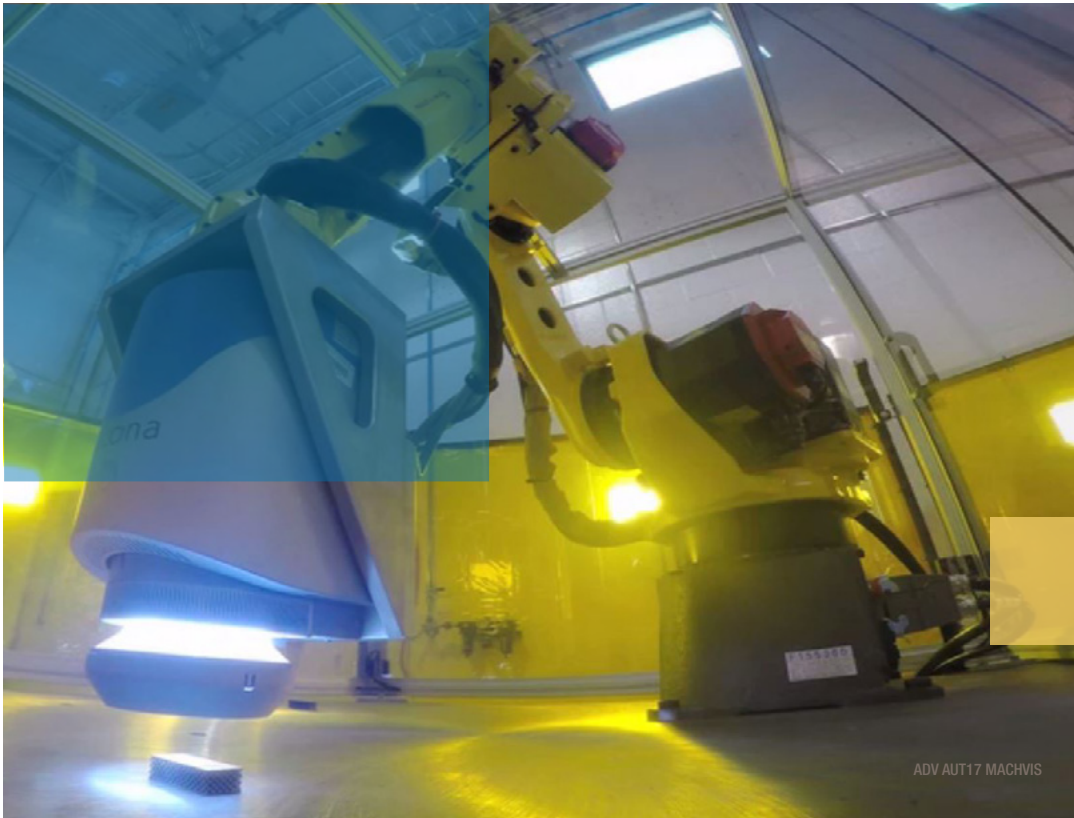
MACHINE VISION—

HOW INTELLIGENT ROBOTS ARE ADVANCING AUTOMATION

EWI®

We Manufacture Innovation



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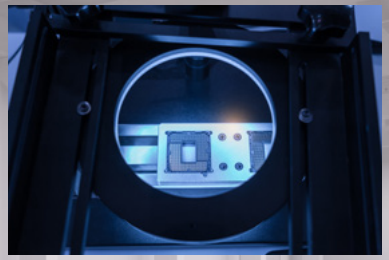
INTELLIGENT ROBOTS

When you think of robots working in a factory, images of assembly-line automatons might spring to mind. Such robots perform only the tasks that they are programmed for without deviating from their strictly coded regimen. For years, this automation approach was sufficient.

Today's manufacturing robots have advanced significantly. Technology has expanded their senses and unlocked new abilities. Their software has become more complex, and their tooling more sophisticated. One of the most critical evolutions is their "sight." Advanced vision systems including cameras, scanners, sensors, and software have opened robots' eyes and revealed tremendous manufacturing potential.



WHAT IS MACHINE VISION?

Put simply, machine vision is technology that gives computers the ability to see and understand their surroundings. The rise of automation in manufacturing continues to drive the adoption and evolution of machine vision technologies. Over the last decade and a half, these technologies have matured into a critical tool for advanced manufacturing automation, with primary applications being automated inspection and industrial robot guidance.

The market for computer vision technologies is predicted to grow to **$33.3 billion** by 2019[1]

[1]Computer Vision Technology Market to Reach $33.3 Billion by 2019 (2015, May 5). In Tractica. Retrieved from https://www.tractica.com/newsroom/press-releases/computer-vision-technology-market-to-reach-33-3-billion-by-2019/

INDUSTRY 4.0 AND THE "FACTORY OF THE FUTURE"

A key characteristic of the factory of the future, or smart factory, is automation via the interoperability of machines, devices, sensors, and people—also known as Industry 4.0. As such, advancements in machine vision will be integral to future manufacturing success.

THE BENEFITS OF MACHINE VISION

Vision technology has improved significantly and now enables robots to freely move and perform a variety of tasks without operator intervention and reprogramming. With advanced object detection, recognition, and grasping technology, these newly empowered robots are well-suited to manufacturing the customized products that are in high demand.

By using advanced vision systems to adjust coordinates to specific locations, today's robots can pick up parts and items of varying consistency—a task that is impossible for traditional assembly robots. Now, robots with vision capabilities can recognize a changing environment and adapt to it.

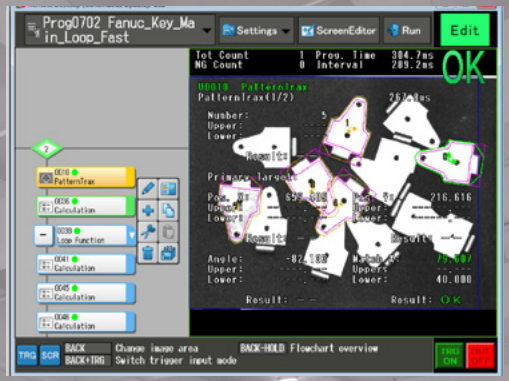
THE ADVANTAGES TO MANUFACTURERS INCLUDE:

- More functional and easier-to-use robots
- Improved quality
- Increased efficiency
- Greater manufacturing flexibility

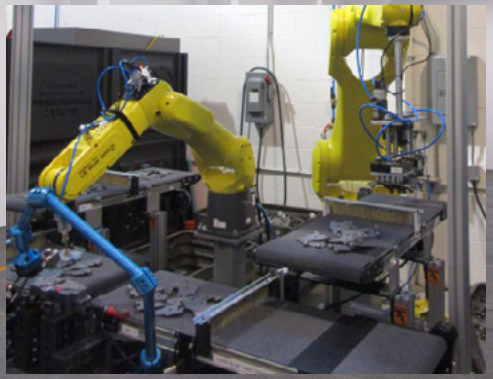
RANDOM BIN PICKING USING 2D IMAGING

ONE MAJOR APPLICATION THAT HAS BEEN MADE POSSIBLE WITH MACHINE VISION IS RANDOM BIN PICKING.

Because this application requires accurate determination of the position and orientation of parts in an unpredictable environment, it has for many years been merely a dream of manufacturers. Now, with robots that can identify and sort parts using machine vision, it is a reality.



An integrated vision system supports two industrial robots in a pick and place application



3D VISION

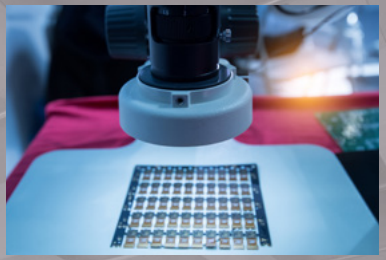
Machine vision makes use of either 2D or 3D imaging depending on the particular application. Applications like automated inspection, object tracking, and product profiling can be greatly enhanced by 3D systems since robots operate in a 3D world. For years, many manufacturers were wary of 3D machine vision due to the higher complexity and costs that came with it. However, with improved sensors and an increase in computing power, 3D vision system technology has become more accessible and easier to use, and has been more widely adopted as a result.

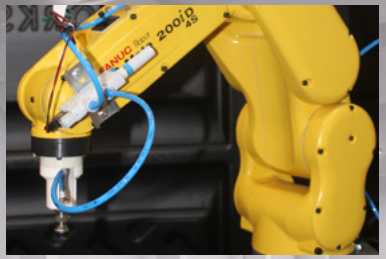
CASE STUDY

AN EWI CUSTOMER NEEDED TO DEVELOP AN AUTOMATED ROBOTIC CELL TO LOAD PAIRS OF HINGES INTO AN ASSEMBLY FIXTURE FROM A BIN.

Objectives: Increase consistency, improve safety and ergonomics, and allow operators to focus on more complex tasks to maximize their overall productivity.

Solution: EWI's solution was to create a semi-structured environment for which existing 2D machine vision technology would be suitable. To accomplish this, the automation cell utilized four cameras, an area gripper, four conveyors, two industrial robots, and a pick-and-place gripper. With this system, hinges were identified using machine vision, reoriented if necessary, and correctly placed into the fixture.





CASE STUDY

Automated Sealant Application

Objectives: EWI's client needed to automate the application of sealant to nearly 100 product models, each with 10 to 20 sealant application sites. Each trajectory pattern was unique, complicated, and located in an arbitrary spatial plane. To automate this previously manual process, the system needed to:

- Maintain a path accuracy tolerance of less than ± 0.5mm
- Adapt to different models with minimal modification
- Avoid safety wires around bolts
- Inspect the sealant bead shape after application to determine width and height
- Operate in a fully automated mode without mediation from a human operator

Solution: EWI used a machine vision system and laser profilometer to adjust the desired sealant trajectory, and allowed the system to maintain the error between the desired and actual path within ± 0.5mm.

EWI'S AUTOMATION FEASIBILITY FACTORY FLOOR

Machine vision is just one area of EWI's automation expertise. To see you can develop and integrate automated solutions for manufacturing processes at your facility, come visit our automation feasibility factory floor in Buffalo, New York. We can design, build, and demonstrate solutions for you in our lab to verify concepts before you make any significant capital investments for implementation.

EQUIPMENT ON OUR FLOOR INCLUDES A VENDOR-AGNOSTIC VARIETY OF RESOURCES:

- Universal UR5 and UR10
- Kawasaki DuAro
- Fanuc CR-35iAFanuc M-10iA 12S
- Fanuc LR Mate 200iD 4s
- Fanuc M-1iA/0.5A
- Fanuc F-100iA 106s
- Mikrolar P2100YM
- ABB IRB 2600
- Adept Python Linear Module
- Denso HM-G
- 2D and 3D Camera Assortment
- Gripper Assortment

ABOUT EWI

With broad expertise in machine vision, advanced automation, joining automation, and automated inspection, EWI provides innovative, industry-driven automation solutions to enhance process efficiency, improve quality, and reduce operating costs. We develop custom automated process solutions to meet our clients' specific manufacturing needs with an aim to establish a significant competitive advantage. To learn more, contact Nadine Powell at **716.710.5555**.

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