EAGLE TECHNOLOGIES
Engineered Factory Automation

# AUTOMATION TOOLKIT

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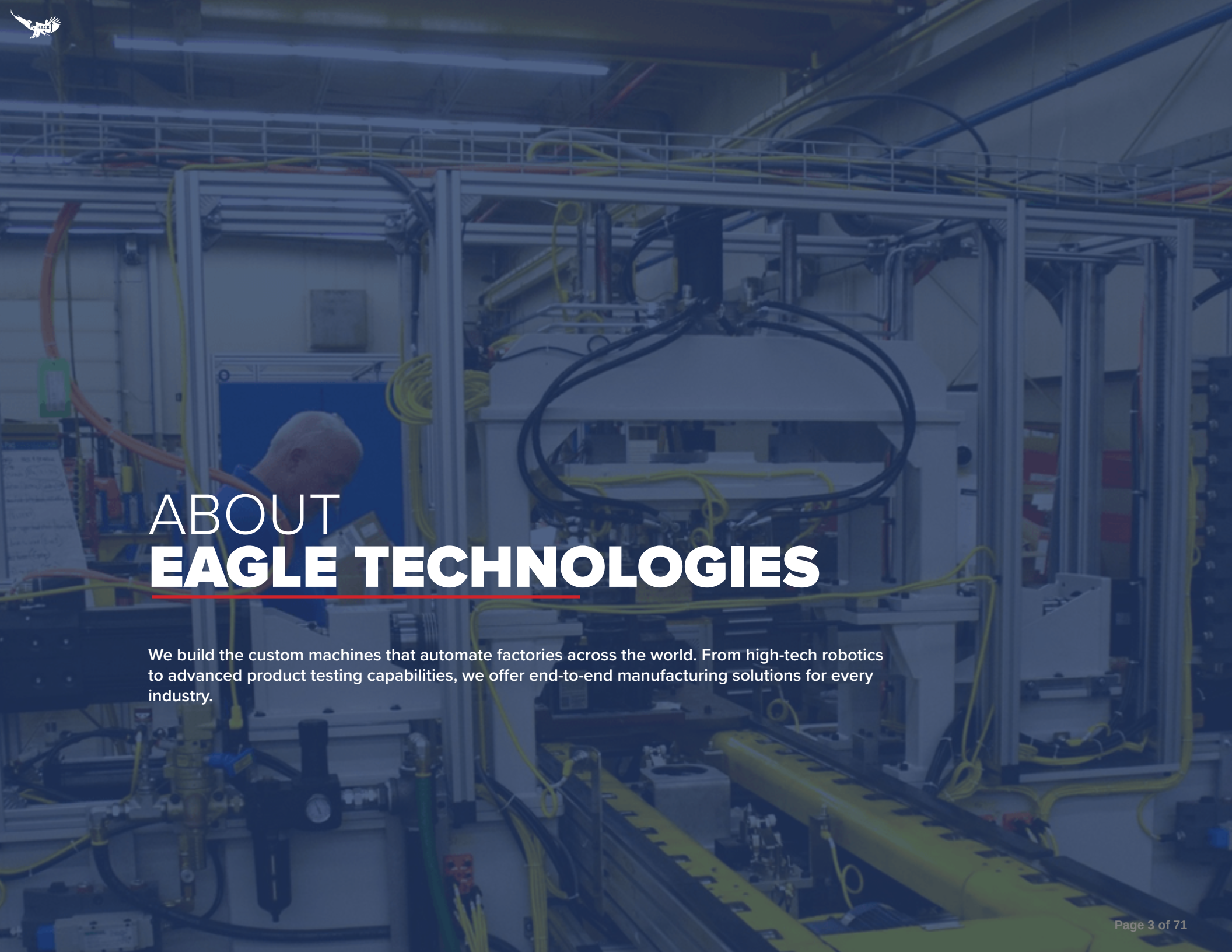
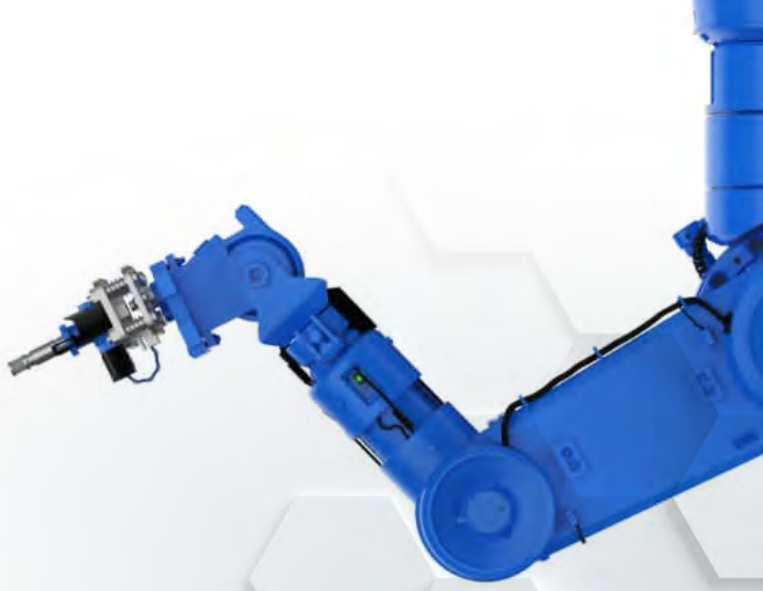


# ABOUT
# EAGLE TECHNOLOGIES

We build the custom machines that automate factories across the world. From high-tech robotics to advanced product testing capabilities, we offer end-to-end manufacturing solutions for every industry.

# ABOUT EAGLE



We build the machines that automate assembly line manufacturing. From high-tech robotics to advanced product testing capabilities, we offer end-to-end manufacturing solutions for every industry.

**The standards expected of automated manufacturing have never been higher. With the increasing intricacy of global supply chains, the introduction of smart technology, and steadily rising levels of product sophistication, meeting market demand requires an unwavering commitment to quality, expertise, and continuous improvement.**

At Eagle, we meet these challenges through a combination of core values and assets that set us apart as leaders in our industry.

## DECADES OF EXPERIENCE

Our manufacturing roots date back to 1953, when we started in the tool and die industry. Since then, we have continued to expand our expertise as a company by broadening the industries we serve, recruiting knowledgeable engineers, and educating ourselves about new technologies.

We are also strong believers in experience cultivated through our in-house apprenticeship program. For years, this four-year training program has allowed us to grow talent from within our organization, so that our team members gain experience with our customers alongside their professional development.

## INNOVATION THROUGH INDUSTRY 4.0

We offer manufacturing solutions that are at the forefront of emerging technologies. Our knowledge of advanced computational tools, interconnected devices, and 3D printing helps us develop machines more efficiently, and to a higher standard than previously possible.

These technologies also offer improvements to our advanced testing capabilities, allowing more detailed analysis of the final product.

## CONTINUOUS IMPROVEMENT

As engineers, we are constantly looking for ways to improve every aspect of our process, from project management, to design, manufacturing, and testing.

We accomplish this through regular “lessons learned” debriefings of major projects, semi-monthly Kaizen meetings where our teams identify marginal changes that can build toward lasting improvement, and even 3rd-party consultants who help us streamline our processes. We believe our dedication to continuous improvement is a critical factor in our success.

## DIVERSITY IS STABILITY

When you commit to a multimillion-dollar contract with a company to supply the machinery that powers your manufacturing, you want to know that company will have the longevity to stay with your business for decades to come.

We have remained a consistent presence in the field of manufacturing automation for nearly seven decades by diversifying our services across a range of industries so that no matter the economic climate, we are positioned to respond to market demands.

## TIMELY DELIVERY

Timeliness is one of the most important factors for our customers. We understand that any delay on our part can set off a domino effect in their production schedule, which undercuts manufacturing output and damages investor trust.

This is why we are so proud that 97% of our projects are delivered on time. We know that a reliable delivery date helps our customers get their factories up and running quickly, which in turn allows them to respond more quickly to market demands.

## STATE OF THE ART FACILITIES

We offer locations around the globe, from the heart of American manufacturing in the Midwest, to our EV demo machine at the Electric Vehicle Innovation Center in San Jose, and a new installation and support center in China.

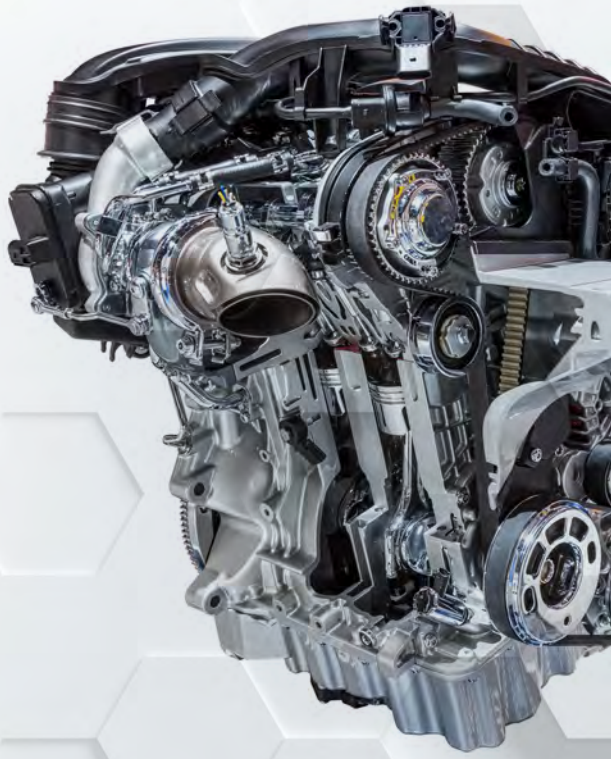
Our main manufacturing locations in Bridgman and St. Joseph, Michigan, are strategically positioned along the Chicago–Detroit corridor, offering over 285,000 sq. ft. of engineering space with extra-wide bays and overhead clearance for crane operations. Our in-house capabilities include machining, welding, sheet metal, electrical build, tooling assembly, pipe fitting, and painting, giving us complete control from start to finish.

As suppliers of automated manufacturing machinery, Eagle Technologies is considered essential to the American economic infrastructure. First and foremost, we are here to serve our customers. Only through listening to their needs and requirements can we deliver the solutions that allow them to clear the high bar of customer expectations.

# OUR SERVICES

**We bring value to our customers beyond design, engineering, and testing. Our services also include support from our customer service team to work with you across every phase of the production cycle, from developing the most efficient production process, to preventative maintenance and repairs.**

Working with our team of dedicated support professionals will reduce the burden on your own plant maintenance team while maximizing machine uptime in your factories. The result is increased profits with lowered costs.

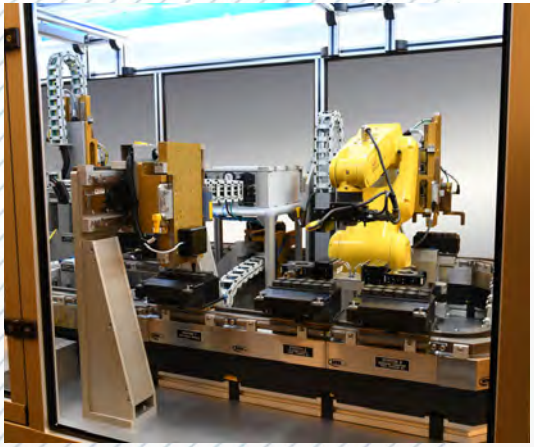


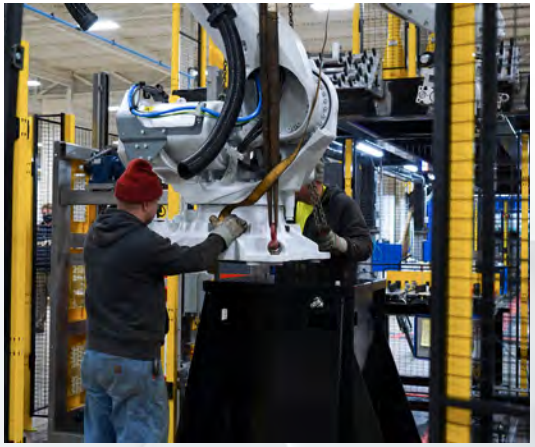
## PROJECT MANAGEMENT

- Utilize PMP principles
- Project Coordination
- Project Schedule tracking
- Open issue tracking
- Weekly progress updates
- Procurement/Expediting
- Prototype Builds
- Company FTP Site

## MECHANICAL ENGINEERING

- SolidWorks
- DFMEA
- Proof of Principle
- Simultaneous Engineering
- Risk Assessments
- Robot Simulation
- 3D Printing for Rapid Prototype and machine components
- Equipment Cycle time studies
- Static and Dynamic Finite Element Analysis
- Process Characteristic Analysis
- Cross-Functional design optimization
- MiniTab, Type 1 (Cpk) and Gauge
- R&R verification
- Laser System FDA





## WORLDWIDE TURNKEY SOLUTIONS

EAGLE Technologies has installed and serviced our equipment installations in almost every major manufacturing location, World Wide. The equipment we design and build is installed at our customers' locations in North America, Central America, South America, Europe, and Asia.

We have partnerships with service organizations in every location where we have equipment installed. If our customer has a problem, we typically have service at their facility the same day anywhere in the world! From the United States to Mexico, from Germany to China, from Hungary to Ireland and from Canada to South America ...and many, many points beyond, EAGLE Technologies Group ...has been designing, building, installing, and servicing equipment since 1953.

## MANUFACTURING

- Machining
- CMM validation
- Electrical technicians
- Machine builders
- Machine builders
- Air and Fluid
- Tool Makers

## FIELD SERVICE AND SUPPORT

- System Installation Supervision
- Turn-Key Installation Startup/ Production
- Extended Warranty
- Operation/Maintenance Training
- Operation/Maintenance Manuals
- Spare Parts and Install Assistance
- As-Built Documentation
- Production Data Collection

## TRAINING

- OJT (on the job)
- Formal classroom style

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# LOCATIONS

HEADQUARTERS

## BRIDGMAN, MICHIGAN

## 9850 RED ARROW HIGHWAY, BRIDGMAN, MI

- 100,000 sq. ft. engineering, manufacturing, administration facility.
- 16 acres of property, off of Lake Michigan, 97 offices and 3 extra-wide bays
- 23’ clear under overhead cranese


ENGINEERING & MANUFACTURING

## ST. JOSEPH, MICHIGAN

## 3545 LAKESHORE DR, SHOREHAM, MI

- 155,000 sq. ft. engineering and manufacturing
- 26 acres of property, 35 offices and 360’ x 320’ of open manufacturing space
- 28’ ceiling clearance
- Ample open floor space for larger conveyor, AGV systems, and sizable programs
  ITAR (International Traffic in Arms Regulations) dedicated space


R&D AND PROTOTYPE

## DETROIT, MI

## 9349 HAGGERTY ROAD, PLYMOUTH MI 48170

- Test systems group, sales and engineering
- Development lab for R&D and Prototype


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# LOCATIONS

Asia Installation, Support, Startup and Service

## GUANGDONG, CHINA

## BUILDING #5, KEYI INDUSTRIAL PARK 20 XINYUE RD. DALIANG, SHUNDE, FOSHAN, GUANGDONG PROV.

- 26,000 sq. ft. Leased space for installations, startup support, warranty, and service.
- 19.5’ ceiling clearance

Europe Installation, Support, Startup and Service

## DUNDALK, CO.LOUTH, IRELAND

## 23 NORTHLINK BUISNESS PARK, COES RD.

- 30 Engineers (Siemens, AB and Solidworks)
- 45 Minute drive from Dublin Airport
- 2-Hour Service flights, covering Europe


EV BATTERY DEMO MACHINEv

## SAN JOSE, CALIFORNIA

## ROCKWELL AUTOMATION 111 N. MARKET ST. #200, SAN JOSE, CA

- 8,000 sq. ft. Electric Vehicle Innovation Center featuring tthe Eagle Electric Battery Assembly Machine

15 Machinists

80M Annual Sales

2 Modern Facilities

50+ Years Automated Systems

75+ Engineers

1,000+ Worldwide Installs

25+ Apprentices & Interns

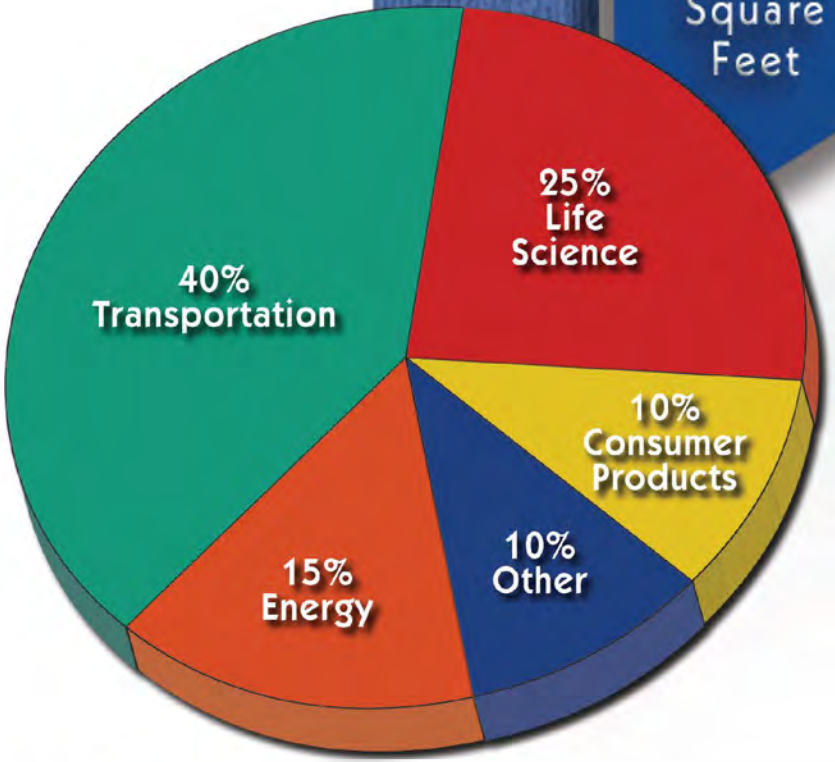
255,000 Square Feet

200+ Teammates

100+ Robots Integrated Every Year

100 Assembly Technicians

20 Project Managers

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# AUTOMATION TECHNOLOGIES

*INTRODUCING THE AUTOMATION TOOLKIT.*

We have created fully automated solutions to handle a wide range of needs from almost every manufacturing industry. We can accomplish this because our manufacturing processes are all based on automated technologies that we have spent years perfecting. From large, heavy-duty machinery to delicate, flexible contact lenses, we have the manufacturing capabilities to match your project.

# INDUSTRY 4.0

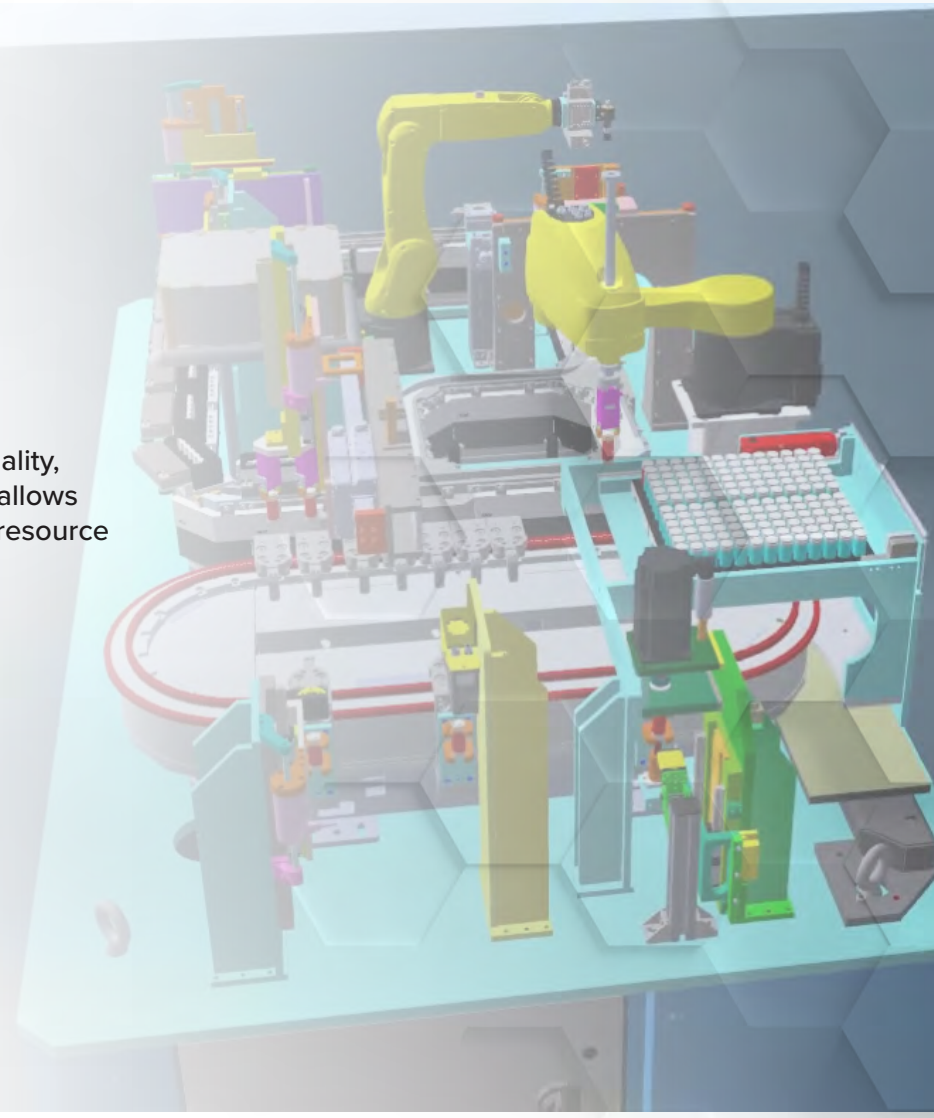
## INTRODUCING THE NEXT GENERATION OF FACTORY AUTOMATION

**Industry 4.0 represents the latest advance in manufacturing capabilities that promise to facilitate innovation, reduce production errors, improve factory performance through decreased downtime and increased output.**

Our commitment to staying at the cutting-edge of emerging technologies means we have been able to integrate these solutions into our processes, enhancing the services we offer our customers.

# SIMULATIONS

Our simulation technology allows us to prove out our designs before we go into manufacturing. We can demonstrate that our machines achieve the desired functionality, meet ergonomic standards, and align with timing and capability specifications. This allows us to demonstrate proof of concept and gain a fuller understanding of material and resource costs so that we can provide more accurate quotes and estimates.



# 3D PRINTING

We use 3D printing to construct prototypes in the early stages of our machine design process. Working with design specifications from our customers, we print and assemble components to create a representation of the final product. Printed prototypes are another of our proof of concept tools, which we use to demonstrate that our machines can create and assemble the final product within the correct design parameters.

# INDUSTRIAL IOT

The Internet of Things, used in industrial manufacturing, brings all the disparate digital components of an automated factory together into a centralized monitoring system. Connected devices gives maintenance personnel and factory workers greater insight into the performance of each machine, allowing them to maximize production and conduct preventative maintenance on an optimal schedule.

# BIG DATA ANALYTICS

Using modern data gathering tools, we collect information about every component of every product our machines produce to help ourcustomers gain an in-depth look at everything it took to engineer and manufacture the final product. Our customers use this data to inform future engineering decisions, or to collect a fault log history so they can trace a manufacturing flaw back to the point of origin.

# ADVANCED DATA ANALYTICS

The latest generation of connected devices allows manufacturers to gather more data about their production process than ever before. We can offer feedback in real-time about production performance or even gather all the process data for a serial number matched product birth certificate and retain it for one hundred years

## PRODUCT TRACING CAPABILITIES INCLUDE:

- Data Management
- Product Traceability
- Barcode – 1D and 2D
- DPM (Direct Part Marking)
- Laser and Dot Peen Marking
- Print and Apply
- CFR21 Part 11
- RF Data Tracking
- Product Birth Certification
- Process Recipe Control
- Build to Order
- ILVS (In-Line Vehicle
- Sequencing)

# AUGMENTED REALITY

AR technology has been an asset for operator instruction, both as they assemble components and conduct repairs. Using AR-equipped glasses or camera screens, we can create a digital overlay showing instructions, such as where to insert a widget, or which components need to be replaced.

# SMART MACHINE

**Businesses from many industries rely on tracking data both to manage their production flow and to trace production errors back to their source in case of a recall. We provide tracking solutions as simple as a pass/fail paint mark and as complex as modern technology allows.**

## TRACK EACH COMPONENT THROUGH THE MANUFACTURING PROCESS

Countless examples of product recalls over the past decades have demonstrated the costs of faulty production, and the importance of high quality control standards. A product recall isn't only a significant loss of revenue and damaging to a business's reputation, it's also a waste of resources and raw materials.

The accurate product tracing provided by our technology can limit the scope of a recall by allowing businesses to pinpoint the origin of a manufacturing error, and recall only the parts affected.

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# ROBOTICS

**From picking and placing to inspection and assembly, our advanced robotics technologies are capable of complex material handling tasks without the need for operator intervention.**

## COMBINING AUTOMATION TECHNOLOGY WITH ADVANCED ROBOTICS.

All our automation technologies are enhanced when used in concert with precision robotics. Our machines can dispense adhesives and sealants, weld electronic wiring in place, deburr components, place pieces onto a conveyor belt, and load them into a tray for shipping.

Meanwhile, our vision-guided technology allows for more advanced tracking and verification capabilities, while also improving worker safety.

## ROBOTIC WELD CELLS

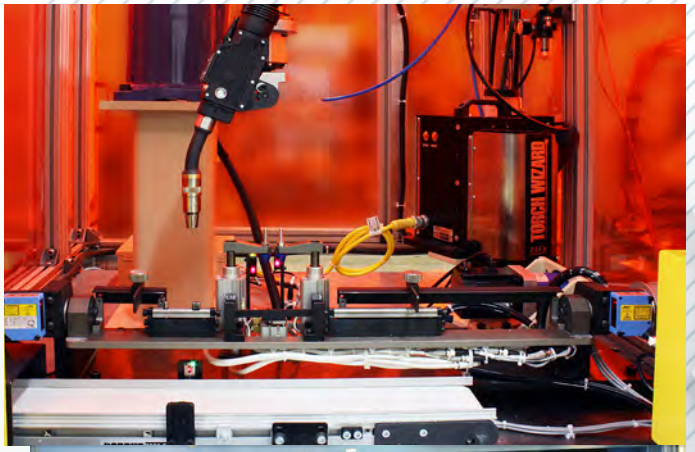
We are equipped to provide complete robotic well cells. As your complete automation solution, Eagle integrates all leading robotic solutions, including FANUC, Yaskawa Motoman, Denso, ABB, KUKA robots, and more. Whether your need is a small single robotic work station or a complete robotic assembly line of weld stations – Eagle has the solution for you.

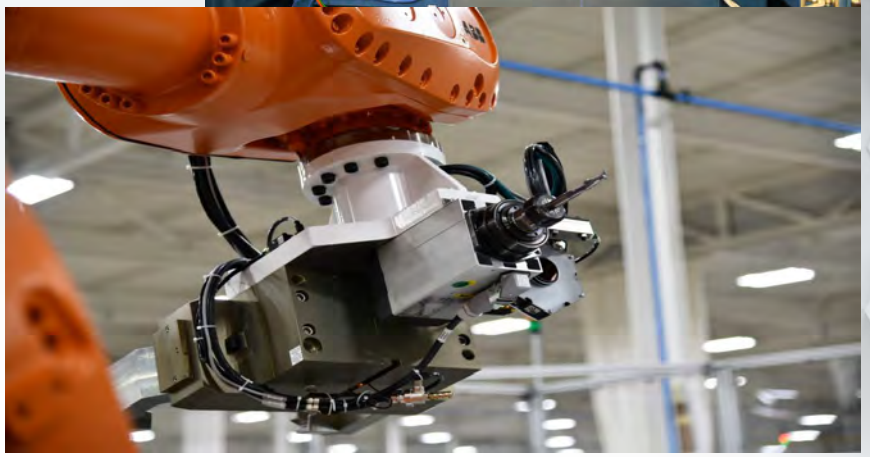
## ROBOTIC PRECISION DEBURRING

There are a variety of custom solutions for Robotic Deburr work cells.

### OUR BASIC SOLUTION INCLUDES:

- Multiple Compensating Electric Deburr Spindles
- Tool breakage sensors
- Vision Guided Robotic material handling of incoming product picking direct from customer racks
- Chip collection and removal



## ROBOTIC SAW CUTTING

Large casting programs using 2 EOAT (Gripper & Saw)

### OUR BASIC SOLUTION INCLUDES:

- Multiple EOAT with high payload
- Tool breakage sensors
- Vision Guided Robotic Inspection and Part Location
- Chip collection and removal

## ROBOTIC DRILLING

Eagle can develop a custom machine for your drilling process.
Some applications require nimble engineering to accommodate applications with vast models. That is why our solutions for robotic drilling and high-speed part transfers are second to none in the material removal demands.

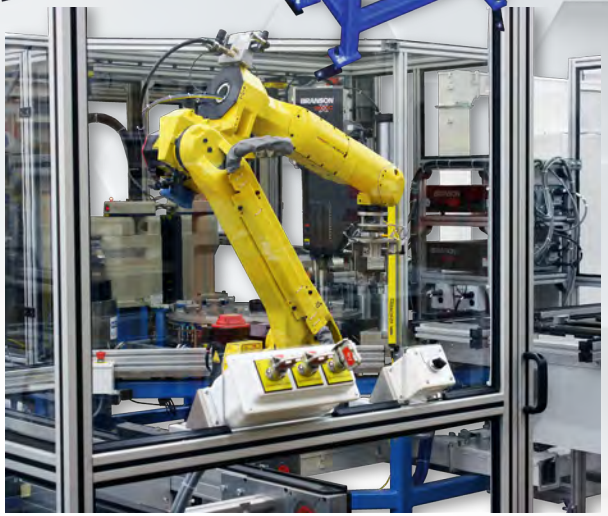
### A TYPICAL SOLUTION CAN BE:

- Multiple Compensating Electric Drill heads
- High-speed precision walking beam
- Torque and depth control and monitoring
- Tool breakage sensors
- Vision inspection
- Chip collection and removal

## AUTOMATED ROBOTIC ASSEMBLY AND VERIFICATION

Robot automation allows for complex coordination between systems, leading to efficient, high-speed assemblies. Our robotics technology has been used to assemble complex electronics, heavy machinery, and even products made with volatile substances.

Visioning technology, with built-in cameras and integrated scanning, expands the range of robotic capabilities. Sensors allow robots to identify components, spot manufacturing errors, and track each piece as it moves through the assembly process.



## 6-AXIS PICK AND PLACE TECHNOLOGY

Moving components from one conveyor system to the next, or preparing them for the next stage of assembly, requires precisions lifting, orienting, and positioning. Using high-tech sensors, our advanced robotics can lift and rotate parts along six axes for exact placement along the assembly line.

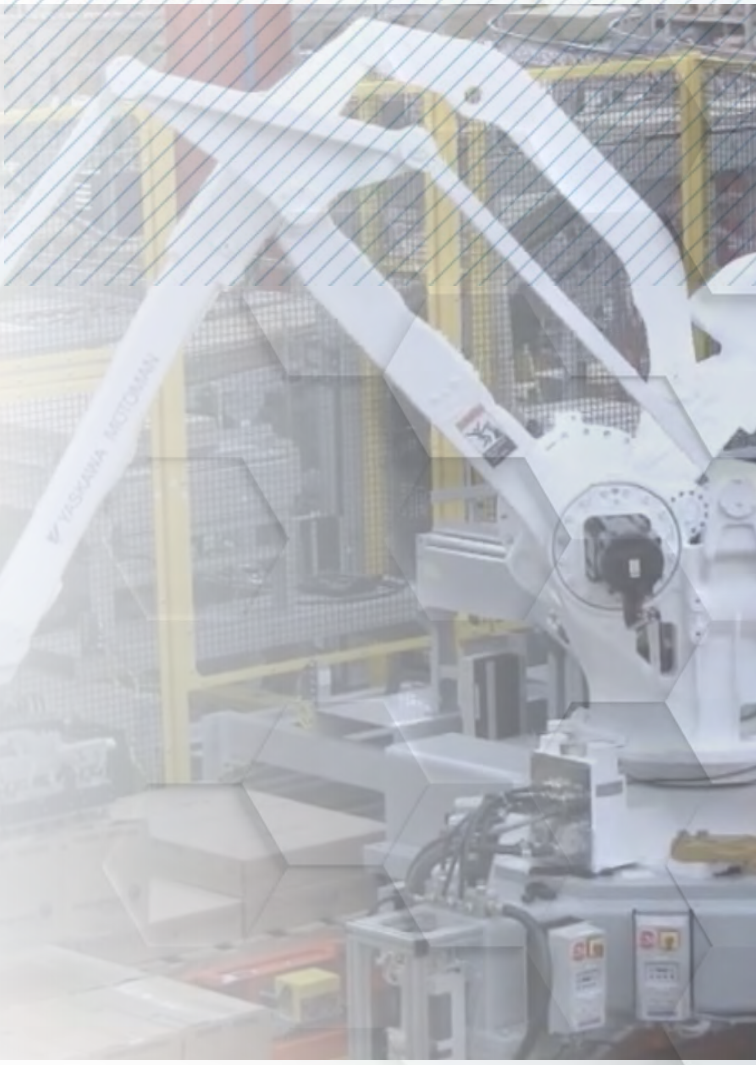
Our robots can handle picking and placing at high speed, even with delicate or fragile components. The result is a fully-automated system that can transport every piece of your assembly from start to finish.

## ROBOTIC PACKAGING AND PALLETIZING

We offer a range of automated palletizing solutions so that your products can go from the factory floor straight to the loading dock. They include kit assembly, pallet loading, and case loading. We can even take the size and shape of a product into account in order to optimize how it is stacked and loaded for shipment.

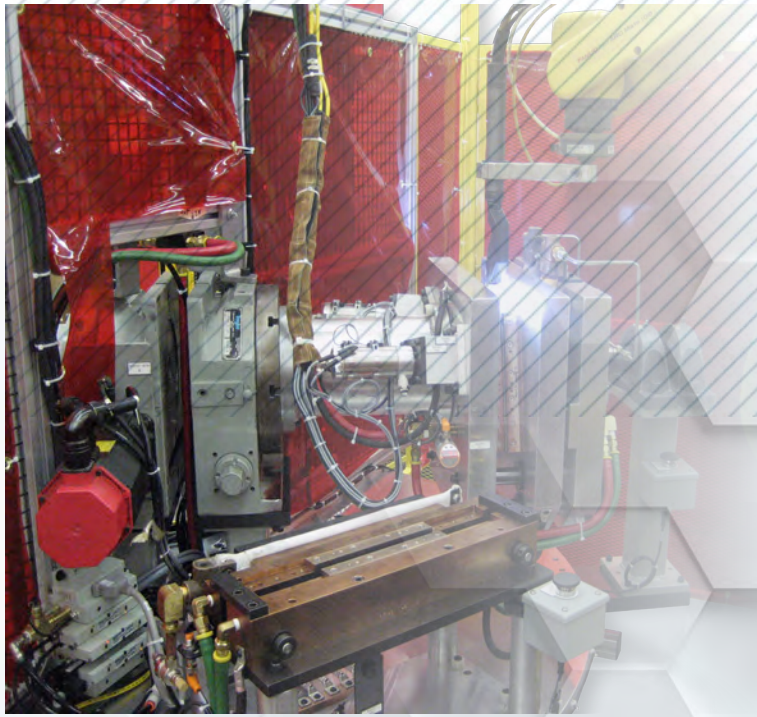
## SPECIALIZATION FOR ELECTRIC VEHICLE ASSEMBLY

Our expertise in the field of electronic vehicles qualifies us to build even the most advanced EV assemblies. In fact, our EV demo machine, on display to visitors at our facilities in Bridgman, MI, demonstrates how our robots work in conjunction with our automation technologies to manufacture complex parts.



# MATERIAL JOINING

**All manufacturing relies on various material joining techniques to assemble components. But only the most experienced engineers can find just the right joining method to use for an application. Allow us to bring nearly seven decades of experience to the table to find the right solution for you.**



## PUTTING THE PIECES TOGETHER IS EASIER SAID THAN DONE.

The methods you chose for assembling your final product can significantly affect the outcome in terms of production efficiency, durability, longevity, and overall quality. We work closely with each of our customers to determine the best material joining processes for their products to ensure optimal results.

## FRICTION/SPIN WELDING

Friction or spin welding, as its name implies, uses on friction to melt two components together. It is a reliable way to join materials when, for instance, a component is required with a fluid interior. By fitting the two pieces together, holding one component stationary, and then spinning the other at high speed, the friction generated welds to the two parts together creating a watertight seal.

## VARIOUS WELDING TECHNOLOGIES

We offer a range of welding tools which we can apply to fit specific use cases, including resistance welding, laser welding, plasma welding, ultrasonic welding, and soldering. From simple to complex, we base our solution on your desired outcome to deliver a product that meets precision manufacturing standards.

### WELDING SOLUTIONS INCLUDE:

- Friction/Spin
- Laser
- MIG
- Plasma
- Resistance
- Solder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## LASER WELDING

Whether your application requires welding of metals, plastics, or dissimilar materials Eagle has a solution for you.

Laser welding uses a laser power supply to provide the heat required to melt the parent mat'ls of components for joining, and is a reliable way to provide very controlled and concentrated heat, resulting in less residual heat within the part and heat transferred to the fixturing.

Safety and quality are fully monitorable.

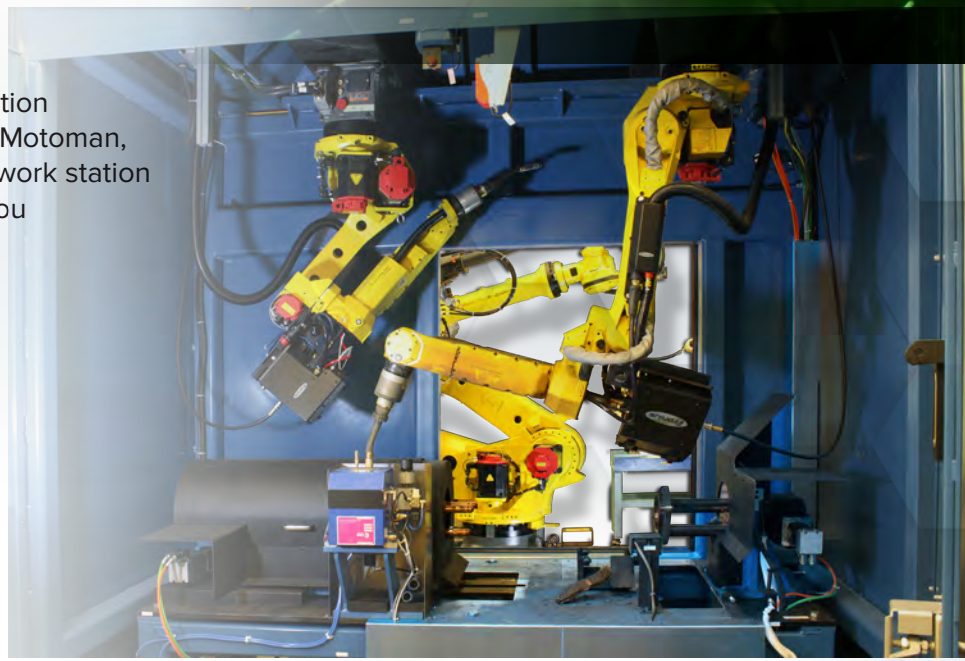
The wavelength of the laser is dependent on the mat'ls being joined.

Laser joining of mat'ls in automated assembly is usually limited to metals and plastics compatible with each other for a durable joint, typically without the addition of joining material.

If attempting to join two dissimilar metals like steel and cast iron, an alloying metal can be introduced to the melt pool via wire feed to provide that compatibility in the heat-affected zone.  The wavelength of the laser is dependent on the mat'ls being joined.

## ROBOTIC WELD CELLS

We are equipped to provide complete robotic well cells. As your complete automation solution, Eagle integrates all leading robotic solutions, including FANUC, Yaskawa Motoman, Denso, ABB, KUKA robots, and more. Whether your need is a small single robotic work station or a complete robotic assembly line of weld stations – Eagle has the solution for you



## PRESSING

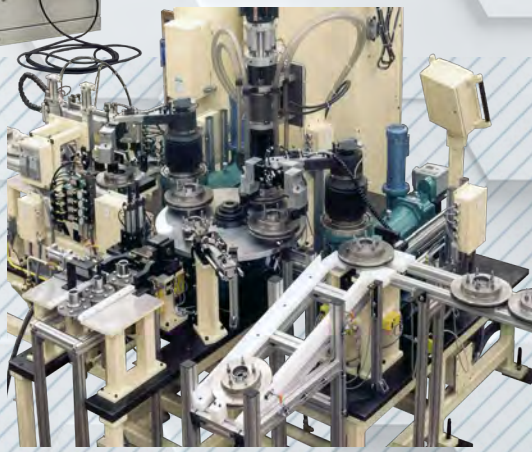
Our pressing machinery ranges from low-pressure hydro-pneumatic applications to high-pressure hydraulic and electro-mechanical applications that offer greater precision and sophistication. We take care to ensure the right process is chosen for your project, and include measurement and testing process to verify product uniformity.

### PRESSING SOLUTIONS INCLUDE:

- Force Monitoring
- Distance Conformation
- Press to Stall
- In-Process Control, Monitoring and Adjustment
- Signature Analysis
- Assembly Monitoring
- Traceability Recording

## FASTENING

Fastening techniques can be as simple as applying a screw or rivet, or as complex as sequential torques and fasteners. We also have experience with a range of adhesive and sealant applications which can be applied using our dispensing technology.



### FASTENING SOLUTIONS INCLUDE:

- Low and High Pressure Riveting Operations
- Orbit Riveting and Forming Solutions
- Hard Staking Operations
- Heat Stake of Plastic Components
- Ultrasonic Welding
- Pneumatic Hand Tools
- DC and Servo Screw Driving Applications
- Nut Driving Operations
- Adhesive and Sealant Dispensing Applications

## SWAGING

Swaging is a joining process whereby no new materials are added, but instead parts are fitted together and then expanded to secure the materials in place. This is a process typically used in ballizing a camshaft—a process we standardized in 1988, and have been replicating since. Today, more than sixty million camshafts have been produced using our swaging machines—technology we can put to work on your project as well.

# MATERIAL REMOVAL

**Manufacturers can benefit from working with Eagle, a full-service supplier. By identifying bottlenecks and areas of reject creation throughout manufacturing processes, Eagle can help refine those processes and help reduce scrap and manufacturing costs. One of the first steps in the manufacturing process is material removal. This can take the form of de-burring, gate removal, and many other processes. Shown below are examples of some of Eagle's material removal capabilities.**


## FACTORY AUTOMATION FROM RAW CASTINGS TO FINISHED PARTS.

We have automated manufacturing processes that begin with raw materials and end in parts ready to be assembled, validated, and shipped. Whether you need an automated solution to load parts to a CNC machine or to gauge critical dimensions, we can design a process that takes your manufacturing from start to finish.

### MATERIAL REMOVAL CAPABILITIES INCLUDE:

- Deburring
- Drilling
- Reaming
- Milling
- Trimming

### EDGES/SURFACES:

- Port Holes
- Fluid Passage Windows
- Gasket Surfaces
- O-ring grooves

### TOOLS:

- Knurled Burr Bits: Straight, Cone, Ball end, Tear drop
- Fluted Cutters: Straight, Tapered
- Brushes: Nylon, Steel wire, Silicon Carbide

### MATERIAL REMOVAL SPINDLES:

- Electrically or pneumatically driven
- Radially compliant, axially compliant, or rigid

### MATERIALS:

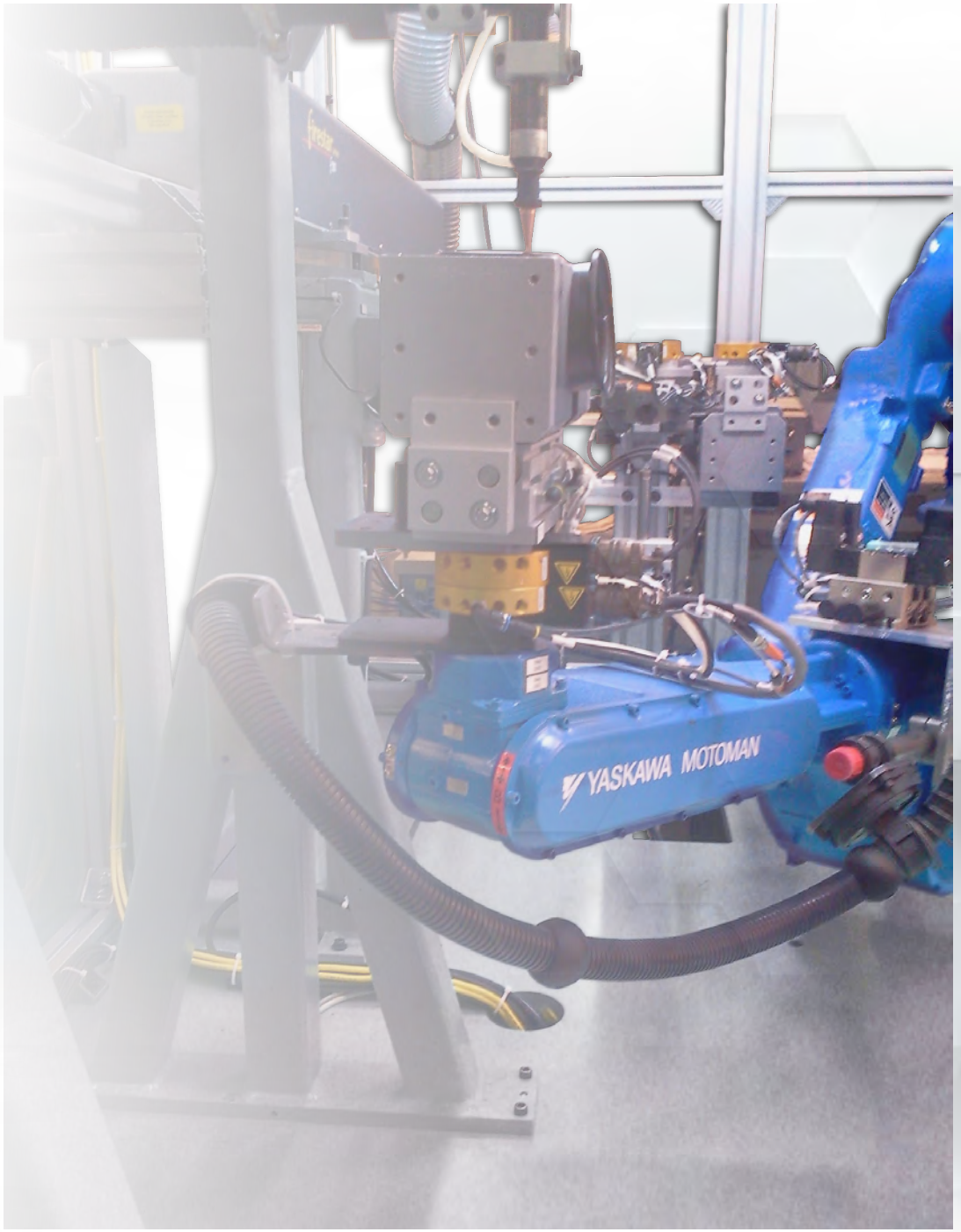
- Aluminum
- Steel
- Plastic

### IMPLEMENTATION:

- Fix-mounted spindle, robotically handled product
- Robot mounted spindle, fix-mounted product
- Automatic tool change for multiple edge/surface processing
- Laser measurement of tool wear
- Robotic fixture cleaning
- Vision Inspection of critical features
- Automated in-feed/out-feed conveyors
- Scrap containment and scrap handling systems
- Tool Cooling/Lubricating Systems
- Cleaning using Plasma Treat processing

## LASER ABLATION

Laser ablation is the process of removing material from a solid surface by irradiating it with a laser delivery system. Eagle uses laser technologies in many applications and with a large array of materials. Our experience from laser ablation removal of paint on radio bezel buttons to circuit boards identification – we have a solution for you.

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# PACKAGING

**Our automated manufacturing solutions don't just produce goods, we also sort, stack, and package them for shipment and distribution. We can even separate incoming materials so that each item goes through the right automated cycle.**

## AUTOMATION FROM PRODUCTION TO PACKAGING

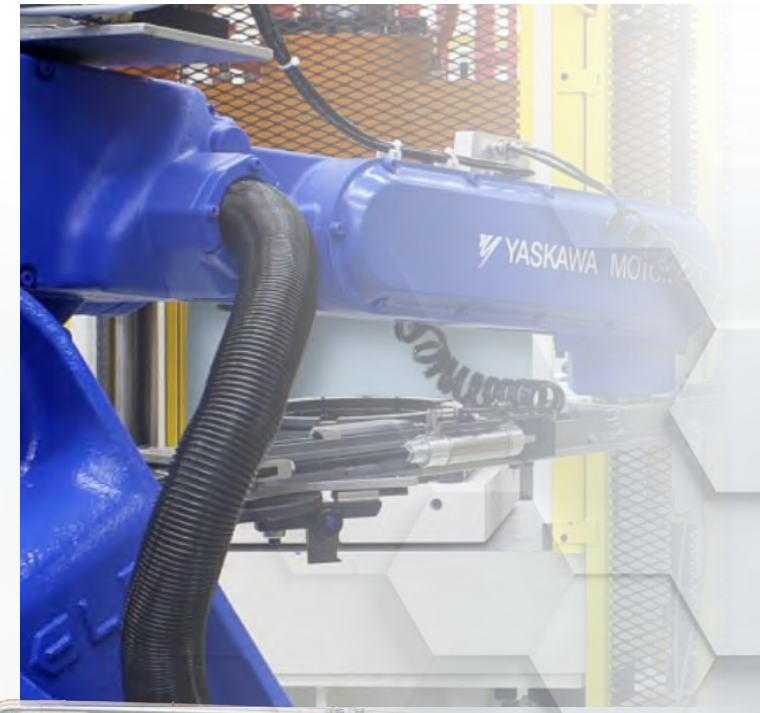
We offer a range of automated packaging solutions so that your products can go from the factory floor straight to the loading dock. They include kit assembly, pallet loading, and case loading. We can even take the size and shape of a product into account in order to optimize how it is stacked and loaded for shipment.

### PACKAGING CAPABILITIES INCLUDE:

- Bag & Case Loading
- Conveyor Systems
- Kitting
- Palletizing
- Sorting
- Stacking

# MATERIAL HANDLING

**Product parts must be safely moved through a factory without damaging them, tipping them over, or causing an inadvertent logjam in the assembly line. Our solutions for moving components through your plant range from conveyor systems to mobile robots that transfer parts from station to station.**




## MOVE YOUR COMPONENTS FROM A TO B

Several considerations must be factored into account during the creation of a factory automation assembly, including the number of stations, the fragility of the components, and the space within the factory. We base our automation solutions off your factory floor plan and product requirements to create systems that can safely and efficiently move product through your space.

## CONVEYOR SYSTEMS

Conveyors are some of the oldest and most reliable methods for moving parts through a manufacturing production line. Our conveyors systems come in a range of sizes with advantages and disadvantages based on application. We can help you find the right solution.

### CONVEYOR SYSTEMS INCLUDE:

- Palletized
- Chain Driven & non powered roller conveyor
- Tabletop Chain
- Bosch Rexroth, Flexlink & others.
- Twin Strand
- ITE, Mencom, & others
- Non-palletized
- Flat Belt
- Dorner, MK & Others
- Clean Room

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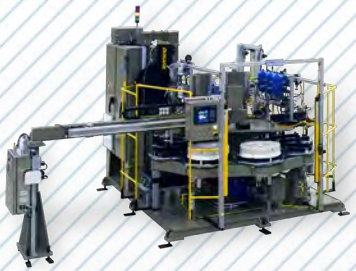
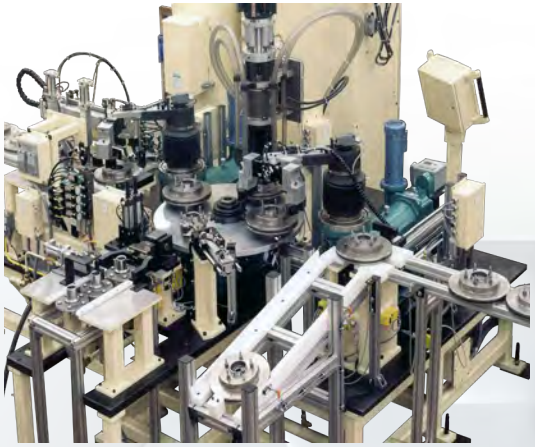
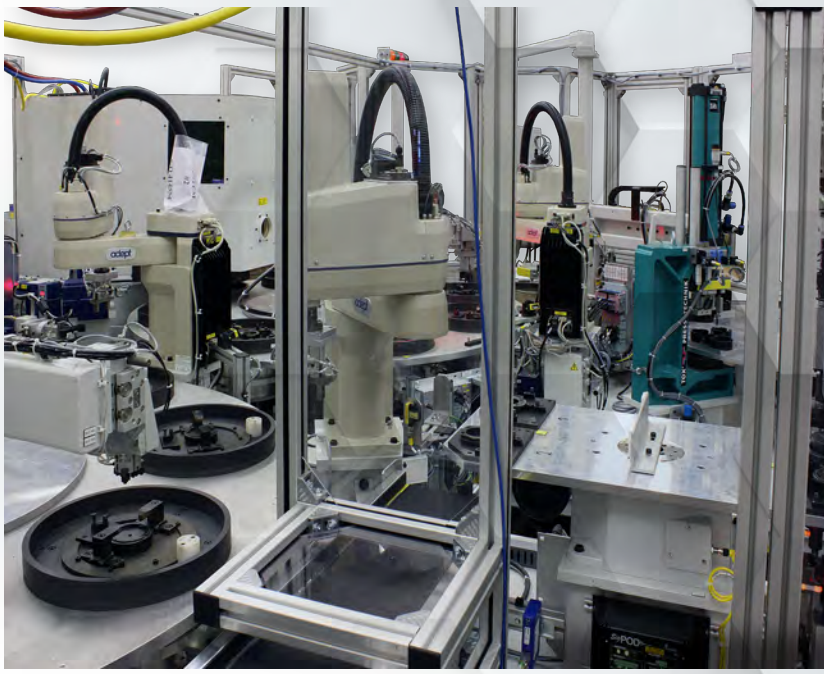




## DIAL MACHINES

Although a hard automation, dial and carousel machines provide a robust and long-lasting solution for quickly moving components from one location to another. We can retool these machines for more flexible applications, or repurpose them for a new application within your factory.



### DIAL MACHINE SOLUTIONS INCLUDE:

- Fixed Index
- Pneumatic
- Hydraulic
- Electric
- Servo Controlled
- Continuous Motion

## HITCH FEED & WALKNG BEAM

Whereas conveyor belt and even mobile robot solutions require loading parts onto a pallet or some other surface for transportation, which must then be returned to the start of the production line, hitch feeds and walking beams can move product through a manufacturing process without the need of an additional loading platform.

## MANUFACTURING ROBOTS

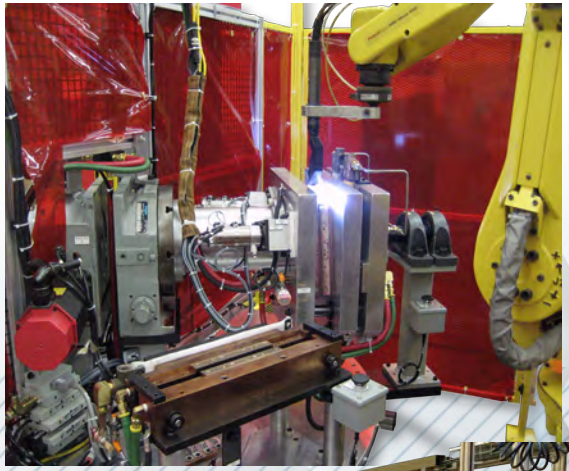
As robotic solutions grow increasingly sophisticated, our automation capabilities grow with them. We have created automated robotic solutions that are as simple as a two-axis pick and place robot, to as complex as those with six-axis motion control sensors and vision-guided high-efficiency packing machines.

### OUR ROBOTICS SOLUTIONS INCLUDE:

- Articulated (6-axis)
- Cartesian
- Parallel
- SCARA
- Mobile Robots

## MOBILE ROBOTS

Mobile robots are a special territory of robotics solutions. They have an advantage in many factory situations in that they can freely navigate a factory floor without prior programming, avoiding people and objects as they go. As a new but highly adaptable technology, they are expanding robotics applications within the factory automation industry.



## FIXTURE DESIGN

We sometimes encounter manufacturing needs that are not suited for automation, such as very low volume processes. For these, we use our expertise create safe and ergonomic fixtures that can be used manually or automatically to produce the same time-quality results as our automatic assemblies.

### FIXTURE DESIGNS INCLUDE:

- Manual Assembly Fixtures
- Test Fixtures
- Automatic Assembly Fixtures
- Multiple model fixtures
- Welding fixtures

## MANUAL WORKSTATIONS

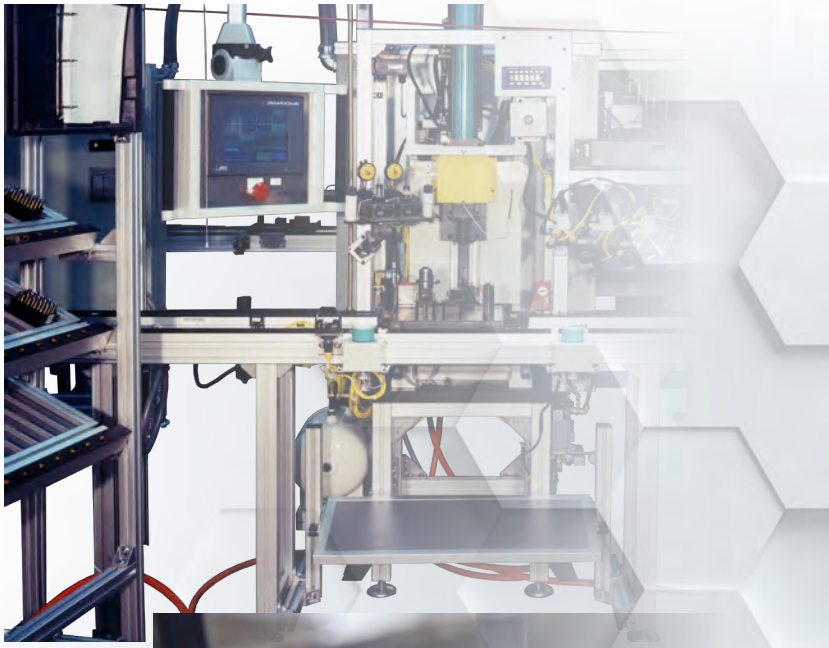
Operator workstations remain a central component of many factory automations, whether their role is to oversee production or move the process forward. We design high-quality ergonomic workstations for operators that are designed to optimize comfort, safety, and productivity.

### WORKSTATIONS WE PROVIDE INCLUDE:

- Manual Workstation – offline
- Manual Workstation – online
- Standard Platform/Quick Change Fixtures

# DISPENSING

**Weighing, measuring, and dispensing can be an automated end in itself, or part of a more complex manufacturing process. From powders to pellets, adhesives to lubricants, we can design the right solution for your product.**



## CHOOSING THE RIGHT PROCESS FOR THE DESIRED OUTCOMES

Automated dispensing technology can be used to measure pills for pharmaceuticals, powdered fertilizer for farming, or food products for packaging. For businesses that need to weigh and portion end products, our dispensing technology provides a reliable solution in keeping with FDA standards.

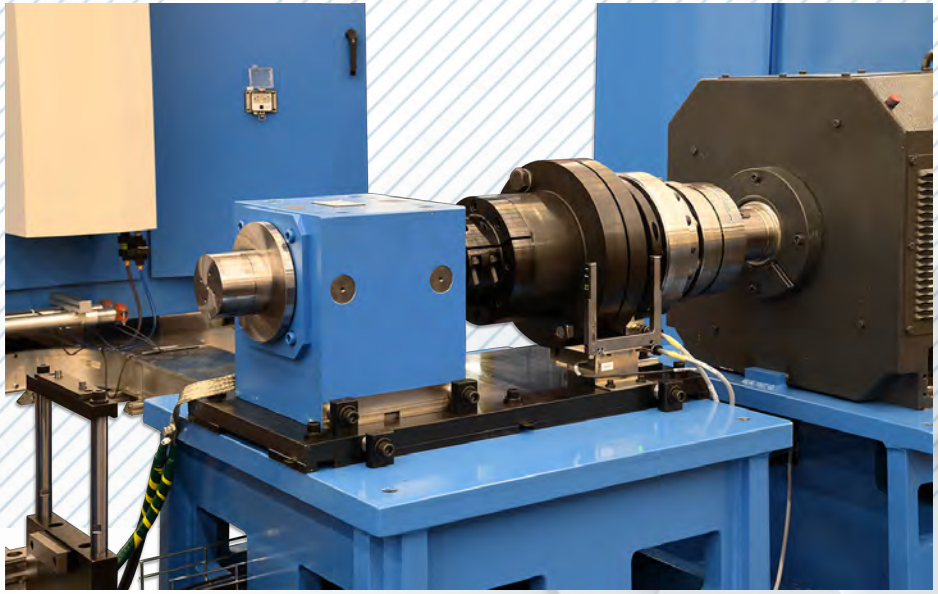
However, measuring a final product is only one application—we also incorporate our technology into assembly processes themselves. We have used dispensing technology to manufacture solar reflectors, draw a bead of caulk around a window, and apply grease to a joint.

## HIGH-SPEED DISPENSING AND PROCESS VALIDATION

Our experience in high-speed dispensing includes materials such as Betabate, Butyl apoxy, and two-part mixtures that need to be combined before rapid application. We also provide validation for our procedures using technologies including laser and vision inspection.

### DISPENSING CAPABILITIES INCLUDE

- High Speed Applications
- Programmable Displacement
- Feed & Weigh
- Fixed Displacement
    - o Liquids
    - o Adhesives
    - o Sealants
    - o Lubricants
- Solids
    - o Powders
    - o Pellets



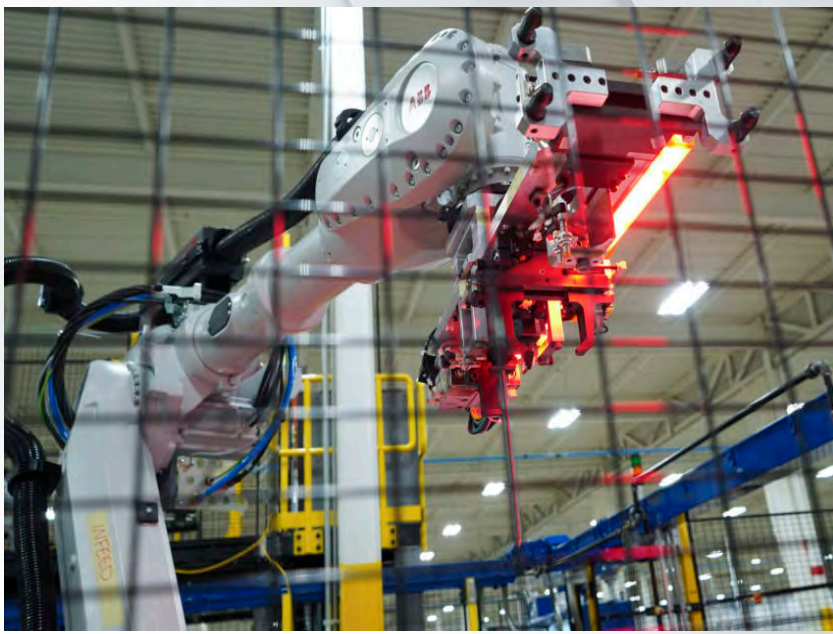
# VALIDATION

**Product assessment and measurement throughout the production phase has become a standard part of automated manufacturing in almost every industry. We build validation and verification into our systems so that you can monitor and adjust your manufacturing in real time.**

## IMPROVED RELIABILITY THROUGH MANUFACTURING VALIDATION

Validation and assembly processes are proven cost savers for businesses. These additional quality control measures mean businesses are able to reduce scrap and rework costs and reduce expensive product recalls linked to manufacturing flaws.

We offer several validation tests to ensure the products manufactured by our automated systems meet design specifications. When conducting these tests, we bring our validation equipment to each factory site to compare on-location data against the results of our laboratory tests. These correlation studies demonstrate that the output from each factory meets the same high standards achieved by our own tests.



## VISION VERIFICATION

Static vision applications are robust. However, when the application requires multiple model verification, component environments that change, a dynamic solution may be the best option. In many cases, Eagle will integrated a robot vision inspection station to save costs

## AIR VERIFICATION

Using compressed air, we can gather precise and reliable testing data about product performance by means of an inherently clean medium. By eliminating tests with dirtier and potentially hazardous wet materials, we can achieve cleaner, safer, and more accurate results.

### AIR VERIFICATION CAPABILITIES INCLUDE:

- Fluid pump performance
- Valve body tolerances
- Accumulator
- Valve seats and seals
- Compressors


## PRODUCT TESTING

We can create custom product test scenarios for almost any situation. If you need your final product to withstand certain boundary conditions, we can build our procedures around those limits and create a repeatable test that your team can perform to ensure product quality.

### PRODUCT TESTING CAPABILITIES INCLUDE:

- Crush
- Durability
- Electrical
- Functional
- Hardness
- Leak & flow
- Destructive

## GAUGING AND MEASUREMENT

When your product needs to meet highly specific output measurements, we can create tests that ensure you achieve them. We use results from our measurements to dynamically adjust the assembly process, thereby reducing the costs of Work in Process (WIP).

### GAUGING AND MEASUREMENT CAPABILITIES INCLUDE:

- Contact
- Non-contact
- Select fit
- Vision verification and measurement

# UNIVERSAL BASE

**Perfectly-suited for low-volume manufacturing, our universal base provides a compact and affordable solution for producing components or assembling goods in small batches.**

## BRINGING FACTORY AUTOMATION TO SMALL MANUFACTURERS

Factory automation has typically required large amounts of capital to invest in large, single-purpose machines designed to produce thousands of components a week.

Our universal base houses the most expensive hardware components, while our interchangeable tooling plates can be custom-built for your specific production requirements.


## CHALLENGE

- Full custom automation is too expensive
- Production doesn't run five days a week
- Has several automated tooling needs

## SOLUTIONS

- High-cost hardware built into base
- Program-specific custom tooling plates
- Easy to position and dock
- Universal, ergonomic, and ambidextrous

## RESULTS

- Affordable manufacturing automation for small production runs
- Reduced overhead costs and low capital expenditure
- Expandable functionality with new tooling plates



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## COMFORTABLE, USER-FRIENDLY CONTROLS

Our universal base has been ergonomically designed to include electric height adjustment, ambidextrous controls, touch screen operation, an operator fan for comfort, and LED lighting. The HMI is on a swivel arm for easy positioning, and is height-adjustable independent of the base so you can set it to the most comfortable sight-line.

The universal base is also built to be easily moved and docked. The operator panel includes well-lit controls and a pushbutton panel that can be easily positioned along the base rails. There is additional space along the back panel for accessories, which can be built according to customer specifications.

## EASY TO CONNECT AND CONFIGURE

Our tooling plates can be swapped out in less than a minute, making it easy for you to change fixtures throughout the day. The universal base comes equipped with standardized control packages to make setup and configuration quick and efficient.

The PLC control system includes Ethernet-IP connectivity, power outlets, programming ports, serial interfaces, and predesigned options for screw driving, leak testing, and part marking. Valves are prewired and plumbed, ready for configuration to your application. We have even included a courtesy airline to keep your work surface clean.

### UNIVERSAL BASE FEATURES INCLUDE:

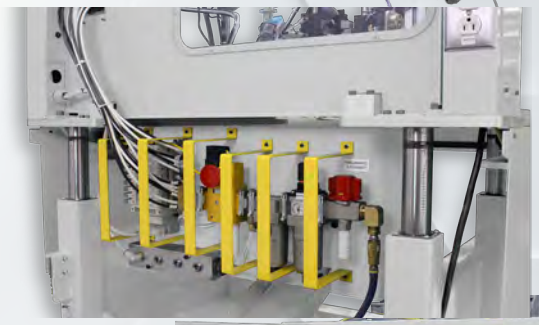
**Bulkhead connectors**

- Pneumatics on the fixture
- Discrete I/O on the fixture
- Serial on the fixture (BCR)
- Analog on the fixture
- Other user requirements

**Control Package**

- Allen Bradley Standard
- CompactLogix PLC
- Panelviewplus 700 HMI
- Ethernet-IP connectivity
- Serial to E-net gateway
- HMI controls Fan, Lights, Height
- Numatics Valve Manifold with Eight valves
- Rotary Disconnect

- Courtesy Outlet
- Programming Port
- Locking Casters
- Fork Truck Tubes
- Painted to your specification
- Pneumatic lockout
- Filter, Regulator, pressure switch



# INDUSTRIES **SERVED**

*WE ARE A CRITICAL MANUFACTURER IN THE GLOBAL SUPPLY CHAIN.*
Our customers come from a diverse range of sectors spanning agriculture, automotive, energy, healthcare, and the military.

Eagle engineers innovate factory automations that run vertical farms, mold contact lenses, dispense prescription drugs. We assemble washing machines and engine blocks, in-flight guidance systems and laptop computers, solar cells and nuclear fuel rods.

In any industry where automated manufacturing takes place, we play a role. This makes us part of the essential infrastructure keeping the world economy running. See how our industry expertise can serve you.

# AEROSPACE

The aerospace industry requires manufacturers who can accurately produce carefully-engineered components that operate at high speed with little room for error. We can meet those conditions.

**Aerospace manufacturing is a lengthy process involving rigorous design, testing, and validation. We work with your engineering department every step of the way, from prototyping and simulation to demonstrate proof of concept. Our advanced testing capabilities validate the end products to ensure they meet every design requirement.**

We can design machines to manufacture small parts, such as actuators, or installations that include complex electronics. Meanwhile, our manufacturing facilities, which include extra-wide bays and ceilings with high clearances, have the capacity to produce machines that can build large components. Contact us to learn more about our aerospace capabilities.

INTERNATIONAL ITAR REGISTERED AND COMPLIANT TRAFFIC IN ARMS REGULATIONS

# AGRICULTURE

It would be hard to imagine an industry more vital to the national health than agriculture. However, new and innovative ways to cultivate crops are necessary for this sector to thrive. Learn how our automation technology has supported growth.

**Vertical farming has been one of the most significant and exciting emerging branches of agriculture of the past decade. By combining efficient land use, fully automated planting, cultivation, and harvesting, and an indoor environment free of pesticides, it opens new possibilities for the next generation of farming.**

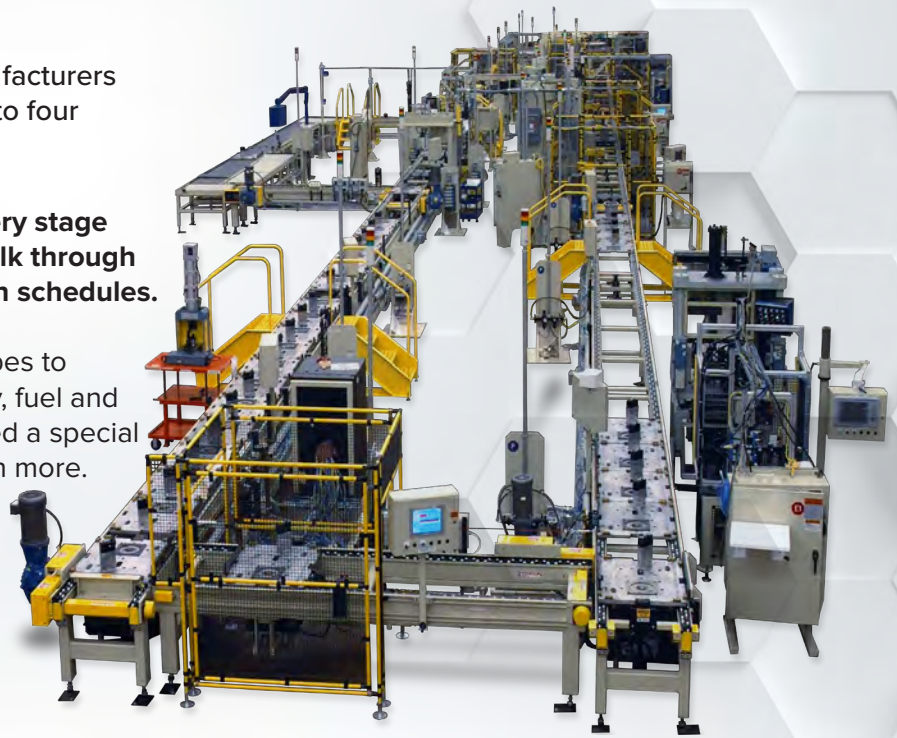
We have designed advanced robotics to transplant seedlings into farming towers, conveyor systems to move cultivator towers through the growth stages, and machines that harvest produce once it has reached maturity. We can even automate the cleaning and repacking of towers for future use.

# AUTOMOTIVE

They say you can't reinvent the wheel, but that hasn't stopped automotive manufacturers from redesigning every aspect of their vehicles from the ground up every three to four years. Iteration on this scale doesn't happen on its own.

**We have worked with automotive manufacturers from around the world at every stage of the manufacturing process. Whether you're an OEM or a supplier, we can talk through your needs to ensure your factory is up and running in time to fulfill production schedules.**

Our experience in the industry covers every stage of development, from prototypes to testing. We have worked on nearly every component, including chassis assembly, fuel and engine systems, powertrain, interiors, and HVAC systems. We have even launched a special innovation center in California specializing in electric vehicles. Contact us to learn more.

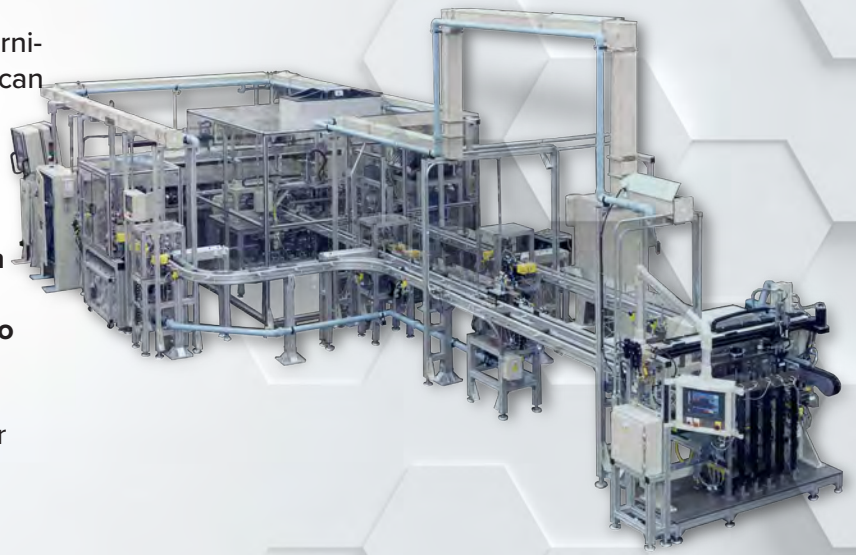


# CONSUMER PRODUCTS

The world of consumer goods is vast and varied. We've worked with manufacturers of furniture, household appliances, home electronics, and even vision technology. See how we can help you.

**One of the greatest challenges of manufacturing for consumer products is the sheer range of materials and processes involved. We have designed machines that can lift concrete floor tiles and assemble complex electronics, dispense adhesives and friction seal balance rings, stack products and load them onto pallets for shipping. Talk to us about your product, and we'll manufacture a machine that can assemble it from start to finish.**

Our specialization in vision technology has kept us at the forefront of the industry for over twenty years. From molding contact lenses to automating optical labs, we provide optical manufacturing solutions with crystal clear results.



# FOOD PROCESSING

Food processing requires a range of automated systems, from the production of the food itself, to the portioning, packaging, and loading of end products for shipment. Our machines provide safe and hygienic automation for every stage of this process.

**Factory automation has been part of food processing for decades, but that hasn't stopped us from finding ways to innovate. We use state-of-the-art motion control technology to improve the reliability and programmability of our systems. From dispensing pie fillings to stacking frozen hamburgers, we know how to automate food production to meet customer needs.**

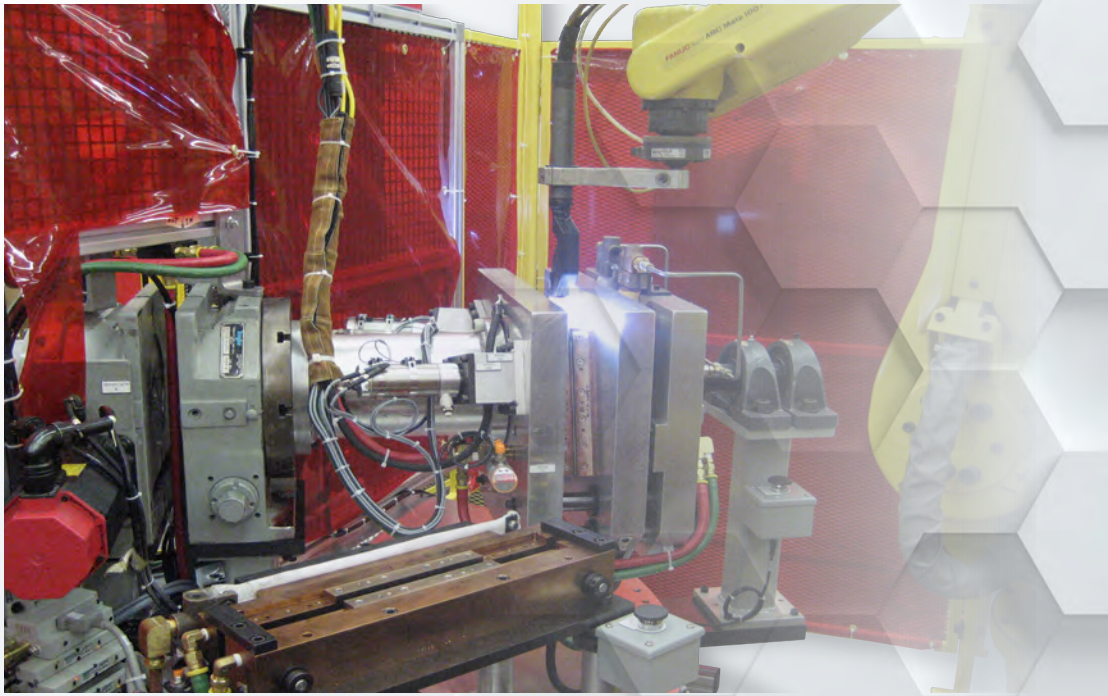
Any system that handles food must meet sanitation and hygiene regulations from the FDA. We know how to design our automated production processes to accommodate high temperature and high pressure wash-downs, along with full documentation support to show that our equipment meets federal guidelines.

# ENERGY

Advances in energy technology lead to widespread economic and environmental benefits both for the United States and around the world. As partners in the energy industry, we have played a crucial

**We have worked extensively in the green energy field, both in the generation of clean energy, and in improving the capacity of large battery storage. We can work with you to produce a more efficient turbine, design the production of solar energy cells, and engineer a more powerful electric vehicle.**

The nuclear industry requires special background knowledge and experience to ensure safe production and performance. We have worked in this sector on projects that include metal fabrications, storage tanks, and fuel rod production. Let us bring our expertise to your project.

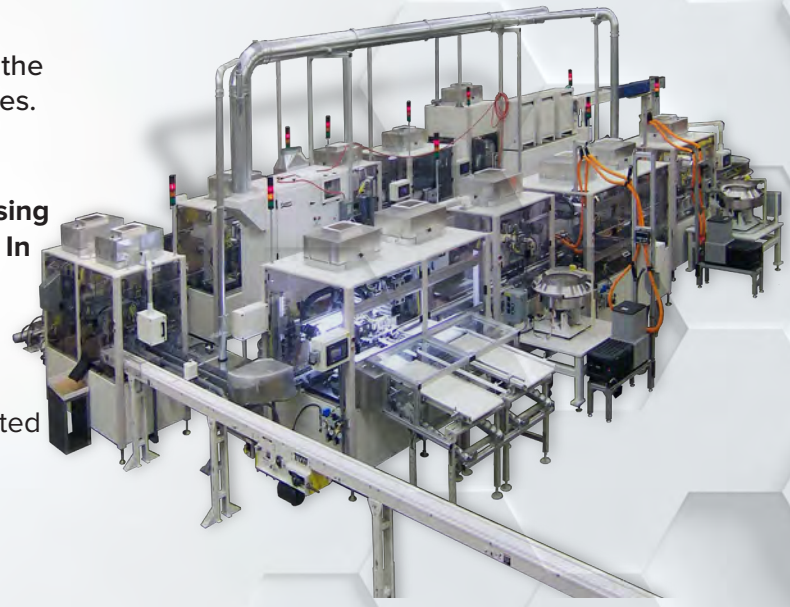


# HEALTHCARE

As one of the largest and most technologically advanced industries in the United States, the healthcare sector relies on automation to fill the demand for medicine and medical devices. We are here to help.

**Our experience in the healthcare industry falls into roughly two categories: the dispensing and packaging of pharmaceuticals, and the production and testing of medical devices. In each case, we go above and beyond to deliver automated machines that achieve class 10,000 clean room standards, and meet GAMP and FDA regulations.**

From mail order pharmaceuticals to contact lenses, disposable devices to surgery kits, implantable heart pumps to plasma collection equipment, we can design and test automated processes to meet the intense demand the health industry faces every day.

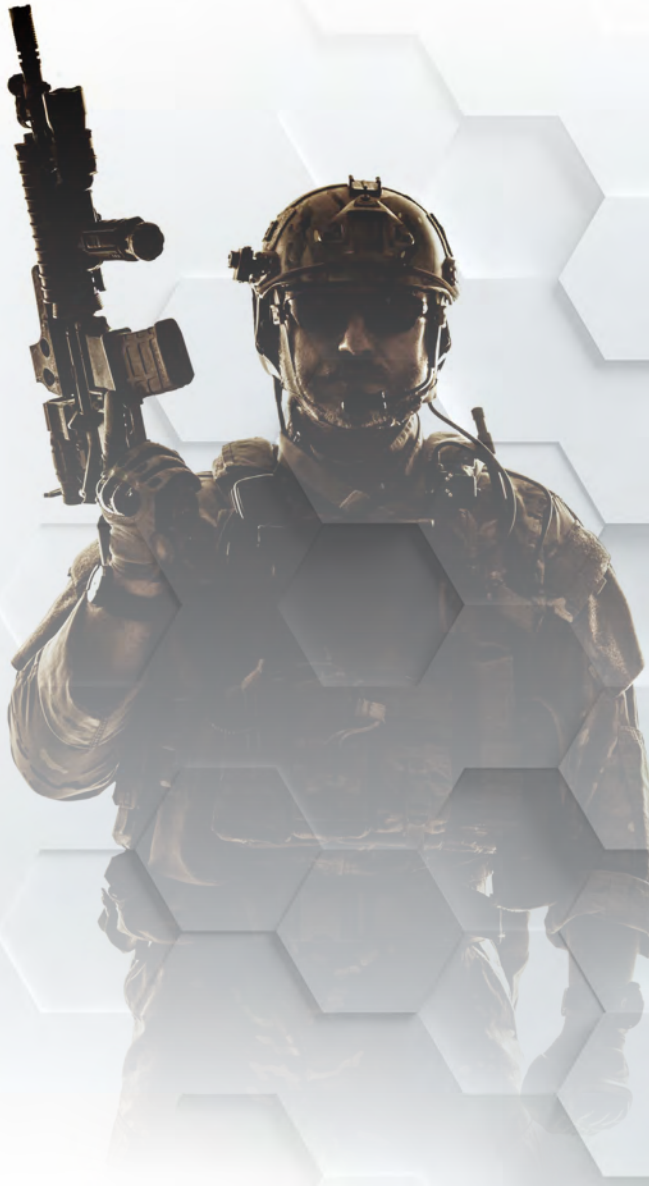


# MILITARY

For over seven decades, the United States has been the largest military force in the world. With a global infrastructure comes a demand for safe and secure high-volume manufacturing. That is what we supply.

**Whether we're assembling flares to be used in planes or precision guidance systems, Eagle Technologies brings the most advanced technology to military manufacturing. Even when assembling a fuse or handling sensitive powder, our machines are designed to operate in an intrinsically safe environment.**

We have also automated the manufacture of non-lethal munitions used in peacekeeping operations. These less-than-lethal products can include chemical devices such as pepper spray or tear gas, riot guns that use sub-lethal ammunition, or electroshock weaponry that can stun or disable with lower risk than traditional munitions.



INTERNATIONAL ITAR REGULATIONS REGISTERED AND COMPLIANT TRAFFIC IN ARMS

# ADVANCED TEST SYSTEMS

Around the world, six sigma standards have become the new hallmark of top-quality engineering. This excellence by design—which requires that even the worst of the worst outcomes still pass manufacturing requirements—has been made possible only by the type of advanced test systems we offer at Eagle Technologies.

# CORE CAPABILITIES

**Mechanical concept, design, and build for product test configurations; axle, transmission, trans-axle, engine, PTO, and EV/EV battery systems.**

- 3D Design and FEA
- Modeling validation using SolidWorks, MSC or ADAMS
- NVH design validation & stress/strain validation to insure robust machine designs

Controls concept, design, and complete panel build along with test pod (test computer/UPS/hardware/CAN BUS).

- Test Software Design & Support (NI LabVIEW, NI TestStand, DISCOM, BauerControls, WMA, AB Plato, other)
- PLC (Allen Bradley, Siemens, Mitsubishi, Omron)
- Drives/Motors (Rockwell, Rexroth, Siemens, Yaskawa, Unico, KEB, ABB)
- Serial/Digital Controllers (VECTOR CANape, other)

## SPECIAL DESIGNS

- Time/Frequency/Order Domain Analysis (NICK, Torque to Turn, Backlash, other)
- Angular Based Analysis (Dynamic torque/Angular Acceleration)
- Leak Test/Mass Spec
- Vision Systems (Area Scan-Line Scan)
- Integrated Robotic Systems Supporting EOLT / Final Test

# ELECTRIC VEHICLES

**In the past decade, innovations in fuel cell technology, autonomous driving, and rapid charging have transformed the electric vehicle market. To maintain the rapid pace of development, EV manufacturers depend on the high-level testing we provide.**

## ADVANCING THE CUTTING EDGE OF EV TESTING SYSTEMS

Every part of an electric vehicle, from the powertrain to the autonomous systems, requires rigorous testing and validation to ensure proper functioning and prevent the need for a costly recall.

Our investment in the EV industry leaves us uniquely positioned to run verification tests on our machines that demonstrate the reliability and repeatability of our methods. Our facilities include both an advanced testing center in the Detroit Metro area and an EV Innovation Center in San Jose, California featuring our Electric Battery Assembly Machine.

### INVERTERS

As the component used both to convert DC to AC energy, and to control speed and torque, the inverter plays an essential role in the EV powertrain. Our testing validates the individual components, and ensures they function properly within the final assembled powertrain module.

### BATTERIES

As companies compete to engineer more powerful batteries for electric vehicles, our testing verifies that the new systems meet the design standards. We offer specialized test systems for battery assemblies for EV powertrains that monitor heat transfer, charge efficiency, and energy transfer to the inverter.

## STATORS/MOTORS/ROTORS

The EV motor is one of the most finely-tuned components in an electric vehicle. With rotors running at up to 20,000 RPM, and stators that require complex wiring to function, each part needs to be properly validated before it can be integrated into the final assembly.

## DRIVE UNITS

In an electric vehicle, the drive unit is what translates driver input from the accelerator pedal into speed adjustments in the motor inverter. Our testing verifies that these signals are transmitted appropriately.

## FUEL CELLS

Fuel cells are an alternative to batteries for producing energy for electric vehicles. A zero-emissions technology, they rely on the chemical reaction of hydrogen and oxygen to create a charge for the electric engine.

## BATTERIES

As companies compete to engineer more powerful batteries for electric vehicles, our testing verifies that the new systems meet the design standards. We offer specialized test systems for battery assemblies for EV powertrains that monitor heat transfer, charge efficiency, and energy transfer to the inverter.

## AUTONOMOUS

The sensor technology powering autonomous vehicles demands highly accurate input data that can monitor and respond in real-time to rapidly changing driving conditions. These systems must be tested extensively to demonstrate that they can safely replace human control of a vehicle.

## MIRROR ACCESSORIES

The next generation of auto technology integrates additional sensors and monitoring systems to relay traffic information to the driver or the autonomous controller. Our test systems check the quality of this data to ascertain its reliability.

## NVH

Electric vehicles are quieter than their combustion-fueled counterparts, and so naturally lower levels of noise, vibration, and harshness are expected. In some cases, this has raised new problems related to pedestrian safety.

## ADVANCED DRIVER ASSIST SYSTEMS

While fully autonomous vehicles are still rare, vehicles with advanced driver assist systems are the new standard for the latest range of models. These features include parking assistance, collision warnings, and object tracking.

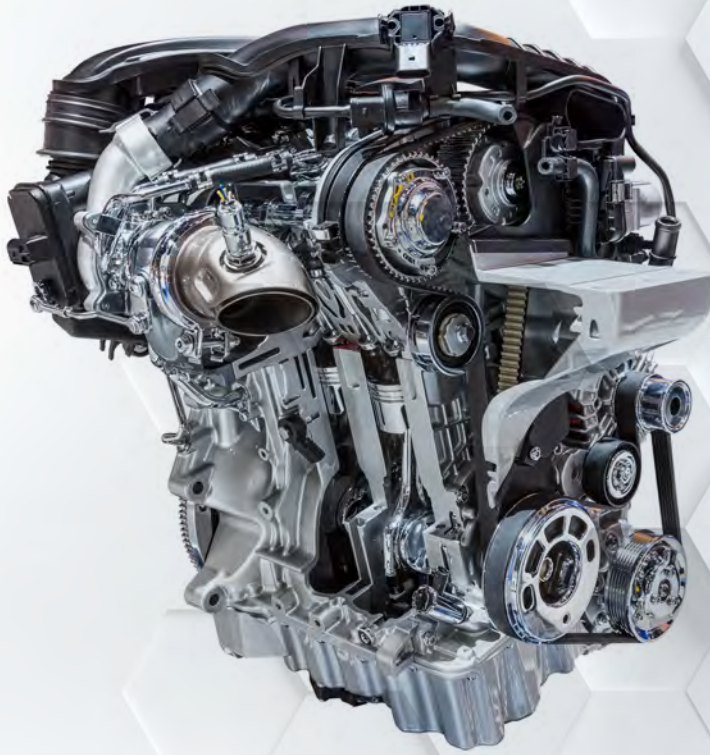
# ENGINES

**Despite recent investments in EV technology, the combustion engine remains the most common choice for automotive applications. Yet advances in design and engineering make it far from traditional. Let us help you achieve the next big step forward.**

## ENHANCED ENGINE EFFICIENCY AND PERFORMANCE

Horse power and fuel efficiency are two of the main factors related to engine performance that influence consumer purchasing decisions. The desire to improve these metrics has driven innovations in engine design. However, these advances must be verified through careful testing to certify that each new improvement meets engineering specifications and passes quality control measures.

We run both hot and cold tests to gain the clearest understanding of how our engines are performing. Our tests either verify that the product is ready to go to market, or else identify production flaws that need to be addressed before production.



### COLD

A cold engine test allows for more controlled performance measurements at both high and low speeds. Our cold test validates the engines primary functions, as well as sensors, cams, and pressures, while our advanced signature analyst systems provide a full characterization of the motor.

### HOT

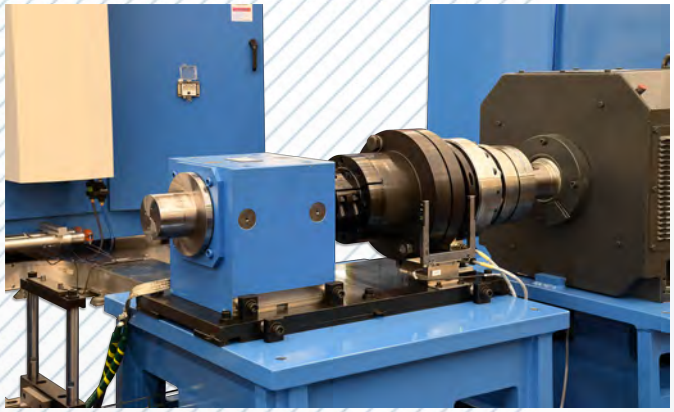
A hot test runs the engine regular operating conditions, measuring fuel efficiency, drivability, and torque speed performance. Metrics from this test can be measured against design requirements to ensure they meet quality control standards.

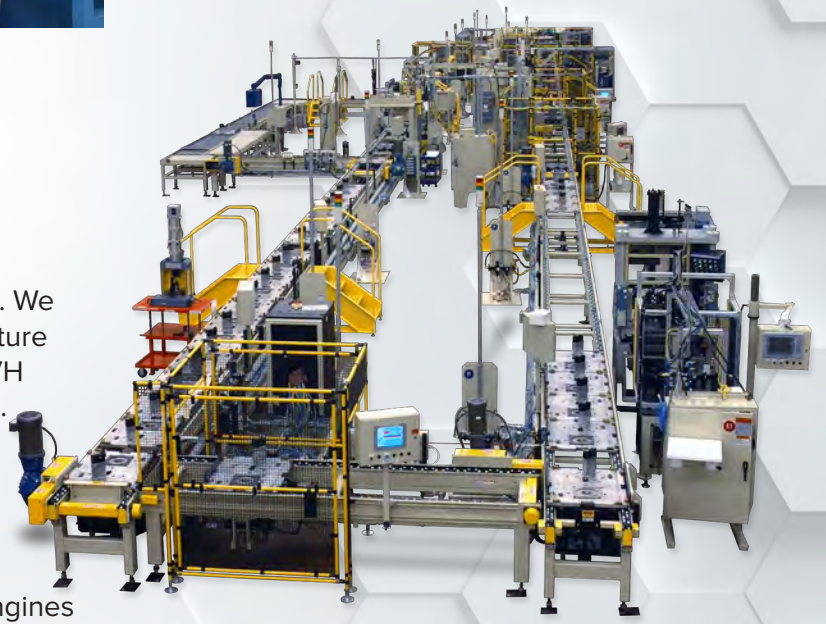
### STATIC SPARK

Without a functioning spark plug, the engine won't run. Static spark testing allows us to isolate a firing circuit to check timing and analyze its characteristics.

### WIRE HARNESS

The wire harness is essential for relaying both electrical power and critical sensor data throughout the vehicle. Our advanced signature analysis allows testers to run both hot and cold validations and characterizations of engine wiring circuits.





## CAMSHAFT

Engine camshaft validation checks for out-of-specification lobes, incorrect cam functioning, and other cam defects that can affect engine performance. We run both hot and cold tests to provide characterization of the camshaft.

## TTT/NO PISTONS

We use dynamic torque-to-turn evaluations to check for possible issues with the crankshaft prior to full motor assembly. This allows us to check for binding errors, bent shafts, or even missing bearings.

## TTTW/PISTONS

Torque-to-turn tests including pistons are essential to be sure that the final engine assembly meets quality control standards. We use a combination of our advanced signature analysis along with torque signals and NVH probes to validate short block assemblies.

## NVH

We measure NVH characterizations using dynamic torque, linear acceleration, and dynamic angular acceleration to certify engines meet design specifications. When necessary, our advanced testing tools include laser vibrometers and microphone arrays to help characterize dynamic noise from the motor.

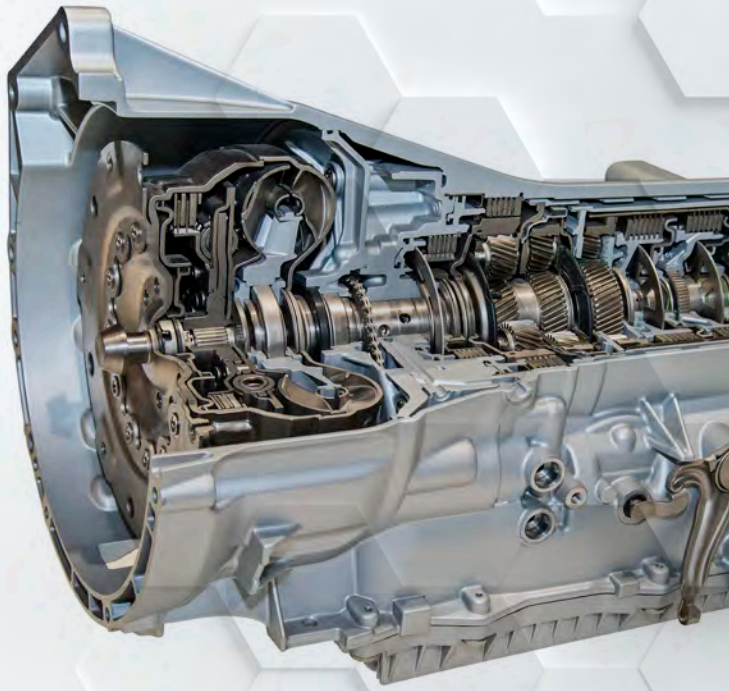
# TRANSMISSIONS

**The transmission transfers energy from the engine through the powertrain, meaning their performance has a direct impact on engine efficiency. From manual to automatic, multi-speed to dual clutch, we can test your transmission systems to ensure peak performance.**

## BETTER HANDLING, GREATER EFFICIENCY.

Many gains in engine performance are tied to transmission efficiency, from continuously variable transmissions which operate without a fixed gear ratio, to higher production standards that reduce manufacturing flaws.

However, transmissions don't just affect engine performance; they also impact the driver's experience while handling the vehicle. For automotive enthusiasts, the sound of an engine shifting gears, or the feel of a clutch making a smooth transition, are essential for their enjoyment. Our testing can check for handling and driver experience metrics, as well as for performance.



### SOLENOID CHARACTERIZATION

In a transmissions and fuel injection systems, precise control over pressure and flow is what allows for smooth handling of a vehicle. Solenoid testing of the final assembly validates factors such as volume in a circuit or the positioning of a clutch.

### VALVE BODY WET TEST

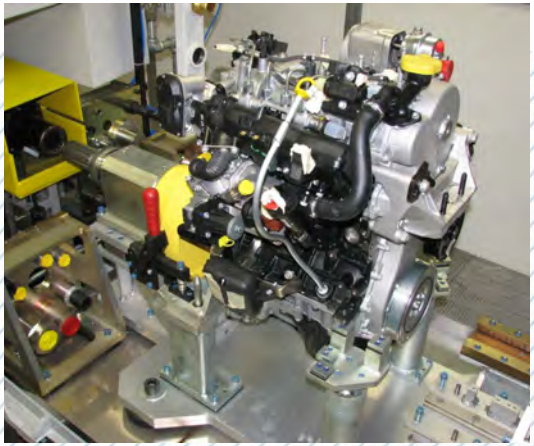
Following the air test, we use a wet test using the appropriate fluids and the right temperatures for a full working assessment of the final assembly. This also allows for a full characterization of the solenoid circuits.

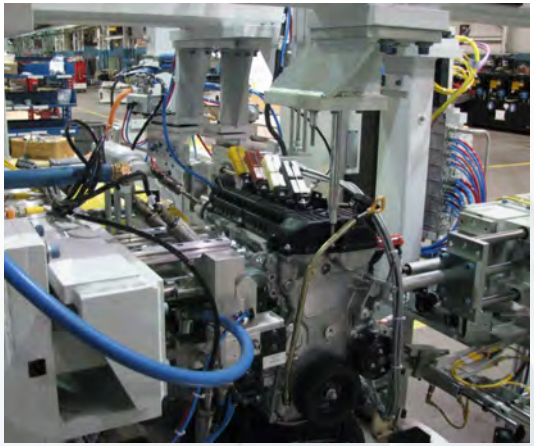
### VALVE BODY AIR TEST

High-pressure air tests provide preliminary validation before a full wet test. The air test can be conducted at lower pressures and with fewer tools than a wet test, and can indicate if there are any leaks in the system that would impede functioning.

### FWD/RWD/AWD

During this test, we conduct a full assessment of the final powertrain assembly for front-, rear-, and all-wheel-drive systems. The systems check review electrical integrity, pumps and pump noise, the final characterization of sub systems, kiss point calibration, shifting, NVH, and parking pawl.





## 4–10 SPEED

In cars with automatic transmissions, higher-speed gearboxes can lead to increased engine efficiency and performance. Our multi-speed transmission tests include high-speed, precision balancing tools and testers which include the CANBUS interface.

## HYBRID ELECTRIC

Hybrid transmissions combine a smaller electric battery system with the standard combustion engine resulting in a vehicle that has tremendous gains in fuel efficiency without the range limitations of an electric vehicle.

## DUAL CLUTCH

Dual clutch transmissions allow for quick shifts while maintaining the power train within its peak torque band range. As these systems are essentially three transmissions in one, they require additional checks to be sure all parts function harmoniously.

## NVH

Noise, vibration, and harshness testing is critical for end-of-line testing in transmissions. We used advanced linear, torsional, and dynamic torque sensors to ensure proper validation, and include nicked gears, PLRO, and gross imbalance as part of our standard testing.

# AEROSPACE & MILITARY

**Aerospace and military technologies represent a class of high-tech products that must operate under conditions far beyond everyday applications. Our test systems ensure that they measure up.**

## DEVELOP AND DEPLOY THE NEXT GENERATION OF ADVANCED TECHNOLOGY

From jets traveling several times the speed of sound to armored vehicles that must hold up under explosions and heavy fire, components designed for aerospace and military applications must be reliable above all else.

We bring decades of experience in automotive and ballistics manufacturing, as well as new VR, 3D additive manufacturing, and advanced simulations to help your team move projects from proof of concept to final production.

### DEVELOPMENT

Our range of cross-industry experience means we can work with you to develop premium-grade equipment for aerospace and military applications. From material sciences to heat treating to advanced signature analysis, we have the resources to support your project.

### ASSEMBLY TEST

Having demonstrated proof of concept in the development and validation stages, we can complete your project through our assembly and test systems. Whether you need a manual or fully automated process, we can deliver according to your requirements.

### VALIDATION

Aerospace and military technologies must be able to withstand intense pressures and extreme conditions. We validate variables from dynes to durability to ensure your technology continues to operate at peak performance.

INTERNATIONAL ITAR REGISTERED AND COMPLIANT REGULATIONS TRAFFIC IN ARMS

# LIFE SCIENCES

**Advances in medical technology have revolutionized modern medicine, offering new procedures, treatments, and medical devices to hospitals and patients. Our advanced testing systems help these products reach the market quickly and safely.**

## ENHANCING THE PRODUCTION OF LIFE-SAVING EQUIPMENT

Now more than ever, the life sciences industry is seeking reliable partners in their supply chain to increase the production of essential medical supplies. However, these supplies must meet the high standards set by the FDA in cleanliness and safety before they can be approved for mass production.

Our experience in the life sciences industry positions us to exceed regulatory guidelines, while providing the requisite documentation to validate our procedures.

### LABORATORY

When producing prescription drugs in a laboratory setting, a number of tests must be conducted to demonstrate product safety. We can measure temperature, volume, pressure, and force, along with other metrics, to meet your project specifications.

### VISION SYSTEMS

We have specialized in optical manufacturing for decades. Our advanced testing capabilities in this field include area scan, line scan, surface finish, and surface topography. From contact lenses to eye glasses, we can support your vision system requirements.

## WE CAN BE YOUR ADVANCED TESTING PARTNERS

**Our job is to choose the right sensor to measure the right measurement to report the right data. By conducing advanced testing at key points in the manufacturing process, we can identify potential production failures before they reach consumers, saving businesses hundreds of thousands of dollars in costly recalls that damage the bottom line and lead to tarnished reputations.**

We are not satisfied by passing tests under perfect lab conditions. Rather, we bring our testing equipment into the field, to each manufacturing plant, so that we can run correlation tests that show our machines achieve the same high production standards as the baseline no matter where they are deployed.

EAGLE TECHNOLOGIES
Engineered Factory Automation

**sales@eagletechnologies.com | 269-465-6986**

# PROJECT MANAGEMENT

UTILIZING PROCESSES BASED ON PMI STANDARDS AND GUILDINES, EAGLE TECHNOLOGIES PROJECT MANAGERS FOLLOW A STANDARDIZED PLAN FOR EXECUTING PROJECTS. THESE PROCESSES FALL INTO INTIATING, PLANNING, EXECUTING, MONITORING/CONTROLLING AND CLOSING OUT THE PROJECTS.

THE EIGHT TOOLS LISTED PROVIDE VISIBILITY AND TRANSPARENCY THROUGHOUT THE PROJECT TO OUR CUSTOMERS AND INTERNAL TEAMS. OUR #1 GOAL IS CUSTOMER SATISFACTION.

# PROJECT MANAGEMENT TOOLS

**MEETING NOTES:** Are a vital way of managing a project. They contain a list of attendees, meeting objectives, meeting minutes and action items.

**PROJECT SCHEDULE:** The project schedule is a tool that communicates what work needs to be performed in a specific amount of time. All Eagle projects use a standard template. The template includes all the milestones with details provided on each line item.

**OPEN ISSUES LIST:** Open issues lists: one of the most important tools for Eagle is our open issues list. It's a transparent list with issues, person responsible, priority and due dates.

**PROJECT CHANGE NOTICE (PCN):** As changes in scope occur, our project managers will quickly develop cost and timing impacts to facilitate fact based discussions on whether the scope change will be implemented.


**VISUAL PLANNING BOARDS:** The visual planning boards give our team and the customer insight and visual status of our progress. See reverse side for more details.


**TEAM MEETINGS:** Our project manager will setup recurring meetings as required with the Eagle project team and our customer's team. We will review the open issues list, schedules, design review and project progress. Every meeting will be documented and distributed accordingly.


**STAND UP MEETINGS:** When the project is in the build phase, the project manager gets the team together by the equipment to review the project status and talk with the build team. Our team will flush out many issues and questions during this 15-30 minute meeting.

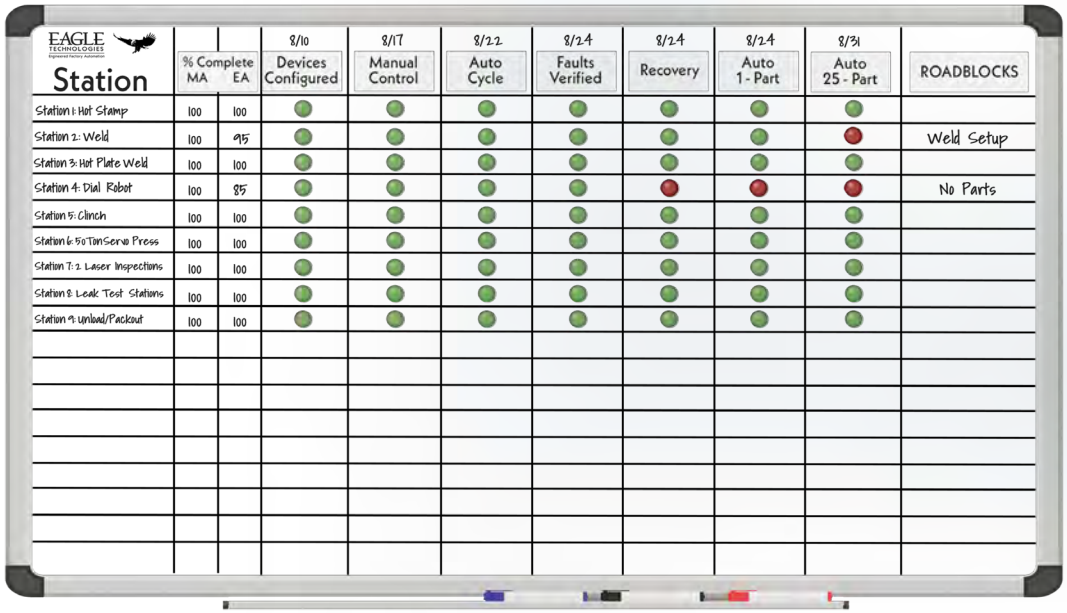

**LESSONS LEARNED:** We finalize a project by gathering the project team together, excluding management this group discusses the things we did well and the things we need to improve on. These findings are reviewed with the functional managers and corrective action plans are developed and implemented.

# VISUAL PLANNING BOARDS (VPB)

When it comes to knowing where Eagle is at during the build and
debug stage of a project, look no further than the visual planning boards.
The visual planning boards give our team and the customer insight and visual status of our progress.

## CONTROLS ENGINEERING DEBUG
## PROGRESS VISUAL BOARD

This VPB gives the team and our customer a breakdown of the controls engineering progress by station.



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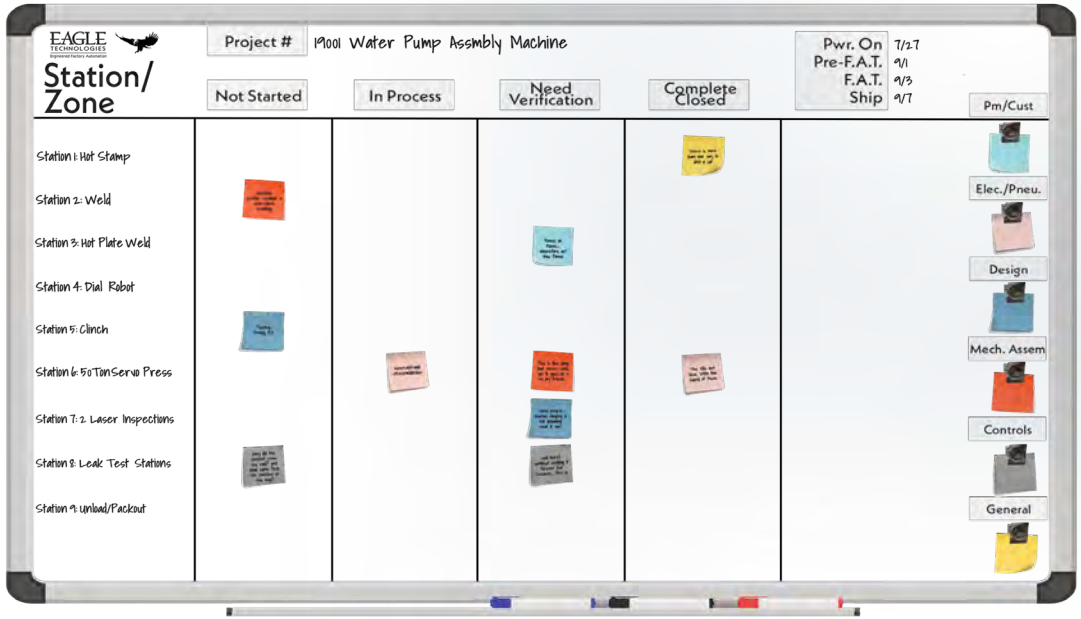
## BUILD TEAM DEBUG
## PROGRESS VISUAL BOARD

The build team VPB gives both our customer and the Eagle build teams transparency to open tasks as the build progresses in real time.

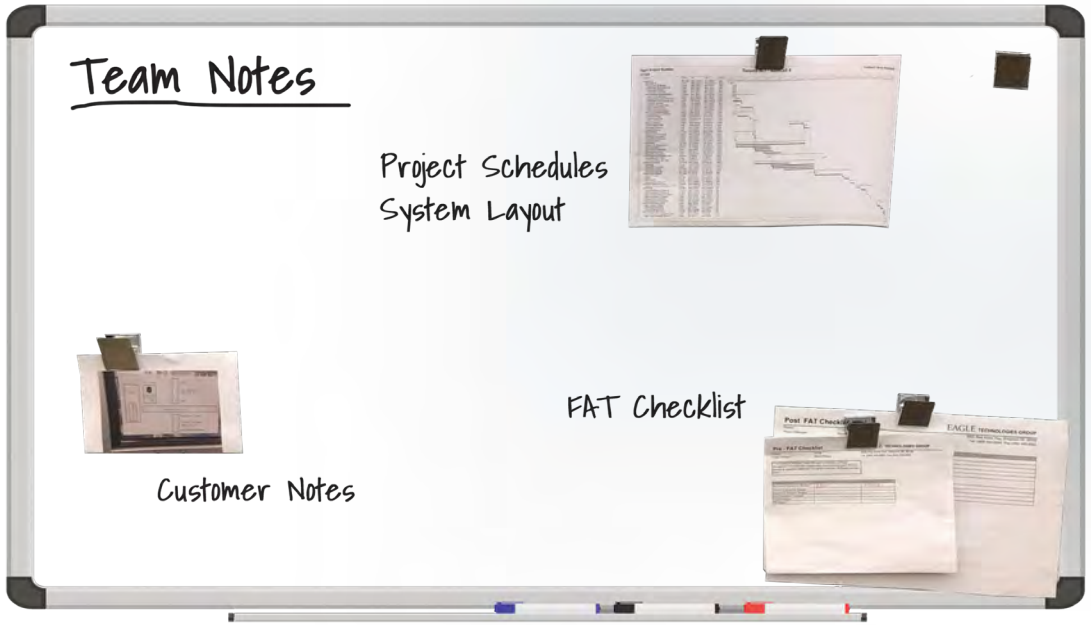


# VISUAL PLANNING BOARDS (VPB)

**When it comes to knowing where Eagle is at during the build and debug stage of a project, look no further than the visual planning boards. The visual planning boards give our team and the customer insight and visual status of our progress.**

## CUSTOMER & EAGLE TEAM BOARD

This VPB is where we post schedules, checklists, layouts, and open issues. This VPB allows for communication across the build team, engineering, and our customer. We welcome our team and the customer to make notes and observations as we progress through debug and run-off.

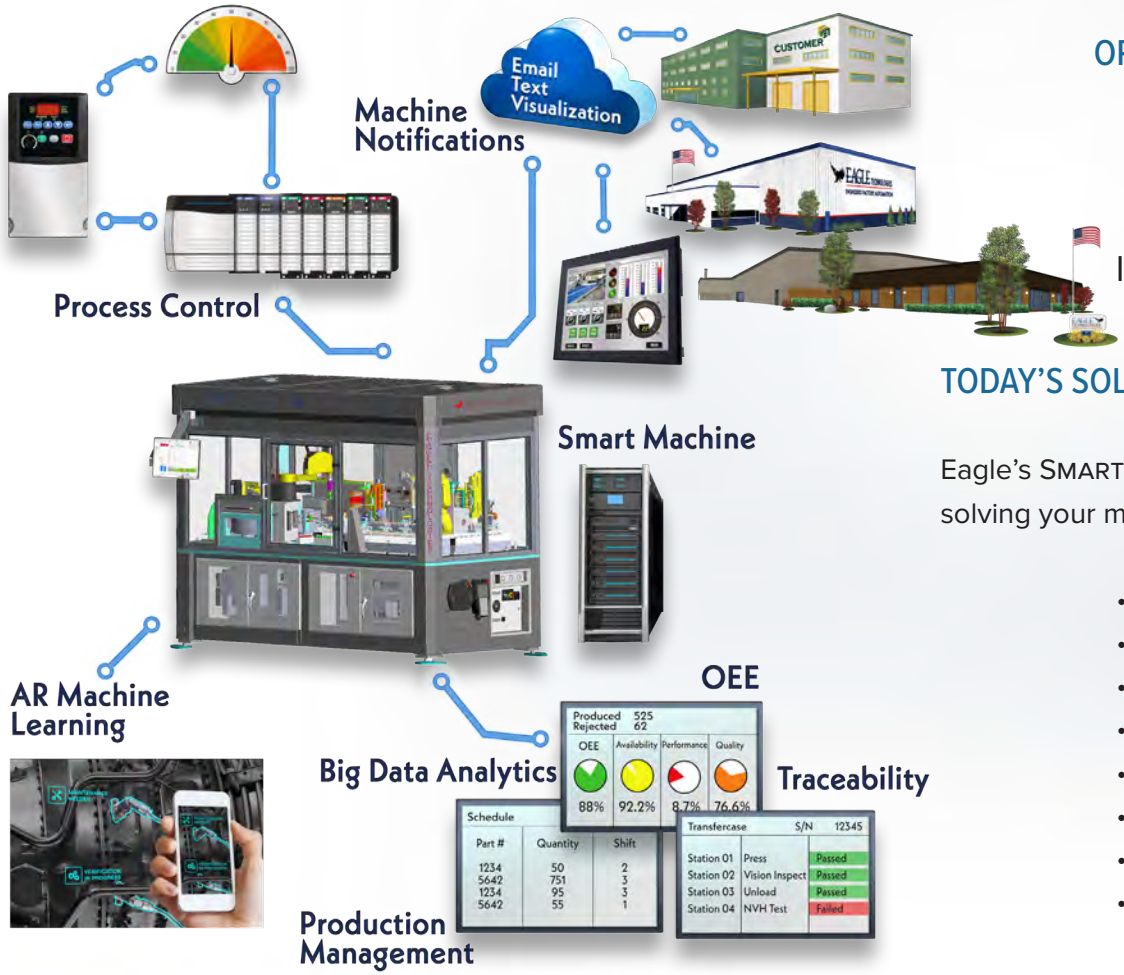



# SMARTTRAC IOT

SMARTTRAC IOT SUITE IS AN INDUSTRIAL ENTERPRISE SOFTWARE UTILIZING IOT HARDWARE DEVICES WE INTEGRATE AND DEPLOY INTO OUR AUTOMATION SYSTEMS.

# INTRODUCING EAGLE SMARTTRAC IOT MACHINE TECHNOLOGY

## ADVANCING MANUFACTURING SOLUTIONS WITH INDUSTRY 4.0 TECHNOLOGIES




### OPTIMIZE YOUR AUTOMATION ASSET TODAY

Reduce rework
Increase asset uptime
Reduce maintenance time
Increase production associate productivity

### TODAY'S SOLUTION FOR TOMORROW'S MANUFACTURING

Eagle's SMARTTRAC solution provides a forward-thinking approach to solving your manufacturing headaches. Featuring:

- Machine Notifications
- Production Management
- Process Control
- Traceability
- OEE & Downtime Tracking
- Big Data Analytics
- KPI Dashboards and Reporting
- Augmented Reality

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# WHAT IS SMARTTRAC?

Eagle SMARTTRAC is an industrial enterprise software that leverages IoT hardware devices we integrate and deploy into our automation systems. We integrate SMARTTRAC software to improve asset management, decision making, and operational visibility for our customers and internal Eagle value stream contacts such as service, support, and spare parts. Our solution emphasizes uptime and minimizing production loss through sophisticated and segmented network designs. Working with our customers, Eagle engineers layout a design that will reduce cost drivers in every automation asset we design and build. Streamlining and optimizing your automation asset to reduce unplanned downtime.

# PLATFORM HIGHTLIGHTS

Eagle SMARTTRAC utilizes Industry 4.0 Technologies to improve insights and actions across automation assets of our customer's factory. We gather complex machine data from networked devices like I/O blocks, torque drivers, vision cameras. Our IIoT software platform SMARTTRAC monitors IoT endpoint devices and event streams (I/O, Variable feedback, Error recovery) which give our customer insights into every machine process.  SMARTTRAC is your gateway to managing your production, from downtime notifications to production management, SMARTTRAC is available in various levels to accommodate many different needs

# NOTIFICATIONS

The only thing better than a machine that never goes down is one that gives you plenty of advance notice. That's what the Eagle's SMARTTRAC is designed to do. It not only delivers on-screen fault notifications to your operators, but it is also proactive in identifying maintenance concerns early so that your team can schedule maintenance during planned downtime, instead of having to conduct emergency repairs during peak operating hours.

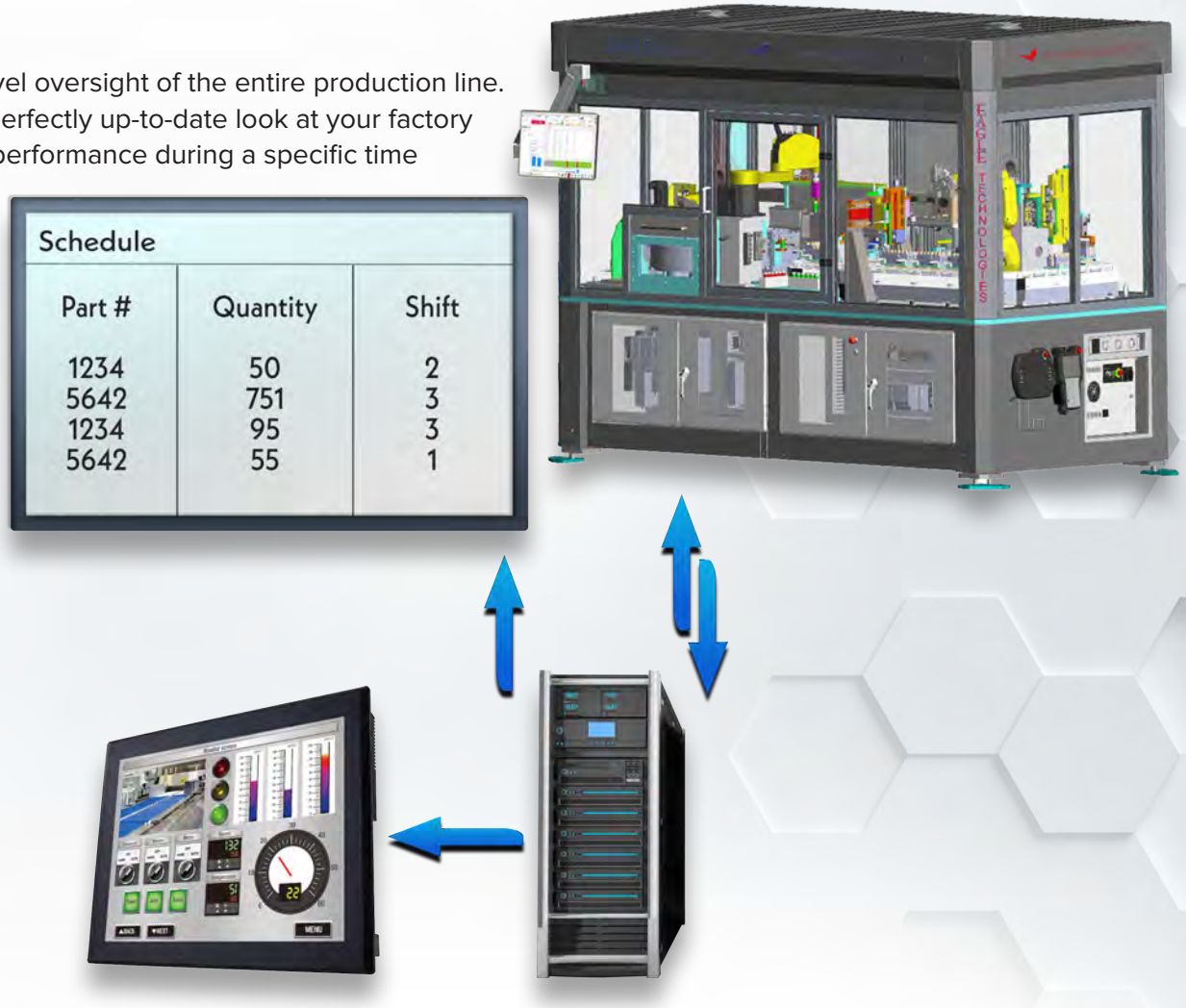
The SMARTTRAC software can be configured to send alerts via HMI messages, emails, and text to anyone our clients choose. Whether you want to alert the floor manager, on-duty staff, or even a contact at Eagle so that we can prepare a spare tooling quote and have your replacement part ready as soon as you need it.

Monitoring and notifications are also available for life cycles of perishable tooling and critical preventative maintenance items.

# PRODUCTION MANAGEMENT

The new SMARTTRAC puts manufacturers in full control of their production process management. Whether you want to control production manually, schedule production to run at certain times, or have it begin automatically based on the status of other steps in the production process.

In the meantime, our system enables high-level oversight of the entire production line. Track production progress in real-time for a perfectly up-to-date look at your factory operations, or create an overview of factory performance during a specific time period. And, because our devices can share data with any of your production consoles, you can keep your entire team in the loop.



# PROCESS CONTROL

Want to adjust the pass/fail tolerances for quality control purposes? Deliver specific workflow responses to operators that are triggered by certain production conditions?


Allow your operators to leave shift notes for their coworkers?

The Eagle's SMARTTRAC solution not only informs you of the status of your current manufacturing operations, but it also helps you direct how your operators respond in various situations.
By improving communication and coordination among your factory workers, you can reduce production errors and improve overall operational efficiency.

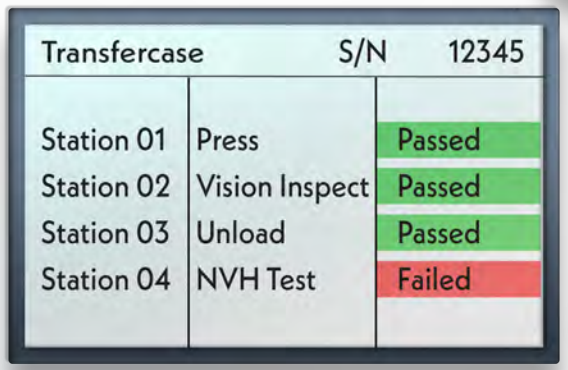
Eagle's SMARTTRAC solution provides access to several key pieces of the puzzle:

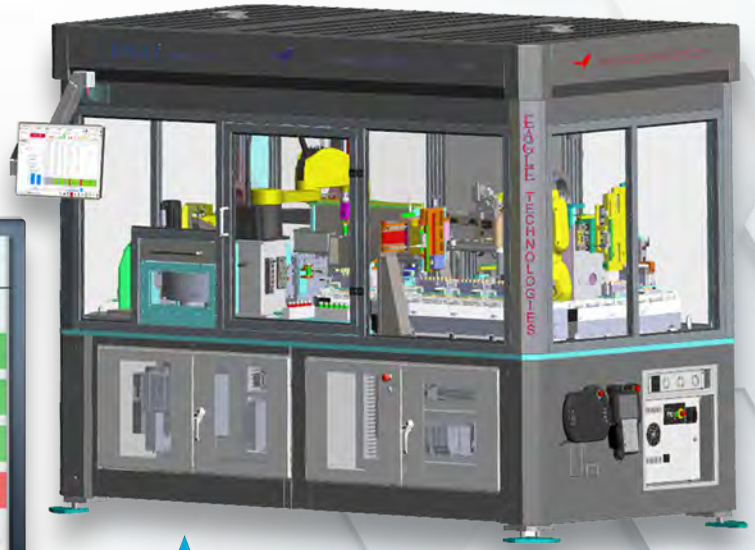
- Monitoring of parameters to ensure they are in-tolerance
- Visualization of active process steps and real-time pass/fail status
- Recipe drive operator instructions available at the operation
- Ability to enter shift notes for other operators and maintenance

# TRACEABILITY

Production errors are the bane of every manufacturer. While the efficiency of factory automation greatly increases output, it also means that an error in the process can be replicated hundreds of thousands of times before being detected—if the manufacturer isn't sufficiently vigilant.

Quality control and advanced testing are designed to prevent errors from occurring and to remove faulty components from the production line before they reach consumers. But if a production error does slip through, product tracing allows manufacturers to limit the scope of their recall by only targeting the parts affected.



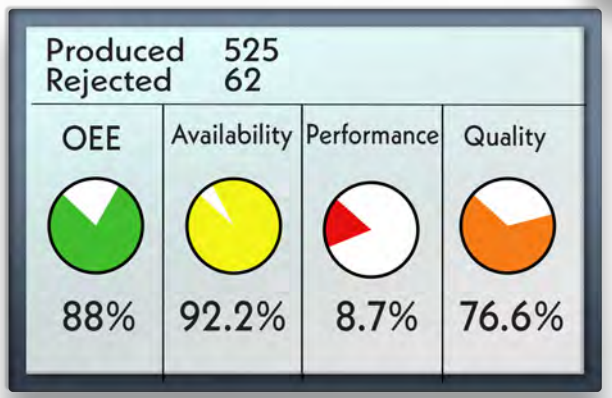

Our SmartTrac software accomplishes several traceability objectives at once, from testing and isolating defective components, to tying production data to a unique serial number for each part, to delivering this data to your ERP system so that you can manage your factory resources effectively. This data allows you to account for every step each component takes throughout your production process.

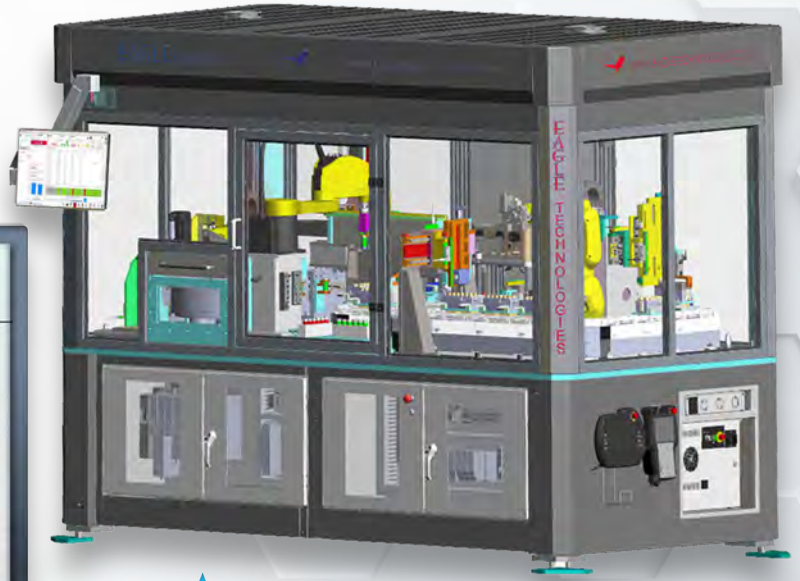
The accurate product tracing provided by our technology can limit the scope of a recall by allowing manufacturers to pinpoint the origin of a manufacturing error, and recall only the parts affected.

- Track material from entry to exit of your facility.
- Analyze and quarantine product runs and batches.
- Provide analytics on product build parameters and First Pass Yield.
- Synchronize your ERP system and production floor in real-time.

# OEE

Achieving ideal operational effectiveness isn't just about monitoring components, it's also about optimizing the equipment that produces them. A machine that is underperforming or contributing to production errors can slow down an entire factory. When this happens, it is essential for manufacturers to have the information at hand to quickly identify and address the problem.




The Eagle's SMARTTRAC OEE module tracks detailed information about each machine and station, from its maintenance history to downtime statistics to operator use. Know how your equipment is being used so you can improve performance.

Eagle's SMARTTRAC is configurable for operator use and offers the ability to capture downtime related to the equipment for the OEE calculation. Downtime events can be revised, split into multiple events, and allows operators to add notes.

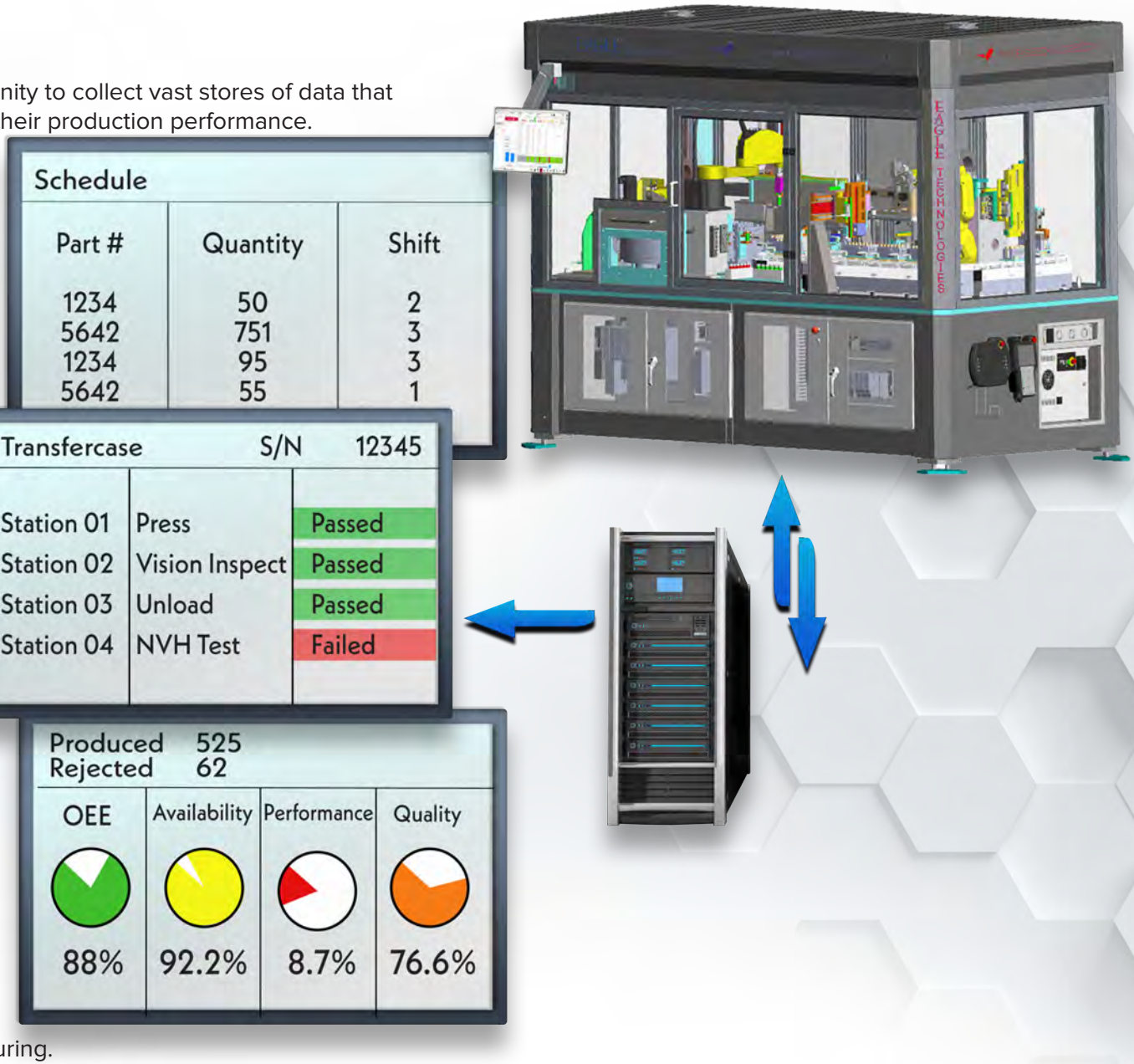
# BIG DATA ANALYTICS VIA DASHBOARDS AND REPORTING

Every stage of our process offers an opportunity to collect vast stores of data that manufacturers can draw on as they analyze their production performance. This data can be put to use immediately, and also stored for future analysis. This gives you the flexibility to analyze production data in any number of ways, including ones you haven't yet considered.

We don't use the word "smart" to describe our machine for nothing. While in many cases "smart" devices are merely those that are WiFi-enabled, ours draws on the machine tracking capabilities to understand the data being collected, and deliver actionable insights to manufacturers.

KPI reporting and monitoring dashboards provide efficient oversight. Every company has different performance standards, special factors they want to track and monitor, and their own set of production quotas to meet. That's why our SMARTTRAC technology is designed to deliver both standard and custom reporting metrics, so that your operators can monitor system progress at a glance.

By linking Industry 4.0 technologies in one interface, manufacturers will gain greater insights into their production systems and have more control over every step of the process. That's what we call smart manufacturing.



# MACHINE LEARNING AR

Utilizing AR technologies, SMARTTRAC will go beyond simple maintenance schedules, AR solutions enable you to create and deliver easily-consumable instructions and troubleshooting. Empower your technicians with real-time access to relevant information to solve problems faster and reduce service costs. Our integration of Vuforia into our customer's automation improves uptime and saves costs.