HEXAGON

Brochure

HxGN Visual Detection

Automate quality inspection and detect product defects faster

Delivering on quality

HxGN Visual Detection is an automated surface inspection application capable of detecting defects across a wide range of materials such as glass, metal, plastics, ceramics and textiles. It uses artificial intelligence to quickly learn from sample image sets in order to inspect surface finish at key stages during manufacturing.

Many businesses still rely on the human eye to identify defects during the manufacturing process. It's a highly inefficient, subjective process. Human eyes are only able to discern defects which are larger than 0.5 mm and false positives and negative detection rates increase over time when eyes become fatigued. Meanwhile, legacy vision systems offer consistency but they can be difficult to program. With limited flexibility and automation in the quality control process, businesses can struggle to respond to fluctuating demand and fail to manage variability across production lines.

The cost of poor quality

The cost of poor quality (CoPQ) is a constant issue for many manufacturers. Product recalls and rework impact revenue. Brand reputation and commercial relationships suffer when businesses fail to detect surface defects.

HxGN Visual Detection significantly reduces the time and costs associated with establishing quality control checks by harnessing the power of machine learning to quickly understand the difference between normal and abnormal surfaces, and then identify them in-line, near-line or off-line.

In any industry where quality is essential, HxGN Visual Detection provides the automation, accuracy and speed to reduce waste, improve profitability and stay ahead of the competition.

HxGN Visual Detection highlights

- Reduce waste by correcting errors faster
- Fast to deploy, easy to train
- Flexible to meet specific manufacturing needs
- Simple to use, with minimal operator training
- Rapid quality control with machine learning powered defect identification
- Integrated with an existing ecosystem of Hexagon products
- Fully automatable for custom integration to production systems

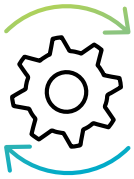
HxGN Visual Detection: Benefits

Improved quality of manufacturing output

HxGN Visual Detection can locate and recognise defects with an excellent level of accuracy. With a high degree of true positive identification and micron-accuracy dimension reporting, it enables manufacturers to reduce rework, limit quality-related downtime and minimise project costs.

Increased production speeds

Whether put to work in the quality room or installed on the factory floor, HxGN Visual Detection delivers faster quality control throughput by automatically detecting surface errors and anomalies at speed. The machine learning process is simple and guided. New products can be added to a manufacturing cell quickly with little involvement from product specialists or quality engineers.



Flexes for a wide range of use cases

Thanks to convolutional neural network (CNN) machine learning, HxGN Visual Detection can be trained to recognise target defects present on a wide range of materials. Automated quality control checks can be quickly configured for many components commonly used in consumer electronics, computing, aerospace, medical and automobile manufacturing. Monitor high-speed throughput in-line within a large manufacturing cell or when validating small batches of high value components during a proof of concept.

Extend the quality ecosystem

HxGN Visual Detection can combine results with standard dimensional metrology reports from PC-DMIS to create a fully comprehensive quality solution for any manufacturing cell. The Bridge application in HxGN Visual Detection enables convenient plug and play integration with compatible Hexagon products to extend quality processes.

Simple to use

With HxGN Visual Detection, users can create new inspection plans in just a few clicks via an intuitive, user-friendly interface based on Hexagon's common UI design principals. Users can quickly draw rectangles or polygons around defects in training images and apply labels. Quality reports provide full details on defect location, size and classification, while HTML formatted quality reports are easy to share with colleagues and stakeholders.


File
Edit
Tools
Help
Overkill
Escape
Added images
Original
break:0.98
w:83 h:22

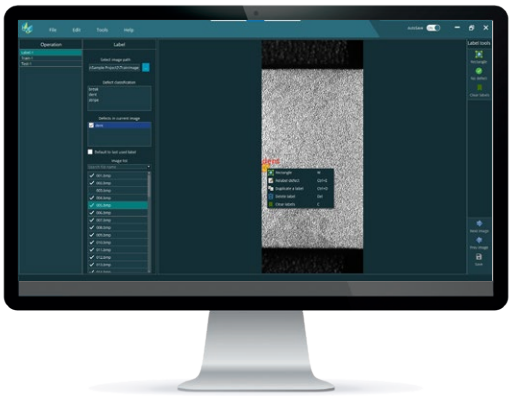
Machine learning

HxGN Visual Detection uses CNN (convolutional neural network) deep learning models to train, identify and categorise surface defects. It requires a relatively small quantity of defects samples (in the order of hundreds) to start. As it uncovers undetected defects, the model can be trained to further its ability to identify true positives.

The algorithms in HxGN Visual Detection employ pattern recognition, statistics, deep learning and other image processing techniques to rapidly learn about surface deviations.

Successful deep learning relies on the depth and sensitivity of the learning model and its environment. HxGN Visual Detection includes a set of models (X-CNN, X-CNN-Tiny, X-CNN-Plus and Segmentation) which are optimised for performance and accuracy.

The foundations of these models are based on accepted industry frameworks such as GAN, YOLO, and RCNN. HxGN Visual Detection provides an open architecture design that can be easily integrated with custom CNN models.



The HxGN Visual Detection machine learning process

1. Label

Upload a range of training set images from a vision system such as an Optiv CMM from Hexagon and annotate the defects with a classification such as ‘scratch’ or ‘dent’. Create as many defect types as are likely to be encountered during any production run.

2. Train

Deep learning models optimise the decision paths created with a training set, called supervised learning.

3. Inspect

Identify product defects within images supplied by the vision system. Advanced GPU processing algorithms optimise inspection speed while cutting down the percentage of false positives and negatives. HxGN Visual Detection can generate HTML reports as well as provide notifications via PC-DMIS.

1. Fast set up and configuration

Off the shelf setup with no coding required

2. Select from a range of CNN models

Choose the most useful machine learning model for your application

3. Built on YOLO (you only look once) CNN principles

Leading neural network for fast object detection

4. Image deformation, normalisation and filtering algorithms

Advanced image analysis for accurate defect detection

5. Easy to use hyperparameters

Fine-tuned image analysis without coding

6. Integrated with local GPU

Direct access to computer processing power for high-speed rendering and detection

7. Quality reports

Easily access and share reports via a convenient HTML format

8. Easy to integrate with dimensional analysis systems

Incorporate into vision CMM and other metrology workflows via the Bridge application

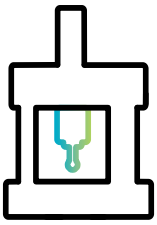
An integrated approach to quality

Driven by rapid advances in technology and digital transformation, the manufacturing industry is an increasingly competitive market.

To keep pace, businesses are continually looking for opportunities to maximise operational efficiency. Leading manufacturers are characterised by high levels of connectivity across processes and systems. The quality function is key, connecting dataflows throughout the product lifecycle to enable more data-driven decision-making.

Achieving these levels of connectivity and productivity requires greater product integration, with quality embedded throughout workflows.

HxGN Visual Detection is part of a wider Hexagon ecosystem, which embraces automated quality processes for smarter manufacturing across the business. It is ready for use with Hexagon's Optiv vision CMMs and can be incorporated into metrology workflows with PC-DMIS Vision to increase autonomy, accuracy and efficiency.



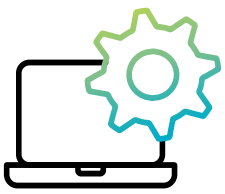
HxGN Visual Detection in the metrology workflow

1. Capture

Offering versatile multisensor CMMs, the Optiv range is ideal for capturing images for measurement and analysis in the quality room or in the production area.

2. Inspect

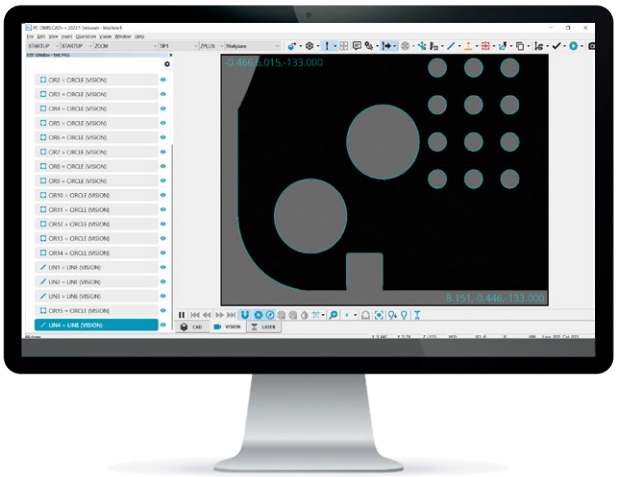
HxGN Visual Detection detects surface errors on images supplied by the Optiv CMM. Monitor high-speed throughput in-line within a large manufacturing cell or when validating small batches of high value components during a proof of concept.



3. Measure

Images are processed by PC-DMIS Vision metrology software and features can be compared against CAD models. PC-DMIS is also a gateway for data analysis applications such as Q-DAS or HxGN Metrology Reporting.

PC-DMIS Vision



Serving the unique requirements of vision metrology, PC-DMIS Vision is enhanced with a range of capabilities to maximise vision CMM usability and make inspection simple and productive.

PC-DMIS Vision reduces the time spent developing inspection programs with a set of tools crafted to ease the job of developing, debugging and executing vision-based measurement programs to by up to 75% and integrates CAD into the measurement process.

Users can develop and prove inspection programs off-line while leaving the measurement machine free for inspection. The user-friendly interface enables users to select geometry and define program parameters by pointing and clicking on a CAD model. For more information visit: hexagonmi.com/pcdmisvision

Optiv vision CMM range

Offering versatile multisensor CMMs that combine optical and tactile measurement with 3D scanning, the Optiv range is ideal for measuring smaller as well as larger workpieces – both in the quality room and in the production area.

Capable of measuring with a complete range of tactile and non-contact sensors, Optiv CMMs can tackle a wide range of measuring tasks. The design of these granite-based coordinate measuring machines, with precision mechanical linear guides on all axes, allows for high-accuracy measurements through consistent positioning accuracy. For more information visit hexagonmi.com/optiv

Service and support

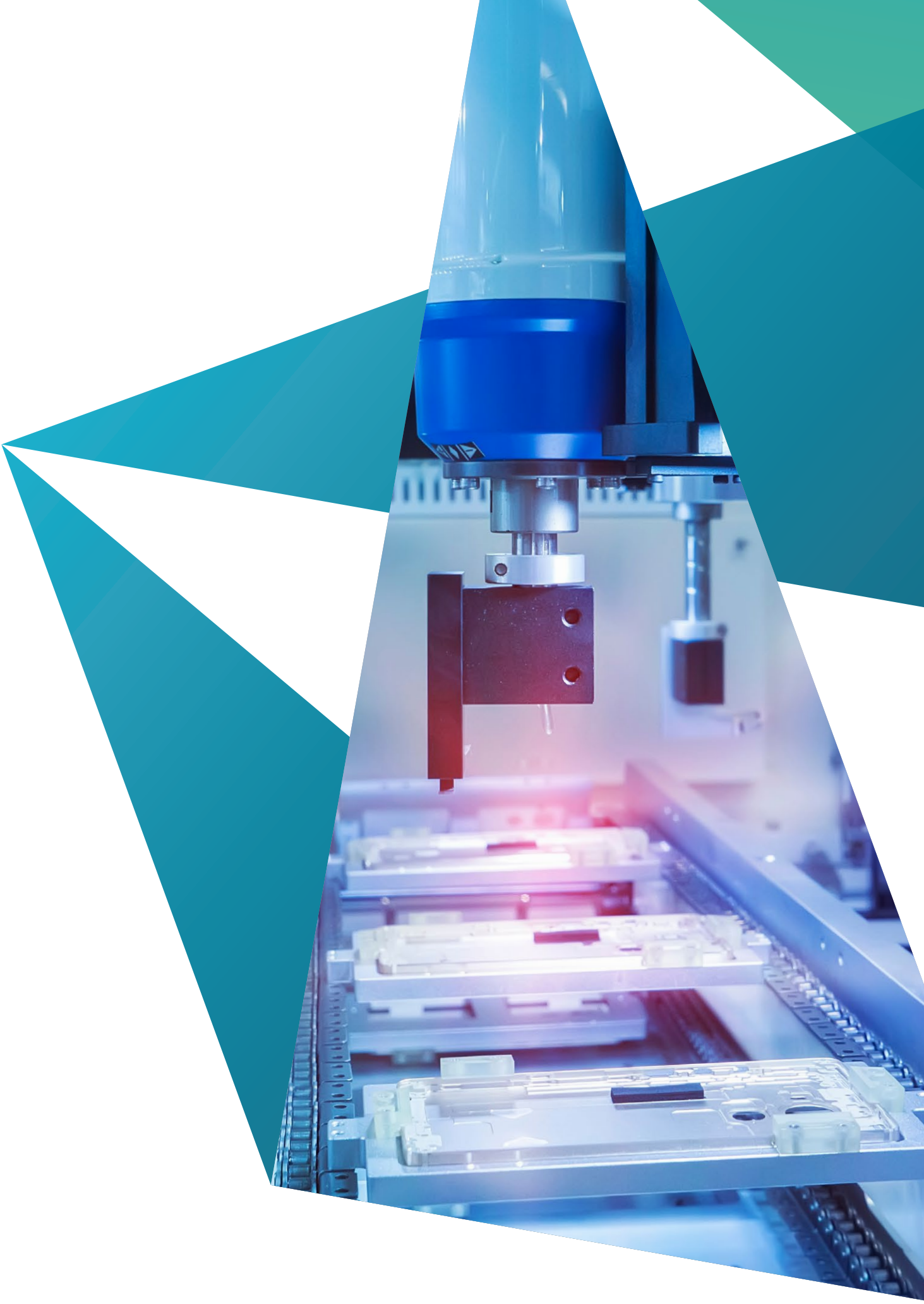
Timely expert service and support

Hexagon's global service and support teams are committed to helping our software user community maximise the value of Hexagon software by offering support where and when it's needed.

With Hexagon's global presence extending to over 70 solutions centres globally, our service and support network is strategically placed to ensure users have access to responsive technical support and experience minimal disruption to your operations. With Hexagon, customers receive assistance from product experts equipped with extensive experience of HxGN Visual Detection and regularly trained on the latest software versions.

In addition, local Hexagon teams offer a range of service and support to help you push productivity further. This includes a range of hardware and software training, maintenance and repair, and software maintenance agreements (SMAs) that ensure quality operations continually benefit from access to software updates and free trials of other Hexagon software.

For more information, visit hexagonmi.com/customerservices to contact our customer services team.



Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us @HexagonAB.