

API

CHECKBOX - Smart Factory Inspection System (SFIS)

API, recognizing manufacturing industry's increasing demand for part measurement automation, with a higher degree of accuracy, has developed its Smart Factory Inspection System with true 6DoF real-time 3D robotic measurement incorporating its proven metrology technology and calibration components.

SFIS can be delivered as a customized integrated solution or as a standard production inspection cell.

The standard API SFIS CheckBox™ is an optical 3D measuring solution developed for the inspection of production parts and installation integral with manufacturing operations. Modular in design, and scalable in size, CheckBox utilizes a 6 axis industrial robot with real-time encoded robot position using the benchmark API 6DoF RADIANT Pro laser tracker. Real time enhanced robot accuracy completely eliminates any requirement for problematic stickers used by photogrammetric robotic measuring systems and provides comparable horizontal-arm CMM accuracy. For larger part inspection the robot is mounted on a linear rail.

CHECKBOX MODEL	INTERNAL DIMENSIONS
10.12	1000mm x 1200mm
22.30	2200mm x 3000mm
25.60	2500mm x 6000mm
25.100	2500mm x 10000mm

- A turn-key solution that unifies the strengths of Laser Tracker and 3D Area Scanner for unmatched global accuracy
- Intelligent run-time software is a backbone of the system
- API's Radian and RapidScan are metrology tools
- Robotic Arm is used as manipulator for large scale measurement

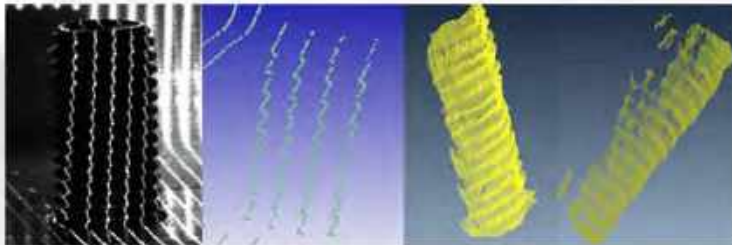


CREATING THE DIGITAL TWIN

API's RapidScan ultra-high dynamic range, 3.2 mega-pixel, stereo imaging, hybrid optical sensor captures a 3D point cloud of the part within its large field of view. Capable of measuring highly reflective and composite surfaces RapidScan completely eliminates the need for impractical production part spraying. With sub pixel edge detection, the (hybrid pattern) optical projection generates a highly accurate dense point cloud. The systems metrology evaluation software provides point cloud geometry extraction and surface topology creation providing direct comparison with part digital model. Generated point cloud quality makes RapidScan the ideal solution for intricate features like nut-hole and stud inspection in automotive sheet-metal parts.

The CheckBox modular enclosure design allows system size to be configured to suite each customer's specific measurement task while providing a standardized solution. Optional rotary table for part positioning can be incorporated together with 7th axis linear track and automatic part loading as the measurement application necessitates.

Standardized SFIS is the ideal automated measurement solution for production-floor quality control, combining reliable hardware with robust software, allowing trend analysis, monitoring of production processes, root cause analysis, and delivery of increased productivity and process improvements.



Images: Example of stud scan

The SFIS software supports the robot, laser tracker, optical sensor and measurement function in one simulation environment. Inspection paths are automatically generated from part CAD data with interactive robot measurement path definition based on optimum sensor scan-angle and standoff. Automatic checking of SMR targets visibility in planned inspection path and seamless loading and application of the simulated path to the online measuring process.

API's network of SFIS project integration partners will customize the final measuring solution utilizing API supplied SFIS metrology technology components including measuring sensor, laser tracker, SFIS and metrology evaluation software and application tool-kit.

ADVANTAGES VS OTHER OPTICAL SYSTEMS

- No Targets or Photogrammetry
- No Spray needed on reflective parts
- No special lighting condition – works in dim to bright light
- All materials including carbon composites
- All surface finish and texture
- High Density Point Cloud Generation
- Global Accuracy
- Capable of Discrete Measurements on-the-fly
- Unique sheet-metal feature extraction
- Modular measuring range up to 25m
- No setup time (only in seconds)
- Suitable for in-line, near line, and off-line inspection

API SFIS Standard Supplied Components

- CheckBox Enclosure
- API Radian Pro Laser Tracker
- 6DoF Tracking System
 - Smart Tract System
 - SMR Extension Tube
 - SMR Plate
- Calibration Artifact
- RapidScan Hybrid Optical Sensor
- SFIS Software
 - Robot Programming and Simulation
 - Runtime module
 - Point Cloud Analysis Software
 - Polyworks
 - Metrologic