IndustLabs designs, builds, and integrates advanced automation solutions for customers all over the world.

Think. Solve. Create.
CHALLENGE

An aerospace customer needed automation of large-scale robotics, component processing, and conveyors while integrating an MES system with their ERP system. Their complex array of CNCs, CMMs, OMMs and custom cells all made unique parts – in quantities of one. Additionally, different parts required different machine setups and configurations.

OUTCOMES AND BENEFITS

Improved cycle time, work flow and line balancing. We were able to coordinate with the customer’s existing ERP system, allowing for consistent and familiar output for the management team.

ROBOTIC SYSTEMS AND DIGITAL TECHNOLOGIES

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CHALLENGE

Oftentimes, enabling IIoT is not considered at the time of an automation or machine tool design in the industry. SmartAttach™ is a leading edge-technology in terms of automation to install nut plates. The machine is Industry 4.0 ready off the shelf.

OUTCOMES AND BENEFITS

Industry 4.0 was the design requirement for this machine that resulted into a fully integrated architecture where the machine PLC is fully integrated with the IIoT platform resulting into seamless data flow from several machine sensors and devices.
In any manufacturing and assembly process, operators and automation require combinations of scheduling, recipe management, work instructions and work execution monitoring to ensure first time, in-station quality. There is never better quality than when products are manufactured in sequence using the original operators, equipment and processes. In this case, our customer required IndustLabs a fully functional system which would provide all of these functions.

**OUTCOMES AND BENEFITS**

Visual and sequential operator work instructions guide operators through configured standardized work  
Successful operation monitoring for torque, part assembly, part pick and work complete  
Historical records created for traceability  
Monitors integrated to processes, such as leak test and leak test results  
Maintenance monitoring and screens for maintenance scheduling

**OPERATOR WORK INSTRUCTION AND WORK MONITORING - LMI**

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A customer had equipment and work cells from multiple vendors with very little digital integration. The request was to provide data driven insights that could be fed into other existing manufacturing systems to improve throughput and overall control. This was an initial entry into data analytics for the customer.

**OUTCOMES AND BENEFITS**

The outcome for the customer was improved HMI / Visualization, recipe management, KPI tracking and reporting, AGV management, alarm tracking and key telemetry reporting. This also laid the ground-work for continued digital improvements to the facility.

**FUSION OF ROBOTIC SI AND DIGITAL TECHNOLOGIES**

[https://industlabs.com](https://industlabs.com)
EGR VALVE ASSEMBLY LINE

CHALLENGE
This system was developed in response to a customer’s request to design and build an assembly line that could assemble two products: valves with two shutters and a one-way valve.

OUTCOMES AND BENEFITS
The biggest challenge was to develop an unreleased process, such as automatic loading of flap. This type of process did not exist in our customer's facility and this innovative solution helped them grow their production rate.

IMPLEMENTING AUTOMATION HELPED GROW PRODUCTION RATE

https://industlabs.com
SOLAR PANEL TEST AND FINAL ASSEMBLY CELL

CHALLENGE

The goal was to design and build a final assembly and test system for solar panels. The system had to be able to adapt to different models with significantly different form factors. The data driven processes included diode cover, lid and leash install, generate and apply module label, and performance testing.

OUTCOMES AND BENEFITS

ODBC communications to factory server, Part tracking/data collection based on serial number, Grading of modules based on product matrix query from SSI server, Panel size verified through a sensor array, Cycle rate of over 60 parts per hour

FAST AND EFFICIENT ASSEMBLY AND TESTING OF VARIABLE PANELS
PV CELL SOLAR SIMULATION TEST SYSTEM

CHALLENGE
Our customer needed a machine that could handle, test, and sort two different sizes of photovoltaic (PV) cells at a high throughput rate.

OUTCOMES AND BENEFITS
Chilled cell test nest with infrared sensing probe for closed loop temperature control, Integrated cell thickness testing, SPC data collection, Cycle rate of 1500 parts per hour

TEMPERATURE CONTROL ESSENTIAL TO PROPER PV CELL TESTING
CHALLENGE

A large international conglomerate in the solar cell business needed a high-throughput line to print, inspect, and cure solar cells. Because thin substrates are cut from a large ingot, the silicon material is stressed and tends to break very easily. The dynamics of wafer handling was very important.

OUTCOMES AND BENEFITS

- Fast precise handling of large, fragile wafers
- 0.003” dial placement accuracy
- Five robots, four machine vision applications, and all process I/O on one robot controller
- Line-scan machine vision (2k x 2k) inspection for 0.005” defects on a six-inch wafer
- Three different product sizes and form factors
- Cycle rate of 2,800 cells per hour

FIVE ROBOTS USE VACUUMS TO PICK DELICATE SILICON WAFERS

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COOLING AND TRIMMING LAMINATED PV PANELS

CHALLENGE

Robotic integration was used to automate the process of cooling and trimming warm laminated photovoltaic (PV) panels. The system had to be able to accommodate panels with varying length and width.

OUTCOMES AND BENEFITS

Automatic accommodation of different panel sizes, Dual purpose end-effector, Custom designed trim head with automatic blade exchange, Shared excess materials shredder, Cycle rate of 75 parts per hour between the two robot cells

TWO ROBOT CELLS WORK TOGETHER TO COOL AND TRIM PV PANELS
CHALLENGE

Running one shift a day, with a throughput rate of 1,400 pistons an hour, it was not possible for the customer to conduct detailed quality inspections on all their products. Because of increased quality mandates from their end-users, a high-throughput inspection system was necessary to detect manufacturing defects.

OUTCOMES AND BENEFITS

- Six different applications, incorporated on 12 stand-alone vision systems, networked to a robot controller
- Telecentric optics and telecentric backlights
- 360° inspection of a piston’s ring groove and Grafal patch
- Groove inspection cameras acquire and process 180 images in 2.2 seconds
- Ring groove inspections can resolve an 80µm protrusion

CAMERAS INSPECT ALL PISTONS FOR MANUFACTURING DEFECTS
UMBILICUS LEAK TESTER

CHALLENGE

A large medical manufacturer required a machine to automatically leak test a five-lumen (port) tube, called an umbilicus, used for blood component separation.

The specification required testing the umbilicus for lumen-to-lumen and external leakage. The threshold for lumen-to-lumen leakage was 2.15 cm³/minute. The specification for external leakage was an overall pressure drop of 1 psi over a five second test period from a starting pressure of 20 psi.

OUTCOMES AND BENEFITS

Fail-safe design, FDA compliant, Clean ergonomic design

CUSTOM MACHINE TESTS FOR TWO TYPES OF LEAKS

https://industlabs.com
HEARING AID ASSEMBLY AND TESTING

CHALLENGE

A venture capital company with an exciting new intra-ear, disposable hearing aid had a design ready for mass marketing. With a targeted consumption rate of 5 million units per year, production rates needed to be fast. The problem was that the product design engineers were not experts in design-for-automation. Some redesign was needed.

OUTCOMES AND BENEFITS

- In-process testing of critical subcomponents
- Precision welding, soldering, dispensing, laser etching, and sealing operations on very small sub-assemblies
- Extensive sonic response testing prior to pack-out
- Birth certificate and data management
- Cycle rate of 3.5 seconds per assembly, for 5,000,000 assemblies per year

PROTOTYPING AND TESTING LED TO CONFIDENCE NECESSARY TO AUTOMATE PROCESSES

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GLUCOSE TEST STRIPS ASSEMBLY LINE

CHALLENGE

The objective was to design and build a glucose test strip assembly line with continuously operating web platforms making use of metalized PET materials, while inspecting all products as they are being manufactured. Additionally, each test strip must be equipped with a built-in calibration code so that the patient does not have to enter a code into their meter.

OUTCOMES AND BENEFITS

• Production rate of 2,000,000 glucose test strips per day

CONTINUOUSLY OPERATING LINE INSPECTS ALL TWO MILLION TEST STRIPS MADE EVERY DAY

https://industlabs.com
CHALLENGE

The customer wanted the team to design a system to punch rows from screen-printed Mylar cards. Cards are 325 ± 1mm square and have 1x18 rows printed to a card. Tolerance for punched row width is 15.00 ± 0.03mm, but more importantly, the screen-printed artwork must be maintained at ±0.05mm. Artwork on the card to the edge of the card is not held any better than ±1.0mm. Also, screen masks stretch as they are used for production, which changes the pitch of the artwork between each row.

OUTCOMES AND BENEFITS

Web registration to ±2 microns, True SPC correction for card tolerance issues and screen print stretch, Part tracking/data collection based on serial number, Part rejection based on dimensional measurements, Production rate of 30 rows per minute
VACCINE POTENCY PREPARATION AND TESTING

CHALLENGE

A customer required increased production and potency verification in order to meet rising product demand. The machine had to process plates to prepare for automated vision counting of plaques in order to determine batch potency.

OUTCOMES AND BENEFITS

Cycle rate of 12 plates per minute, Stain module aspirates cell culture media without disturbing plate surface or cell monolayer

MACHINE PROCESSES PLATES TO DETERMINE VACCINE POTENCY

https://industlabs.com
HIGH THROUGHPUT DRUG DISCOVERY SCREENING

CHALLENGE

A large international drug company needed a high-throughput drug discovery system that could accommodate a multitude of simultaneous processes. It was required to handle microtiter plates with heavy stainless steel lids. Typical robots working in drug discovery were laboratory type robots on long linear tracks. These robots had light payloads, were less than rugged, and slow.

OUTCOMES AND BENEFITS

- 13 different asynchronous processes
- Process and plate tracking
- Plate handoff
- Inventory Discovery Mode for randomly loaded plates
- Lid removal and storage
- Storage for 417,000 compounds (386 well plates)
- Incubation for 51,840 assays (96 well plates)
- Cycle rate of 200,000 assays per day

THREE ROBOTS COOPERATE TO MONITOR TEST PLATES FOR NEW DISCOVERIES

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CHALLENGE

A large hard disk drive manufacturer needed an improved system to robotically load and unload hard disk substrates into vertically hung pallets for a sputtering process. The most challenging aspect was that the disk had to be loaded into a groove that provided only 0.012" total clearance without touching the disk sides. But, due to intense in-process heating, the aluminum pallet plane could be warped by 0.080" locally about a hole, so the robot had to precisely load substrates into warped pallets.

OUTCOMES AND BENEFITS

Capable of running 885 disks per cell per hour, 99.9% efficiency rating

ROBOTS CALIBRATE EACH OTHER FOR PINPOINT ACCURACY IN THIS AWARD-WINNING SOLUTION

https://industlabs.com
A US manufacturer supplying interconnect components to the semiconductor industry required an automated, contact force measurement system capable of measuring compression forces of very small devices on a 300mm substrate.

Scaling their products for the larger wafer size, the customer required an easily configurable system for testing thousands of measurements over a multitude of part types at a rate of up to 3,000 tests per hour, providing accurate force and height data.

XY axis travel of 300mm, XY accuracy of ±5µm and ±2°C, Z axis travel of 3mm, Z accuracy of ±2.5µm, Z repeatability is better than ±250nm, Force measurement is 0 – 0.3 Newtons at 2 mN resolution
A large US semiconductor manufacturer needed to precisely align and seam weld a window structure to an optical processor substrate in a low humidity chamber that contained a precise mixture of helium and nitrogen gases.

**OUTCOMES AND BENEFITS**

Vision guided robotics, Mapping of two linear stages using a grid plate to improve X/Y accuracy to 5μm, Capable of processing 34 different part types.
The objective was to come up with a solution that is able to verify that the complex milled surface and thickness of jumbo jet wing skins meet manufacturing tolerances. Bowing of less than 2 inches is allowable, but accuracy better than 0.02 inches must be maintained in a factory environment with large temperature swings. The skins can be 10 feet tall by 110 feet long and vary in thickness between 0.25 and 2 inches.

OUTCOMES AND BENEFITS

Measurement accuracy better than 0.02 inches, Scan rate of 4 inches per second, Capable of scanning skins up to 10 feet tall by 110 feet long
FUSELAGE MINI-RIVETING SYSTEM

CHALLENGE

Create a portable drilling and fastening machine for body skin panel and splice fastening to aircraft fuselage structural components. The automated system must apply and maintain a large, opposing force between skins and frame components while drilling and counter sinking a hole, and inserting and bucking the rivet takes place. The system must have an exceptional strength-to-weight ratio.

OUTCOMES AND BENEFITS

- Sophisticated sensing, monitoring, and tracking capabilities
- Ironless high-torque, disc-shaped servo motors
- Strong, light-weight materials

LIGHT-WEIGHT AND STRONG, THIS MACHINE RIVETS COMPONENTS TO AIRCRAFT FUSELAGES

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