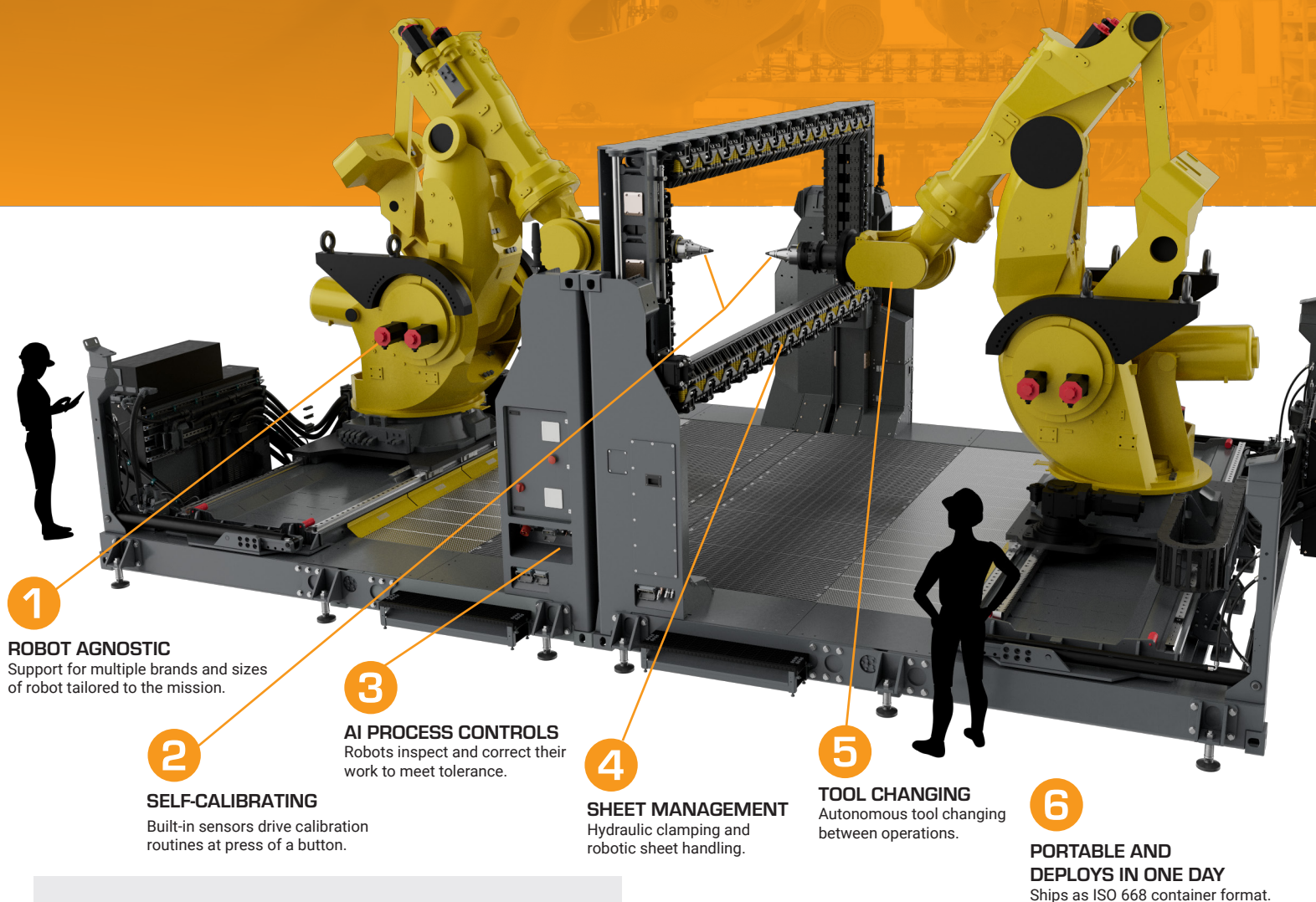


PRODUCT GUIDE



THE ROBOCRAFTSMAN

Machina Labs' RoboCraftsman™ is an agile manufacturing platform that integrates robots, advanced AI process models, and closed-loop controls to enable sheet metal manufacturing processes onsite with your existing technicians.



RoboFormed parts by RoboCraftsman

CORE SYSTEM FEATURES

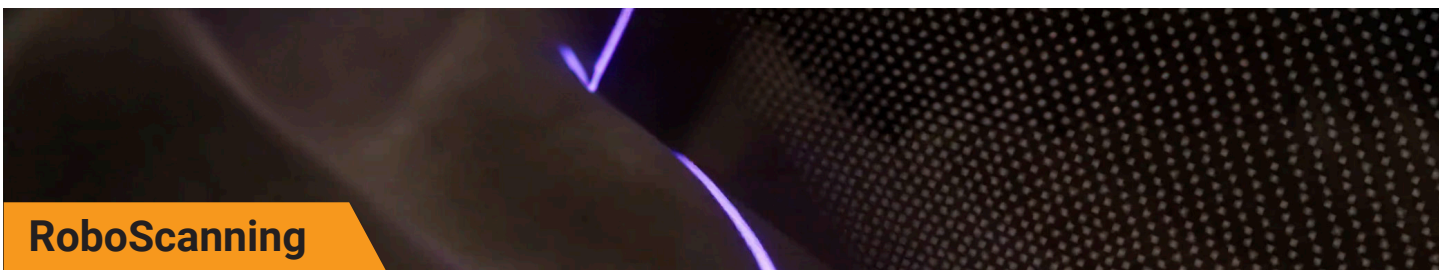
- Rapid deployment in one day with built-in hydraulics
- Intuitive software interface
- Automated and autonomous calibration routines
- Rapid iteration and speed in manufacturing processes
- Virtual part storage
- Patented suite of end effectors



RoboForming

Form complex sheet metal parts powered by industrial robotics and AI process controls.

RoboCraftsman takes you from design to formed part in days, not months by eliminating traditional tooling requirements. Complex geometries become finished structures in weeks, not months or years. RoboForming end effectors can achieve average surface finish roughness of 20 pinches (0.5 μm). It can form parts up to four feet deep in the system's frame that accommodates 15x5 feet (4.6x1.5 meters) sheet blanks. Multiple robot configurations adapt to various geometries, materials, strengths, and sheet sizes, with the ability to handle multiple smaller sheets in a single operation with separately actuated clamping zones.



RoboScanning

Achieve tight tolerances and produce inspection data with robot-controlled metrology.

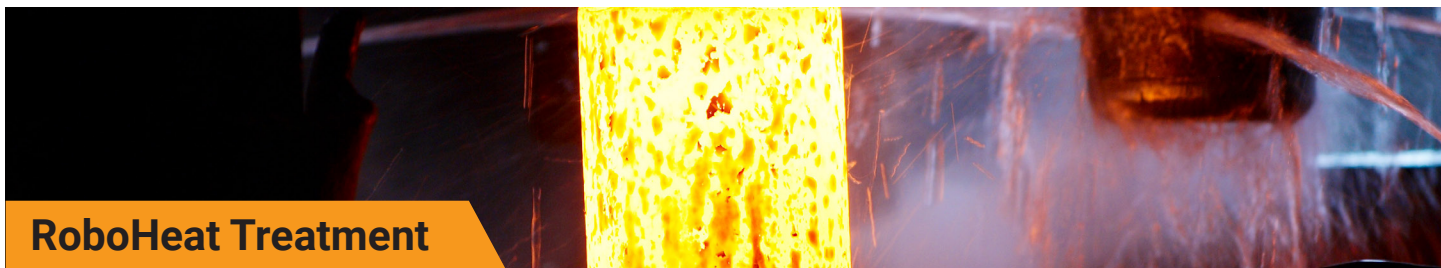
The robot-controlled metrology system leverages laser scanners and advanced robotic control to achieve tight surface tolerances as low as 1mm (.04") and perform advanced workflows such as scanning a physical part to define a forming operation or reworking formed parts into tolerance. This system integrates quality control into every stage of the manufacturing process, ensuring that parts are within specifications and optimizing multi-step processes such as aligning cutting boundaries to Roboformed parts.



RoboTrimming & Drilling

Create parts that are ready for assembly with 7-axis robotic cutting capabilities.

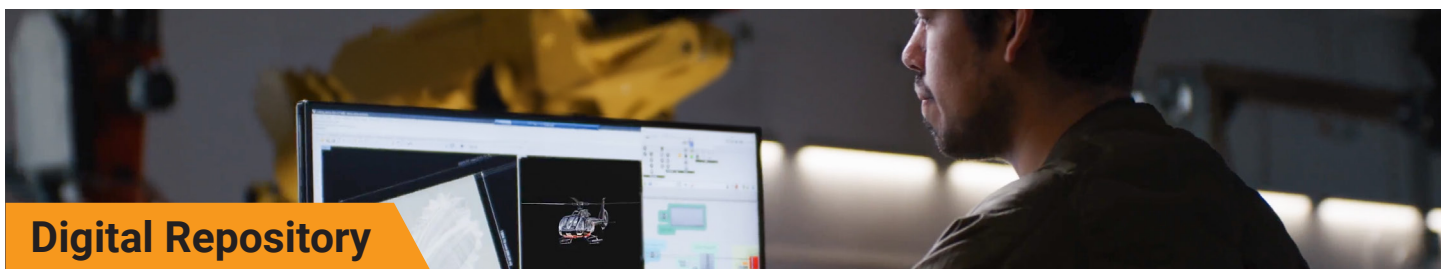
The system combines advanced scanning, tool path optimization, and versatile robotic movements to achieve high precision and adaptability. The 7-axis robotic cutting system can swap in different cutting tools and is designed to handle complex geometries and materials. It can remove parts from sheets, drill holes, and execute intricate subtractive processes. Using the scanner and trimming capabilities together, the system can define and optimize critical dimensions in final parts.



RoboHeat Treatment

Maintain advanced control of stresses and material properties.

The RoboCraftsman will soon integrate a robotic heating solution with advanced process models and trajectory control to manage residual stresses and material properties – eliminating the need for traditional ovens and enabling a sheet blank to become an end-use component in a single setup.



Digital Repository

Store robotic manufacturing instructions and access on systems worldwide.

The RoboCraftsman includes a digital repository for robotic manufacturing instructions which serves as a centralized platform where standardized, vetted, and secure robotic instructions are stored and accessed. This system can streamline manufacturing processes, enhance consistency, and replicate manufacturing steps across systems, globally. The software interface integrates the expertise and resources from Machina Labs, university partners, and Department of Defense manufacturing centers to enhance capabilities, drive innovation, and achieve objectives more effectively.



Continuous Improvement

Receive regular system updates that improve performance and add new capabilities.

Machina Labs focuses on continuous improvement in AI process modeling, robotic control systems, and end effector technology to significantly enhance tool life, part performance, and overall system efficiency. This structured approach to research and development (R&D), system integration, and performance monitoring ensures that advancements are continually translated into operational benefits that lead to higher precision, better surface finishes, and increased manufacturing agility.

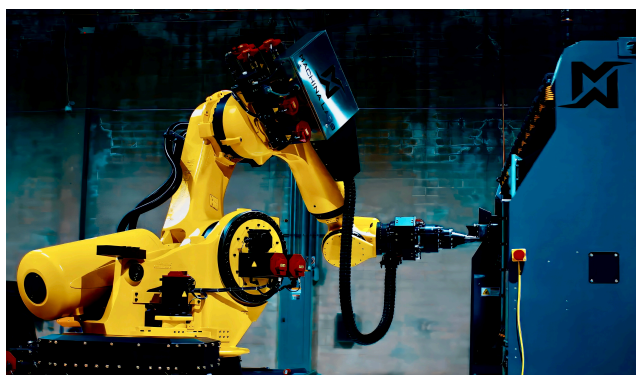
/SYSTEM

SHIPPING
Ships as two (2) 9.5' high cube ISO 668 containers
Goes from stowed to operational using built-in hydraulics in one day
Enables deployment to the edge, painless facilities change management, and system extendibility

SYSTEM WEIGHT
Standard Robot Variant: 85,000 lbm (38,500 kg)
Strong Robot Variant: 110,000 lbm (50,000 kg)

DEGREES OF FREEDOM (DOF)
14

SAFETY STANDARDS
Laser barrier halts robot motion
CE Mark Compliance (pending)
Applies partially or in whole: ISO 10218, ANSI/ISO 12100, OSHA 1910, ANSI B11, NFPA 79



/FACILITY REQUIREMENTS

FOOTPRINT
Robotic cell footprint: 36' x 20' (10.9 x 6.1 meters)
Total footprint recommended (area within safety fence): 42' x 29' (12.8 x 8.8 meters)
*Refer to Figure 1, System Diagram in Operational State.

ELECTRICAL	AIR
One 480V 60A (robotic system)	140 PSI
One 120V (computer workstation)	10 CFM

MOUNTING	OPERATING ENVIRONMENT
Floor-Mounted	10 °C - 40 °C Ambient

CONNECTIVITY
Internet Connected: Requires persistent connection to the internet scoped to communicate with Machina Labs' secure Azure Gov Cloud servers. The connected version sends diagnostics to power faster support and enables access to the part library to aid in coordination across teams.
Internet Disconnected (Air-Gapped): Has no connectivity and is fully isolated. The computer interface can be tailored to specific requirements (USB, encrypted drive, or CD-ROM) and access.

/ MATERIALS SPECIFICATIONS

METALS

Aluminum	Invar
Mild steel	Titanium
Stainless steel	Specialty alloys (Niobium, Inconel, HyMu 80)

THICKNESS LEVEL

.5mm (.02") - 9mm (.35")

ROUGHNESS AVERAGE (RA) OF SURFACE FINISH

As low as 20 μ inches (0.5 μ m) pre-post processing

TOLERANCE

As low as +/- 0.5mm (0.020")

TRAINING

The system's software interfaces are designed for manufacturing technicians familiar with CAD software. Ongoing safety training is provided by Machina Labs.

SAFETY

The RoboCraftsman includes an effective safety system that prevents access through, over, under, or around the robotic system. The fixed barrier allows for adequate clearance for a technician between the fence and robot reach points, including parts held by an end effector, to perform manufacturing tasks under controlled conditions. The laser barrier halts robot motion when needed.

MAINTENANCE

Unlike traditional manufacturing equipment, users can expect regular security and stability software updates, as well as capability enhancements throughout the operational life of the equipment.

/ LET'S MANUFACTURE TOGETHER

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/Figure 1: System Diagram in Operational State

