
ROBOTICS

3D quality inspection robot

A revolution in optical measuring technology



ABB's 3D quality inspection robot is a suite of hardware and software solutions that provide automatic part inspection that far exceeds the capabilities of manual inspection in speed, accuracy and repeatability. Both off-line and in-line solutions are available to suit your needs. The technology represents the future of flexible manufacturing, enabling a high level of automation with advanced data analysis that can be used to optimize production processes.

Speed, accuracy and flexibility

Introduction

One of the primary targets of inspection control is to ensure quality. Automating the task of part inspection can allow quality control to be carried out ten times faster compared to traditional systems, and permit the testing of more parts, dies and tools in less time. In industries such as automotive, aerospace and heavy machinery where every product needs to be validated, checking the quality is vital to ensure that all dimensions are produced to specification. Meanwhile, retaining specialist testing skills within industries is proving an increasing challenge.

Why is quality control and inspection important?

Controlling quality is vital to ensure that products achieve consistency, comply with standards, and meet customers' expectations. It minimizes waste, and ensures that production operates efficiently. If faulty products are allowed into the market, it can be enormously costly for manufacturers in recall costs, potential litigation, and reputational damage.

The challenge is that fast, accurate inspection and testing is difficult. Manual inspection can be extremely time consuming, while automated systems must be delivered to high specifications to ensure that no errors or faults occur, while also providing comprehensive data recording should auditing be required at a later date.

ABB 3D quality inspection robot

ABB's 3D quality inspection robot delivers on speed, accuracy and reliability, making metrology easier and less time consuming. It operates 10 times faster than traditional systems, allowing the testing of more parts in the same time. This can dramatically accelerate production, facilitating testing of more parts per batch, or more batches, with more detailed reports provided.

The robotic technology can detect defects at 20 μm ; less than half the width of a human hair and imperceptible to the naked eye. The system is modular, making it customizable to your particular needs, and facilitating easy upgrades, while its small footprint means that it takes up minimum floor space and is easy to install or relocate. Its simplicity of operation means that it can be operated with little training required compared to traditional systems.

Detection in context (in microns)

Grain of sand	500 μm
Thickness of paper	70-180 μm
Dust particle	100 μm
Human hair	50-100 μm
Pollen grain	30-50 μm
3DQI defect detection	20 μm



Key benefits

INTEGRATED SOLUTION

ABB 3DQI integrates seamlessly with Industry 4.0 technologies, while its ease of use means that it can be operated without the need for extensive training. All logic is provided within a single controller.

HIGH FLEXIBILITY

Combined with flexible holding fixtures, the simulator allows easy configuration of new parts using only CAD data and an inspection plan.

SHINY/BLACK PARTS DIGITIZATION

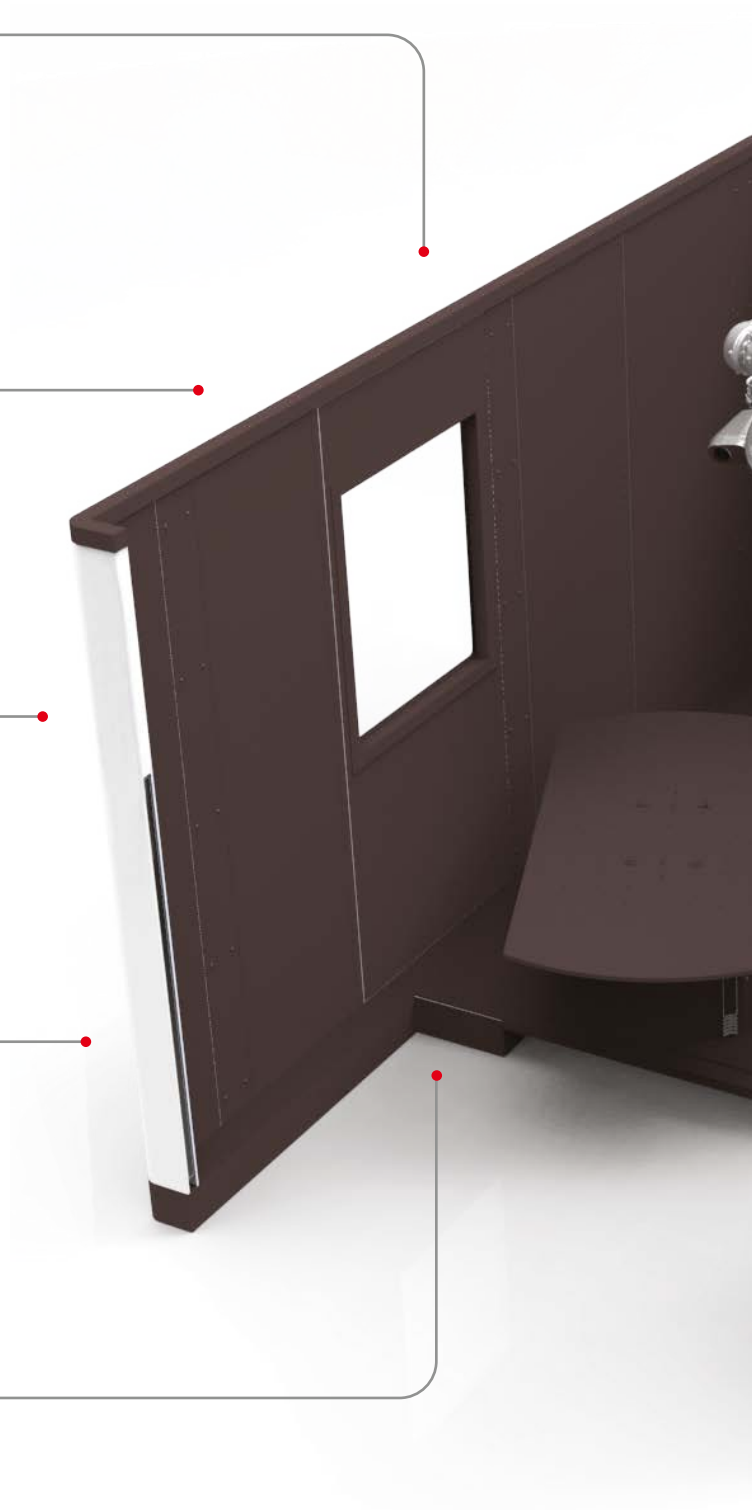
EDR technology implements system parameter adjustments to easily digitize shiny and black parts without the need for spray.

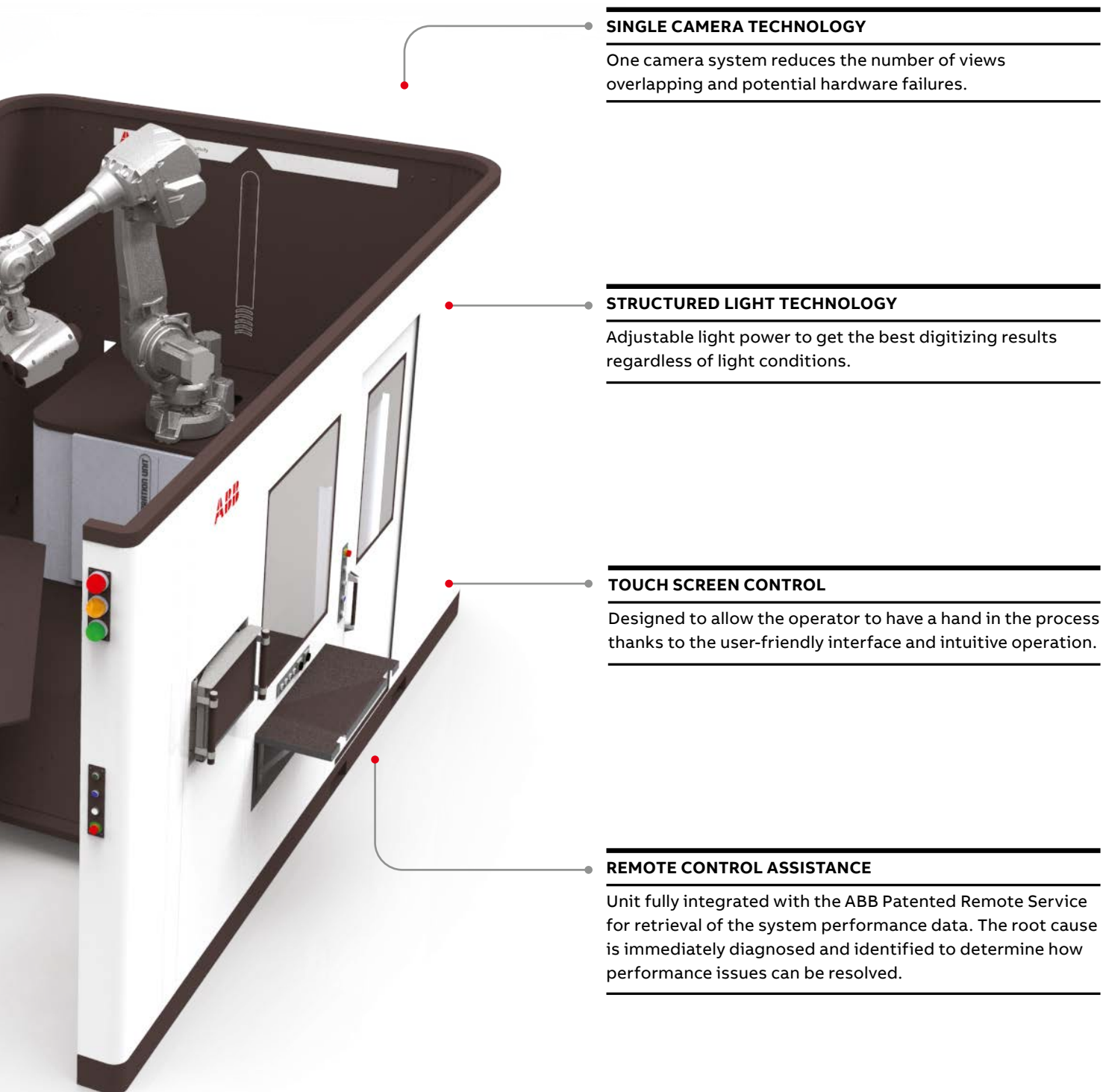
EXTREMELY FAST

Seamless integration with the ABB robot allow the scanning process to be performed rapidly, while the measured data is processed in real time using multiprocessor technology.

SIMPLE TO USE

Thanks to the fully integrated ABB Robot Studio Power-Pack, the 3DQI is extremely easy to program. Further simplicity is enabled by the inclusion of AutoPath planning, enabling the robot to automatically calculate the optimal scanning path.





SINGLE CAMERA TECHNOLOGY

One camera system reduces the number of views overlapping and potential hardware failures.

STRUCTURED LIGHT TECHNOLOGY

Adjustable light power to get the best digitizing results regardless of light conditions.

TOUCH SCREEN CONTROL

Designed to allow the operator to have a hand in the process thanks to the user-friendly interface and intuitive operation.

REMOTE CONTROL ASSISTANCE

Unit fully integrated with the ABB Patented Remote Service for retrieval of the system performance data. The root cause is immediately diagnosed and identified to determine how performance issues can be resolved.

Key applications

Automotive

Using robotic 3D vision quality control and inspection in automotive and Tier 1 applications can help to substantially reduce cycle times, improve quality control and lower the risk of quality control errors. Millions of 3D points can be inspected without touching the part in the same time that it would take a conventional CMM-based technology to inspect just a single point, helping to speed up the quality checking process. By reducing inspection times, 100% quality control of finished parts can be achieved.



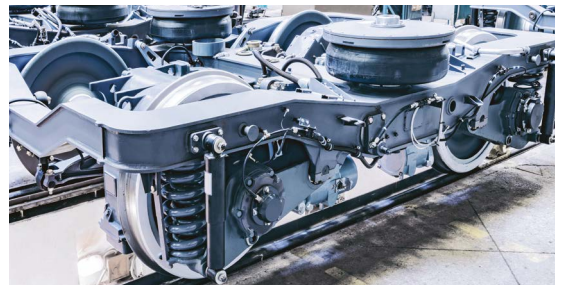
Other industrial applications for the 3D quality inspection robot

The high accuracy, fast performance and flexibility offered by ABB's 3D quality inspection robot make it ideal for use in any application where faulty products or components need to be quickly identified. Other industrial applications where the 3DQI can be used include:



Aerospace manufacturing

- Turbine and turbine blades
- Wrinkle analysis



Transportation

- Welding and inspection for train chassis and wheel bogies
- Ship propeller inspection

Textiles & Footwear

- Shoe mold inspection



Heavy construction machinery

- Crawler excavators
- Shovel excavators
- Chassis components



Technical specifications

Technical specifications: 3DQI Off-Line solution

Unit size and weight	Robotized unit: 1600 x 1300 mm – 800 kg. With rotary table: 3000 x 1300 mm – 1000 kg With closure: 4830 x 2900mm – 3000 kg
Max. part size specifications	Cylinder of 2000 mm diameter and 2000 mm height
Field of view	550 x 390 x 200 mm ³ .
Cameras	5 Megapixels (3D scanner) Photogrammetry camera: 14 µm + 14 µm/m
Technique used	Structured light
Accuracy	Based on VDI 2634-III, accuracy below 100µm in a cylinder of 2m diameter x 2m height
Precision (Repeatability)	Based on MSA type 1 test, repeatability (sigma) 22 µm
Speed	Up to 0.25 sec/shot
Operating conditions	Temperature: 5 – 45°. Light conditions: Designed for industrial environment Electrical compatibility: 200 V – 600 V 50 Hz / 60 Hz III Phase
Rotary table (up to 600 KG parts)	Includes flexible holding fixtures for supporting multiple parts types
Floor mounting or fixing	Anchors for floor fixing.
Closure	Includes emergency stop button, safety sensors and fencing Entry: 2500 mm width with photoelectric sensors. Maintenance door
Certification	Compliant to VDI 2634-III and CE





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