NEXT GENERATION VISION TECHNOLOGY

VISION SYSTEMS FOR INSPECTION ARE MORE HUMAN-LIKE THAN EVER BEFORE

SYSTEMATIX has decades of experience integrating vision inspection technology into complex assembly and test systems. Yet, there has never been more potential for vision to overcome the manufacturing challenges of medical device and pharmaceutical customers than there is today.

A new generation of high speed cameras, intuitive software and advanced algorithms provide simple, flexible and powerful solutions capable of human-like inspection.

> *"The new technology will reduce risk and make it easier to strike the critical balance between product quality, regulatory compliance and operational efficiency."*
>
> **Michael Becker, President**

Needs of Medical Device and Pharmaceutical Manufacturers

The vision inspection needs of any manufacturer include part presence, assembly verification, surface defect detection, gauging, and product identification. However, manufacturers of clear bags, vials, syringes, and diagnostic devices with liquid contents have much to gain from the new technology.

What sets these products apart is the need to inspect for the presence of particulate matter in the liquid.

Because of the programming complexity and computer power required to inspect moving particles in a fluid environment, this type of operation has typically been relegated to humans. While there are many aspects of inspection that humans are good at, they are also prone to short attention spans and fatigue.

For medical and pharmaceutical manufacturers, risk management is a primary concern. Under greater scrutiny of regulators like the FDA, the ability to integrate dedicated vision inspection into critical manufacturing processes supports regulatory compliance. By having a more effective inspection method, manufacturers can also reduce the potential of product recalls or adverse patient events.

Human-like Inspection

When the vision engineers at SYSTEMATIX learned about ViDi Suite – a set of bio-inspired tools that mimic human brain behavior – what excited them was the software's application to advanced inspection. Capable of anomaly detection, localization, features detection, and classification, ViDi uses the good images of product and compares them with what is different. By looking at product this way, applications now identify
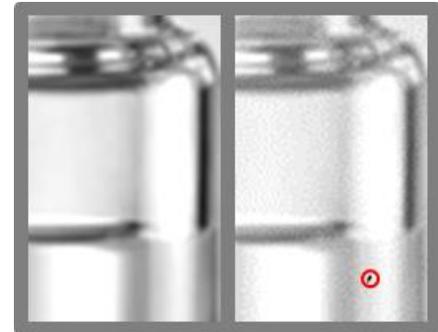
Picture shows a 5 micron particle in a glass vial detected by automated vision.

anomalies or possible defective units just like a human.

The software integrated with high speed camera technology, enhanced lighting and optics, a graphic processing unit (GPU), and data analysis software adds up to a vision inspection powerhouse. According to Michael Becker, President of SYSTEMATIX, "The new technology will reduce risk and make it easier to strike the critical balance between product quality, regulatory compliance and operational efficiency."

SYSTEMATIX has a well-equipped lab for proving out vision inspection solutions. Send us your RFQ or product samples and our experts can recommend a solution that will work for you.

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Deep Learning Principles Applied to Vision Inspection

Deep Learning technology is based on the use of sophisticated algorithms and emerged from artificial intelligence research conducted by the likes of Google. In one famous experiment, thousands of computers were used to simulate a neural network which, after processing millions of images, learned to recognize the image of a cat.

While advances in every aspect of vision technology including camera resolution, high intensity LED lighting, and new techniques in the use of optics are a huge advantage, it's the use of these algorithms that has opened the door to vision applications that were previously technically difficult and too expensive to consider.

When designing a vision inspection system in the past, it was necessary to create a set of high contrast comparison images using hardware to enable the system to differentiate good parts from bad. Now, with the combination of algorithms and powerful GPUs to process large image files, computer generated models depicting both shape and surface characteristics help the system learn what is normal.

Model of a cat created by computers during artificial intelligence experiment.
(See googleblog.blogspot.ca)

Typical Technical Setup of a Particulate Inspection System

Application Parameters	
Part field of view	5 sq cm
Particle size detected	5 microns
Inspection rate	120 parts per minute
Vision Hardware	
Camera resolution	35 megapixels
Lens(es)	Application specific
LED Lighting	Application specific
Computer Hardware & OS Requirements	
Dedicated PC	
CPU: Intel core i5/i7/Xeon	
NVidia Graphic Card (GeForce GTX770-780Ti-970-980, GTX TITAN, Quadro K5000-K6000, Tesla K20)	
8GB Memory	
100GB Disk Space	
1 USB port (2.0 or above)	
OS: Windows 7 – 64 / Linux - Ubuntu 14.04.64 bits LTS	

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