



ACUMEN AI

ARTIFICIAL INTELLIGENCE

THE INTELLIGENT INSPECTION ASSISTANT



ACUMEN AI

The Acumen AI is an automated visual inspection and measurement system with next generation deep learning video analysis. Versatile, scalable, and modular platform capable of solving the most challenging inspection applications.

Sophisticated and robust inspection models can identify, detect, classify, measure, and count a wide range of part defects. Decision-making can be fully automated or used to assist the operator in making the final decision.

The simple and intuitive interface enables non-experts to capture and label their image dataset, optimise training parameters, and train inspection models.

FEATURES

HIGHLY CONFIGURABLE MACHINE VISION PLATFORM WITH SOPHISTICATED TRAINING ALGORITHMS

Wide Zoom Range

Sophisticated camera technology enables automatic detection and measurement of various types of defects over a wide zoom range and FOV on multiple parts.

Object Detection

Identify and locate visual objects or defects within the field of view. Early detection of product faults prevents faulty products entering the market and enables the improvement of internal production standards.

Classification

Classify objects or products into different categories based on their visual characteristics or features to ensure conformity.

Anomaly Detection

Detect anomalies or outliers on parts or products that may indicate a malfunction or error in the manufacturing process.

Instance Segmentation

Identify and locate objects within the image with irregular shapes and distinguish between individual instances of the same object type. Useful for locating and counting unique occurrences of objects.

Semantic Segmentation

Identify the region in the image where a specified object, material or texture is present. Ensure conformity of material within specified zone or measure the surface area of the detected feature.

Highly Configurable

Acumen AI inspection models can be configured/recalled with system settings such as magnification and illumination, along with threshold settings, reporting format and more for optimal efficiency and robustness.

BENEFITS

INSTANTLY TRANSFORM YOUR MANUFACTURING PROCESS WITH AUTOMATED INSPECTION

Return On Investment

The Acumen AI will pay for itself and provide significant return on investment as you will:

- Reduce inspection costs and overheads
- Avoid operator error
- Eliminate risk
- Avoid product recalls
- Protect your reputation

Remove Subjectivity

Many visual inspection methods rely on the human eye, leading to subjective judgements on critical decisions.

AI inspection models do not tire or lose concentration, enabling the Acumen AI to overcome the cognitive overload often experienced by human operators.

Improve Productivity

Visual inspection processes can be automated to keep up with the pace of global demand. The Acumen AI automatically detects a wide range of complex defects on multiple sample parts at one time and integrates with industrial devices to operate on a 24/7 basis.

Increase Workflow Efficiency

The Acumen AI automatically generates in-depth detailed reports and documentation, decreasing and ensuring traceability. This data can be valuable for process optimization, quality control, and predictive maintenance, as well as ensuring compliance with industry standards and regulations.

Ensure Data Integrity

The Acumen AI data quality is reliable and reproducible, increasing the security and quality of inspection tasks.

INDUSTRY

Medical Device

Critical medical devices including stents, needles, balloons and catheters must be 100% inspected for dimensional conformity and defects to ensure patient safety.

Deep learning inspection models offer precise, rapid defect detection and classification to assist inspectors making the quality control decisions, whilst keeping records of decisions.



Magnified image on the Acumen AI of a good medical needle

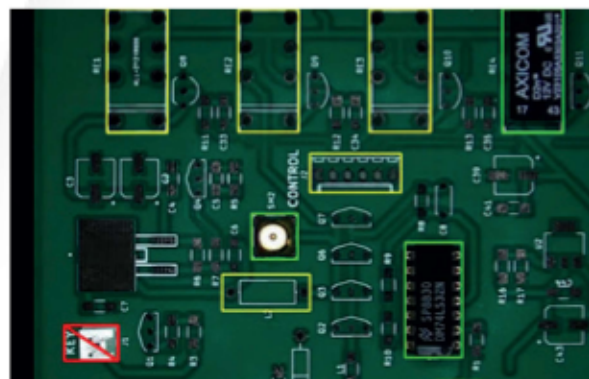


Magnified image on the Acumen AI of a bad medical needle

Electronics

PCB boards are becoming increasingly more complex and intricate in their design. The Acumen AI can assist with PCB assembly to ensure operators position components correctly.

It can also automatically identify, detect and classify anomalies such as missing components, foreign objects, debris, solder bridges or shorts.



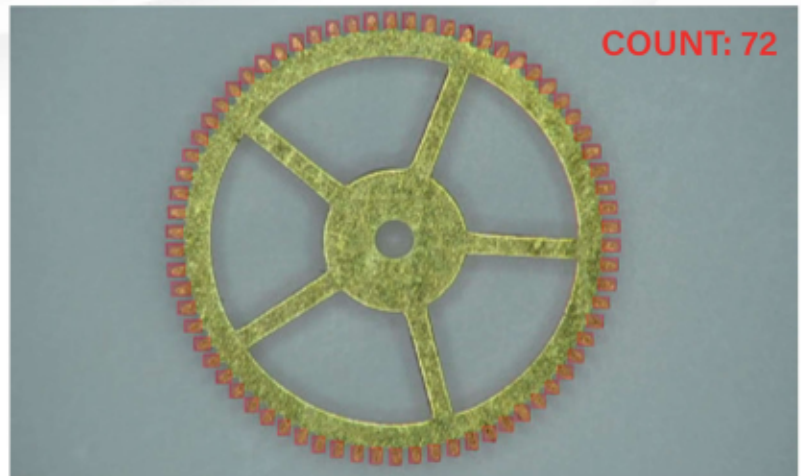
Magnified image on the Acumen AI of a PCB with component placement guides

APPLICATIONS

Precision Engineering

Count objects in real time with the Acumen AI. Counting the teeth of gears in luxury watches is essential for ensuring precision, accuracy, functionality, and quality in timekeeping devices.

Counting these miniscule teeth with the naked eye is challenging and prone to human error. AI visual inspection enables watch manufacturers to create reliable and accurate timepieces.



Magnified image on the Acumen AI of luxury watch gear teeth identified and counted

Automotive

Detect defects such as scratches, handling damage, stains, or uncoated areas on automotive parts, avoiding costly penalties for releasing defective parts to manufacturers.

The Acumen AI can detect conformity of material within specified zone and measure the surface area of the detected feature.



Magnified image on the Acumen AI of glue detection on an automotive part

CUSTOMISATION SERVICES

Tell us the problem and we can deliver a tailored solution.

ASH proudly develop all product software in-house, thereby having the advantage of being able to customise solutions for a customer's specific need.

Whether it is developing additional functionality, changing functionality or workflow, ASH can work closely with customers to adapt existing software products to support customers' exact requirements.

ASH also provide a proof of concept service, training and support in the development of deep learning inspection models.

OUR APPROACH

- 1 We discuss your specific requirements in detail.
- 2 Send us sample parts or images for an analysis and proof of concept.
- 3 Solution is scoped, presented, refined and approved.
- 4 System is configured, delivered, installed, tested and commissioned.
- 5 We train your team.
- 6 Continuous support available to improve AI algorithms.

MODULAR PLATFORM

The Acumen AI is a modular, scalable and versatile platform.



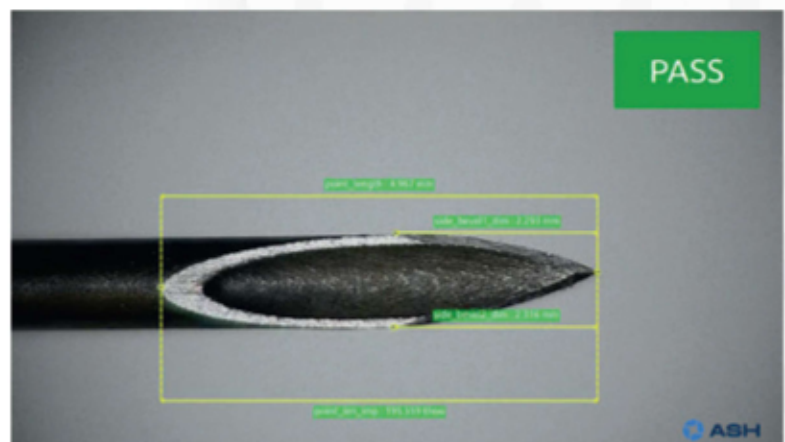
Automatic Measurement Module

Solve the most complex measurement applications with the Automatic Measurement Module.

Automatically inspect and measure parts or products and detect defects or anomalies. Measurement processes are streamlined to deliver automated pass/fail results, reducing the need for human inspection, and improving the overall efficiency of the inspection process.

Feature detection and segmentation algorithms combined with easy-to-use measurement features offer an advanced toolkit for analysis of complex features lacking geometric structure or uniformity.

**INSTANT
MEASUREMENT!**



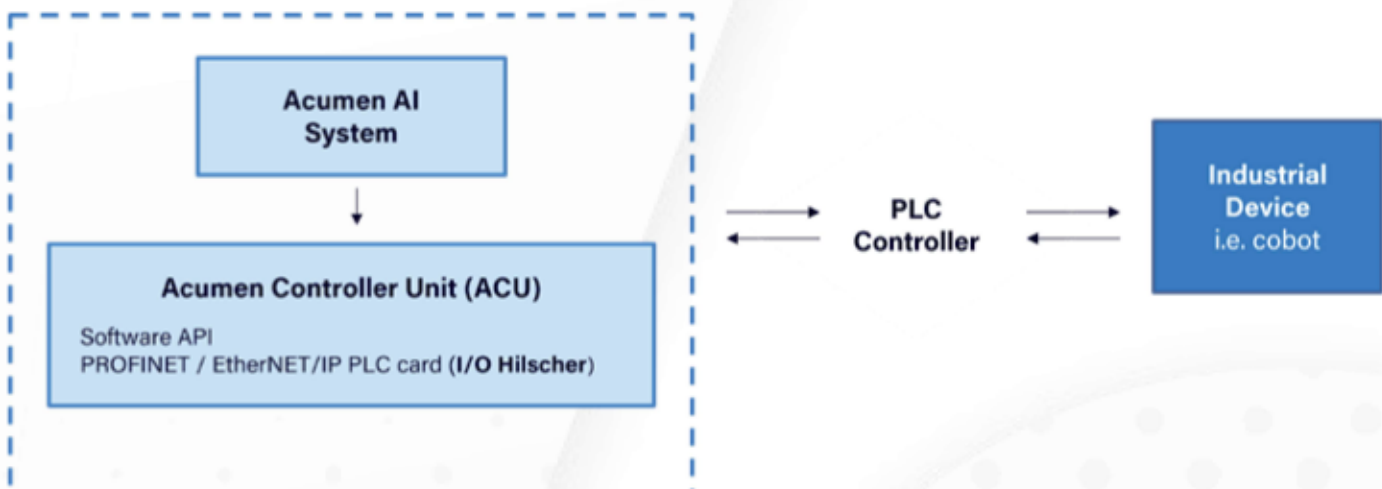


Industrial Communications Module

Establish effective communication and interconnectivity between the Acumen AI and industrial devices such as PLCs, cobots or robots to achieve a fully automated inspection process.

Cobots or robots can be programmed to pick up and place parts under the Acumen AI for inspection. Depending on the inspection outcome, the cobot takes appropriate actions. For example, if a defect is detected, the cobot can pick up the defective object and place it in a designated area for further analysis or disposal. If the object passes inspection, the cobot can place it onto the production line for the next step.

The Acumen AI working in tandem with industrial devices enables operational continuity when staff shortages or lack of trained inspectors occur. Skilled human inspectors can be deployed to higher value add tasks. Downtime on Inspection lines is reduced due to the ability of the systems to continue operations outside of working hours.





Project Sequencer Module

Easily configure a workflow sequence of AI inspection and measurement projects into a central master project for process efficiency.

Certain parts may require inspection at varying magnification levels, or require a combination of inspection and measurement. Acumen AI projects save system settings such as magnification and illumination along with the trained model and its threshold settings.

Creating a master project that triggers the sequential deployment of all associated projects streamlines the part inspection process, reducing set-up downtime and errors.



Reduces time in the inspection process cycle by executing all of the process for a single part into one master project.



Creates agility in the inspection process workflow with rapid sequencing of projects.



Workflows can be standardised to reduce inefficiencies, giving operators more time for high-value tasks.

CUSTOMER APPLICATIONS



Inspection of class D medical devices using AI to improve throughput and efficiency.



AI Inspection of syringes and vials to improve cycle time.



Counting of Colony Formation Units (CFU's) using AI to remove human subjectivity, improve accuracy and data integrity.



AI in sustainable agriculture to improve counting of predatory mites.



Inspection of ampule batches to read QR identification codes to meet throughput demand.

S U C C E S S S T O R Y

11X FASTER. 3X MORE ACCURATE - SWEET!

Cell Counting at Speed with AI for British Sugar

CHALLENGE

Manually Counting Yeast Cells

Yeast plays a critical role in food production. Counting live and dead yeast cells gives valuable insight into yeast viability, product performance, and process optimisation. This enables food producers to maintain high standards and deliver high-quality yeast-based products. However, yeast are tiny organisms - too small to view with the naked eye. Therefore, identifying and counting them is a challenge many food producers encounter. Operators at British Sugar were using a traditional, manual method of identifying and counting yeast cells. The data obtained was manually input and calculated on spreadsheets - a laborious and costly process, subject to human error.

SOLUTION

A Fast, Reliable, Fully Automated Solution.

Paul Wrathmall, from British Sugar, presented our Technical Sales Manager in the UK with their cell counting challenge. The Acumen AI was the perfect solution. With yeast samples provided, the R&D team at ASH got to work and built a working model in-house to solve the problem. A customised app and mechanical jig were developed to use alongside the Acumen AI, to ensure lighting consistency.

This enabled the automatic identification and counting of cells. The whole process was largely automated by programming the system to automatically identify and count the cells, automatically save the data, and automatically create a PDF report.

The solution was presented back to British Sugar. They were delighted with the speed, accuracy and completeness of the solution. The system was implemented immediately.




RESULT

11 Times Faster. 90% Reduction in Human Error.




The Acumen AI, so far, has reduced average task time from 17 minutes to 90 seconds. This task time will reduce even further as time goes on. With the task largely automated, the cell counting documentation and reporting process has been streamlined, and the possibility for human error has greatly reduced. This automated, faster method has enabled quicker decision-making decision on fermentation and has amplified the yield. British Sugar has improved inspection accuracy, counting time, and reduced costly overheads - it doesn't get much sweeter than that!

"Another application that shows the massive improvements in efficiency and accuracy that our technology can deliver. And a good example of how our core technology can be quickly adapted to very specific needs." Technical Sales Manager UK, ASH.

INCLUDED SYSTEM COMPONENTS

	
LENSES	
+5 Lens	2.5 – 68X optical magnification. Min FOV (H x V mm): 200 x 112 ; Max FOV (H X V mm): 7.5 x 4.2
Polarising Lens	Manage reflections, or suppress glare when inspecting transparent or reflective objects.
	
STAND	
Illuminated Dual Focus Track Stand	Adjusts working distance and focus via dual focus knobs. Provides controllable backlight illumination.
	
CONTROLLERS	
Acumen AI Camera Keyboard & Mouse	Access to camera software settings.
ACU Keyboard & Mouse	Controls camera and ASH AI software applications
	
OTHERS	
Acumen Controller Unit (ACU)	Linux based industrial PC with fast data processing to support Acumen AI training and testing applications.
ASH PC Capture	Provides imaging connection from Acumen AI camera to ASH AI software applications.
ASH AI Training Software Applications	Create & deploy inspection models with AI algorithms: object detection, classification, instance segmentation, semantic segmentation, anomaly detection.

OPTIONAL SYSTEM COMPONENTS

	
SOFTWARE MODULES	Automatic Measurement, Industrial Communications, Project Sequencing
	
API MODULE	Non-real-time protocol for sending basic commands via TCP/IP.
	
UR3 COBOT	Mount the Acumen AI onto a cobot arm for multi FOV movements or trigger sample handling protocols based on Acumen test result outcomes.

TECHNICAL SPECIFICATIONS

Technical Specifications

ACUMEN AI

Magnification Range (with supplied +5 Lens)	2.5-68 (Optical) 69d-136.5d (Digital)
Camera Resolution	1920 x 1080 Pixels
Frame Rate	50/60 fps
Monitor Connections	HDMI / DVI
Monitor Requirements	HD Ready / Full HD (Recommended)
Input / Output	HDMI Output USB 2.0 (x4 Ports) Mini USB Port General Purpose IO (x3 Ports) DC Power Jack 24V
Internal Storage	16GB
Image Capture	Internal Storage Removable USB Image Storage USB on the Go (PC Connectivity)
Power	24W
Dimensions	216mm x 125mm x 136mm
Weight	1.5kg
Operating Temperature	Storage 60°C Operating 5°C to 40°C

ACUMEN CONTROLLER UNIT SPECIFICATIONS

Technical Specifications

I/O Ports	HDMI (Mic-in, Line-out) Audio (Mic-in, Line-out) USB 3.2 Gen1 x6 DB-9 x 4 for RS-232/422/485 with automatic flow control PCIe Expansion Slot x3 LAN x3 Antenna Hole x3 12-24V DC Input Semi-Punch for Optional DIO, VGA and USB 2.0x4
System Memory	Support max. 2666MHz up to 128GB
OS Support	HDMI / DVI
Dimensions (WxHxD)	HD Ready / Full HD (Recommended)
Weight	8.4kg
Operating Temperature	With 250W Graphics Card: 0°C – 45°C with 0.5m/s airflow
Anti-Vibration	HDD: Random 1Grm, 5~500Hz
Certification	CE/FCC Class A
Graphics Interface	GPU Memory 8 GB GDDR6 Memory Interface 256-bit Memory Bandwidth up to 416 GB/s 7.1 TFLOPS Tensor Performance 57.0 TFLOPS System Interface PCI Express 3.0 x16