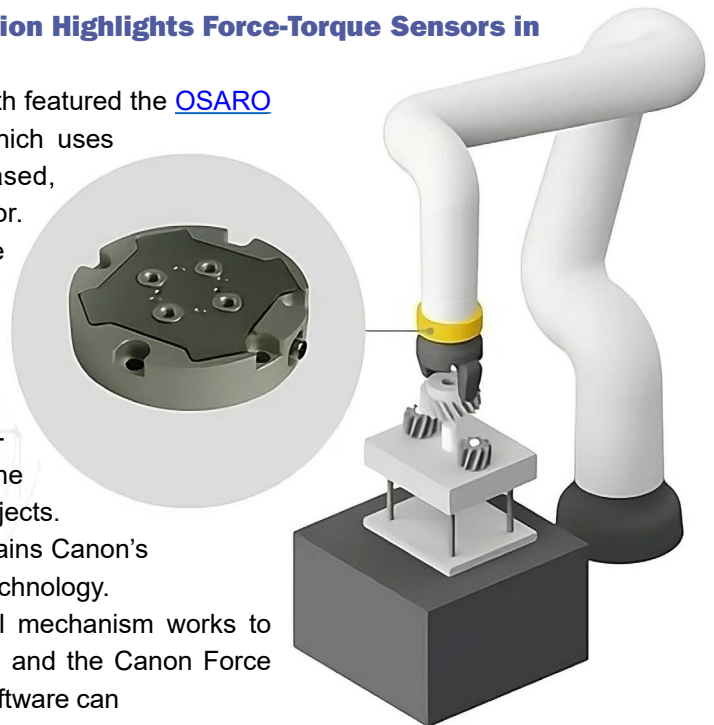
www.rethinkrobotics.com

4. Robotic Bagging Solution Highlights Force-Torque Sensors in Pick-and-Place Demo

A display at the Canon booth featured the [OSARO Robotic Bagging System](#), which uses Canon's optical-encoder-based, low-cost force-torque sensor. The sensor can measure the magnitude and direction of load along three axes and rotational forces, noted Canon. When attached to a robotic arm, a force sensor helps the arm sense the strength needed to handle objects.

The force torque sensor contains Canon's proprietary optical encoder technology.

Canon stated that a digital mechanism works to provide high precision levels, and the Canon Force Torque Sensor Application Software can allow users to connect their sensor to a personal computer without any need for coding while testing.



OSARO and Canon are worked together to showcase a robotic bagging solution at IMTS 2024. Courtesy Canon U.S.A., Inc.

The robotic bagging system was developed by OSARO Inc., a San Francisco-based provider of AI-based robotic perception and picking solutions. The system is powered by OSARO's advanced AI and machine-learning algorithms, [OSARO SightWorks](#), which provides flexibility by enabling the automatic addition of thousands of new SKUs to ensure versatile order processing.

usa.canon.com/FH



Canon's durable force-torque sensor measures the magnitude and direction of load along three axes and rotational forces. Courtesy Canon U.S.A., Inc.

The RCS series from Renishaw is designed to assist in the installation, calibration and diagnostics of robot systems. The ballbar enables shorter set-up times and greater application accuracy. Courtesy Renishaw



5. Measurement, Motion Control and Precision Machining

Known for high-precision technology for metrology and healthcare, Renishaw set up its Quality Assurance booth to demonstrate how manufacturers can use tools to improve precision, speed and productivity at every stage of the manufacturing process. Their latest product line for the industrial robotics market was displayed, bringing into focus the process of commissioning and servicing industrial robots. The product range includes RCS L-90, RCS T-90 and RCS P-series, all supported by a dedicated software suite to help simplify robot set-up, health checks and recovery of robotic applications following collisions.

Other featured precision and measurement tools were the REVO 5-axis multi-sensor system for coordinate measuring machines (CMMs); the world's smallest wireless machine tool probe, RMP24-micro, that measures just 24 mm in diameter and 31.4 mm in length; FORTiS enclosed encoders; and CARTO software suite (version 4.8), featuring support for the Renishaw XM-60 multi-axis calibrator to enhance the monitoring of precision machinery.

www.renishaw.com

6. PLC Functionality Enables Remote Monitoring, Diagnostics and Debugging

Olis Robotics, which provides video and telemetry-based diagnostics for industrial cells, added powerful new PLC capabilities to its diagnostics solution for industrial automation cells. The purpose is to have robotics technicians monitor and set alerts for pre-defined runtime parameters through the PLC, including I/Os, registers and custom tags. Common uses for PLC tags include measuring Overall Equipment Effectiveness (OEE), monitoring cycle times and fault detection.



Courtesy Olis

“The PLC often contains important diagnostic data required to understand the causes of unplanned downtime,” said Fredrik Ryden, CEO, Olis Robotics. The PLC capabilities enable real-time access to that data, thereby closing the loop on video-based diagnostics for industrial automation systems, he said.

olisrobotics.com

7. Equipping Cobots with Deep Learning-Based Part Detection

A recent Universal Robots (UR) survey of 1,200 manufacturers across North America and Europe revealed that more than 50% of respondents are now using AI and machine learning in their production processes. UR, known for its collaborative robotics, is investing in targeted software upgrades and developing an AI applications platform. At the show, UR

UR’s latest AI-powered machine tending solution enables dynamic path planning, ensuring the robot takes the most effective, collision-free paths with minimal user configuration.

Courtesy UR



unveiled an AI-powered machine tending solution geared to enabling faster batch changeovers by eliminating the need for fixtures.

The machine-tending application features AI-based perception capabilities, running on NVIDIA Jetson and Isaac acceleration libraries integrated into UR's new PolyScope X platform. This combination enables dynamic path planning to ensure the most effective, collision-free paths in and out of the machine and is designed for such tasks as machine tending and other material handling. Additionally, the company showcased advanced cobot applications for welding, finishing, part feeding and laser marking.

www.universal-robots.com

8. Low-Cost Automation, Cutting-Edge Engineering and Zero Lubrication

Motion plastics leader igus took up two booths, showcasing two themes: "Improve What Moves with enjoyneering" (Booth #236557) and "Automate Your Factory for Less" (Booth #236230). The first focused on the company's extensive range of products driven by the igusGO AI app and featuring signature products, from e-chain cable carriers and linear actuators to motors and motor controllers. The emphasis was on the reliability and maintenance-free nature of its products, offering a four-year warranty and extolling the benefits of zero lubrication needs.



igus exhibited low-cost automation and making robotics solutions affordable via the RBTX marketplace.

Courtesy igus

The second booth centered around low-cost automation and making robotics solutions affordable via the RBTX marketplace. "Our themes this year reflect our dedication to helping businesses improve efficiency and reduce costs with advanced, reliable technology," noted Felix Brockmeyer, CEO of igus, Inc.

www.igus.com

9. Pursuing the U.S. Market for Collaborative Robots

Rainbow Robotics asserted its presence with 10 robot platforms, including four collaborative robots in the RB series, two cobot automation systems, two mobile robots (a serving robot and an AMR), a quadrupedal robot (RBQ-10) and the first wheeled humanoid bipedal robot developed in Korea (RB-Y1). The company said it is taking an aggressive approach with its IMTS showcase, with plans to sell four collaborative robots the RB series' RB3-1200, RB5-850, RB10-1300 and RB16-900.

Rainbow Robotics showcased at least 10 different robot platforms at IMTS 2024. Courtesy Rainbow Robotics



The company stated that it has a competitive price advantage over competitors due to their low-cost rate based on in-house development of core components such as drivers, encoders, brakes and controllers developed in-house. Hailing from South Korea, the brand is establishing its foothold in the North American market, including plans to expand from its current local branch in Schaumburg, Ill.

www.rainbow-robotics.com

10. New Controller Technologies Backed by Cyber Security

Flexibility in shared workspaces is a mantra demonstrably embraced by Fanuc. Known for collaborative machine tending and heavy payload handling robots, this year wouldn't

FANUC's new R-50iA robot controller has obtained third-party certification for international cyber security: IEC62443-4-1 and 4-2. It provides multiple layers of defense to secure data exchange, whether it's remote access (SSH), file transfers (SFTP), or web communication (HTTPS). Courtesy Fanuc




disappoint. New this year were demos powered by Fanuc's latest offering, the [R-50iA Controller](#), which is designed to "maximize performance and ease of use while offering enhanced cyber security."

Also added to the new lineup was the [FANUC Series 500i-A CNC](#). The new control series improved machining performance by leveraging Fanuc's 5-axis integrated technology and offering faster processing speeds. The new features support both machine tool builders and CNC users. Fanuc bills the R-50iA robot controller as the first to offer cyber security, thanks to third-party certification for international cyber security: IEC62443-4-1 and 4-2, offering multiple layers of defense to secure data exchange.

www.fanucamerica.com

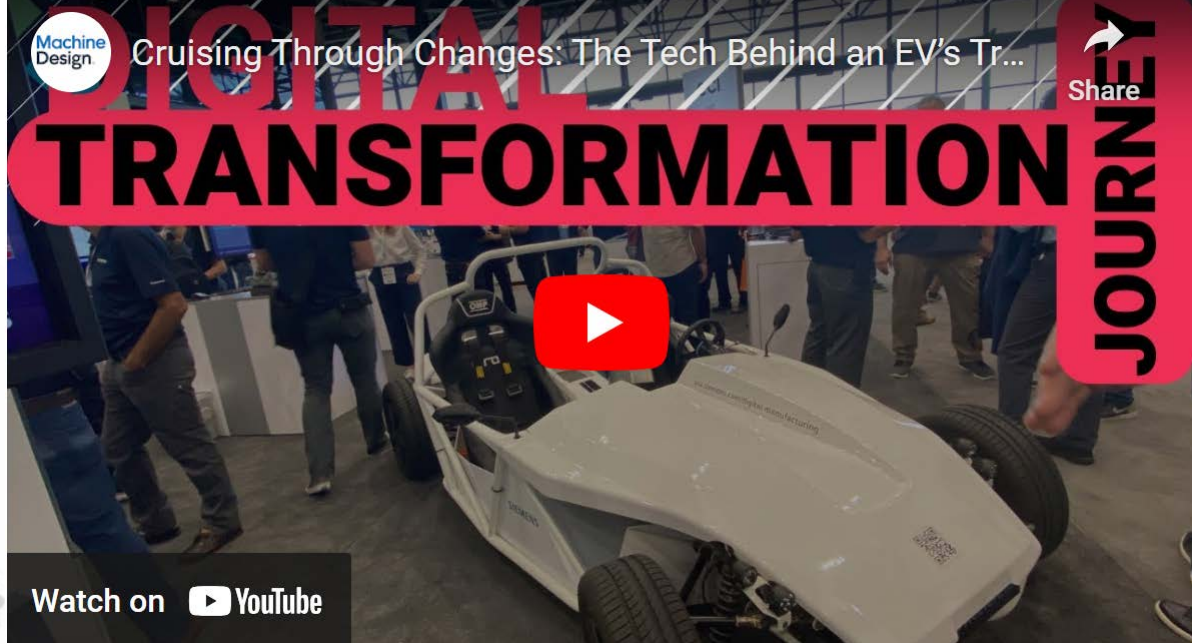
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DIGITAL TRANSFORMATION



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CHAPTER 5:

Cruising Through Changes: The Tech Behind an Electrical Vehicle's Transfer Case Redesign

SHARON SPIELMAN, Technical Editor, *Machine Design*

Experience how advanced technology is driving the next generation of performance in Siemens' electric vehicle (EV) transfer case.


Come along for a journey through Siemens' redesign of a transfer case for the company's electric vehicle (EV) with Aaron Frankel, VP of Additive Manufacturing. Frankel guided *Machine Design* through the redesign and manufacturing process for the transfer case on the show floor at IMTS 2024.

EV's are known for their quiet operation, which makes any mechanical noise more noticeable. The car's transfer case impacts both performance as well as user experience. The mission for Siemens was to create a transfer case that not only performs well but also reduces unwanted noise.

Frankel demonstrated advanced software tools like NX and Simcenter 3D to analyze the transfer case's mechanical strengths and identify areas for improvement. He also showed us topology optimization for material distribution to enhance strength while minimizing vibration.

3D printing was chosen as the manufacturing method to allow for complex geometries. A virtual model of the transfer case and its manufacturing process enabled real-time simulations to anticipate and resolve potential issues. Frankel said that the company's collaborative environment helps ensure data integrity and efficiency throughout every step of the project.

Use this pit stop to learn about how integrating advanced design methodologies, additive manufacturing and digital tools can help set a new standard in component design.

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ROBOTICS PARTNERSHIPS

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CHAPTER 6:

Partnerships Progressing Robotic Potential

SHARON SPIELMAN, Technical Editor, *Machine Design*

Explore how strategic collaborations between Universal Robots and other industry leaders such as NVIDIA, Olis Robotics and Hirebotics are driving innovation solutions and shaping the future of robotics in manufacturing.


Visitors to Universal Robots' booth at the International Manufacturing Technology Show got to see a showcase of collaborations and innovations from the UR+ ecosystem. The company highlighted a slew of impressive partnerships, demonstrating the power of collaboration to advance technology.

With an emphasis on seamless integration and efficiency in robotics, alliances with industry leaders such as NVIDIA, Olis Robotics, Hirebotics and more are helping users to harness the full potential of automation.

Machine Design spoke with Chris Savoia, head of Ecosystem, Americas, Universal Robots, who walked us through just a few of UR's exhibits. First, he offered a technology demonstration of UR's collaboration with NVIDIA, which focuses on integrating NVIDIA's Jetson GPU for robotics, enabling users to deploy artificial intelligence (AI) models easily. The developer kit, which includes a camera and GPU, provides everything needed for experimentation with AI and robotics right out-of-the-box, Savoia said.

Savoia then showed us the UR/Olis Robotics collaboration with its remote diagnostics and teleoperation tool. This system allows operators to remotely monitor and troubleshoot robots, enabling efficient lights-out operations. Maintenance personnel can respond quickly to issues, ensuring minimal downtime and increased productivity.

UR's partnership with Hirebotics highlights their solution for controlling and programming robots through the Beacon app. This intuitive software is designed to allow welding operators to manage robots easily, eliminating the need for extensive technical knowledge. The integration with UR's next-generation PolyScope X software aims to improve usability, offering resources such as instructional videos directly on the teach pendant to help users build their skills quickly.

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A GLIMPSE OF
IMTS
2024



3D-PRINTED TEACHING ROBOT
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Courtesy IMTS

CHAPTER 7: IMTS Smartforce Student Summit Showcased Cutting-Edge Manufacturing Technology for STEM Students

SHARON SPIELMAN, Technical Editor, *Machine Design*

Attracting more than 14,000 students at this year's event, the Student Summit showcased cutting-edge manufacturing technology like Kawasaki's Astorino robot, inspiring the next generation of STEM professionals.

At this year's International Manufacturing Technology Show (IMTS), the Smartforce Student Summit was a hub of innovation and enthusiasm, attracting more than 14,000 students who seemed eager to explore the latest advancements in manufacturing technology.

The Smartforce Student Summit, which was held in the lower level of the East Hall at this year's event, put the latest in manufacturing technology from the highest profile industry exhibit partners on display to provide educators and students with fun and engaging learning experiences centered around the industry's vision of the "manufacturing technology classroom of the future."

According to [U.S. Bureau of Labor Statistics](#), STEM occupations are projected to grow 10.4% compared with 3.6% for non-STEM occupations. As an increasing number of the nation's youth consider manufacturing careers, the Smartforce Student Summit was designed to inspire students who are seeking an education in STEM that leads to a career path in manufacturing.

Among the many exhibits in the Student Summit was Kawasaki's Astorino, an educational 6-axis robot based on 3D printing technology. Programmable in AS-language, it facilitates the preparation of classes with ready-made teaching materials and is designed to be easy both to use and repair. It also gives the opportunity to learn and make mistakes without fear of breaking it.

CHAPTER 7: IMTS SMARTFORCE STUDENT SUMMIT SHOWCASED CUTTING-EDGE MANUFACTURING TECHNOLOGY FOR STEM STUDENTS



Cody Schenk, training instructor/developer at Kawasaki Robotics, demonstrates the company's educational 6-axis robot, the Astorino, which is 99.5% 3D printed.

Courtesy Sharon Spielman

Key features include:

- 99.5% 3D printed
- Precise to 0.1 mm
- Max payload of 1 kg
- Compatible with Kawasaki Robotics programming language
- Easily available 3D-printed spare parts
- Linear track, machine vision and more options available
- Training material, technical documents and CAD files included.

The robot's launch has garnered significant interest, and it offers a direct pathway from training to industrial applications, such as transitioning from Kawasaki to Toyota.

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A GLIMPSE OF
IMTS
2024

CHAPTER 8:

Day 3 Offers Candid Insights from the Heart of IMTS 2024

SHARON SPIELMAN, Technical Editor, *Machine Design*

Explore real perspectives from International Manufacturing Technology Show (IMTS) attendees in Machine Design's Voices from the Floor.

What are the attendees of the International Manufacturing Technology Show (IMTS) jazzed about this year? At the end of Day 3, Machine Design asked showgoers from a range of places and backgrounds for their thoughts about this year's event. These candid interviews reveal attendees' firsthand insights and interests—from tooling and traditional manufacturing equipment to automation and additive manufacturing.

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