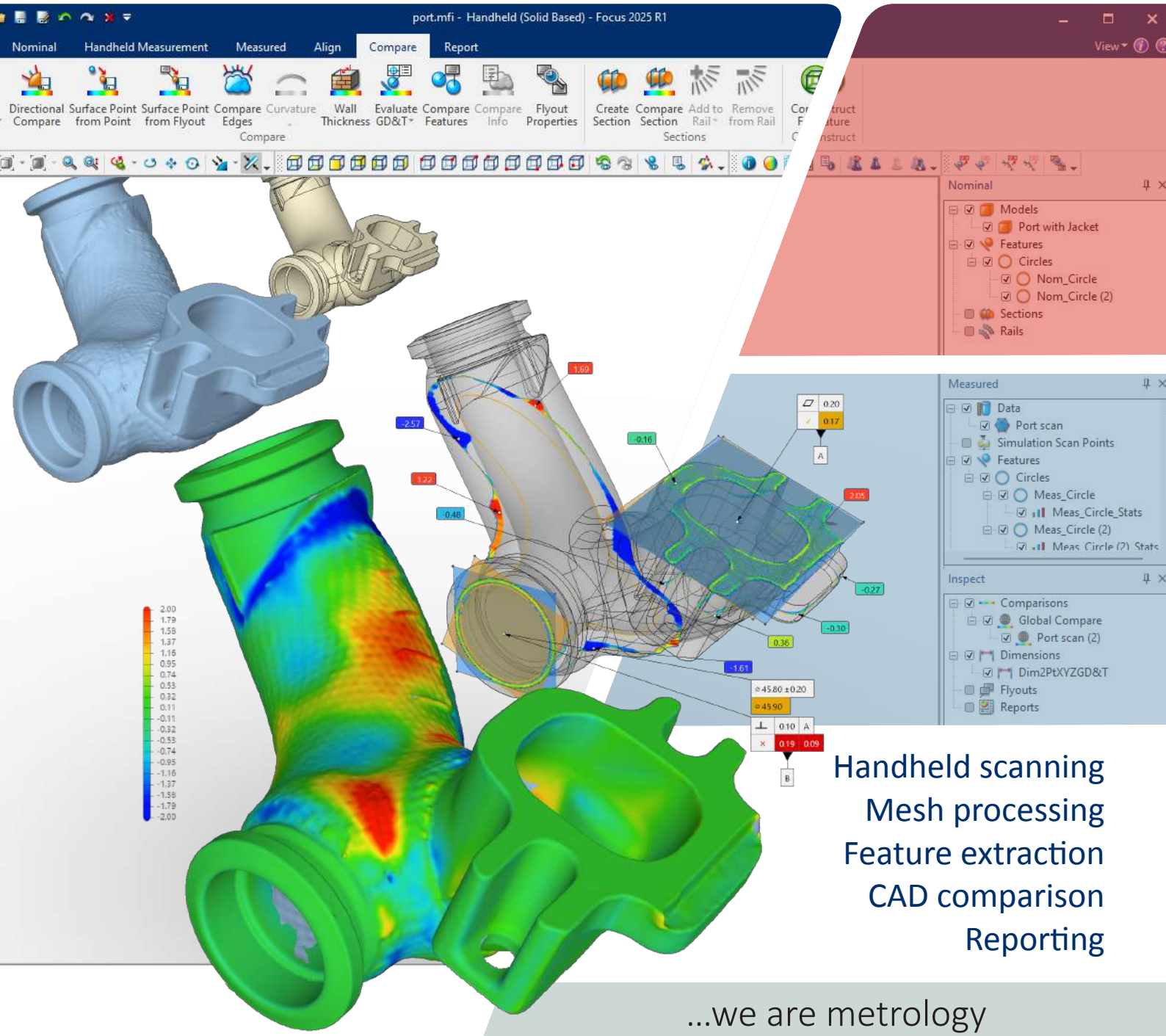
FOCUS

POINT CLOUD INSPECTION SOFTWARE



Handheld scanning
Mesh processing
Feature extraction
CAD comparison
Reporting

...we are metrology

Focus point cloud software drives a digital inspection process. The core of this process is the 3D inspection suite featuring easy-to-interpret part-to-CAD comparisons and advanced feature inspection.

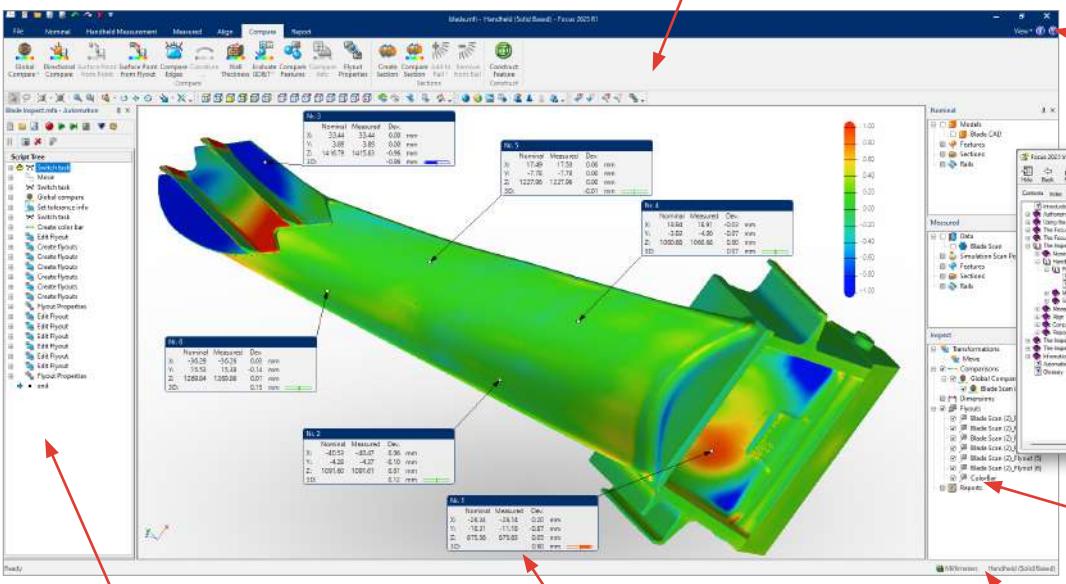
Focus presents a clear, graphical UI where users will feel at ease immediately with direct access to most used functions. Offering tightly integrated data acquisition – via handheld scanners – and intelligent processing and reporting.

Direct access to workflow selection, customization and automation facilitate the setup and execution of processing jobs. Focus seamlessly drives LK Metrology's class-leading H120 handheld laser scanners and FREEDOM arms.

Ribbon Taskbar

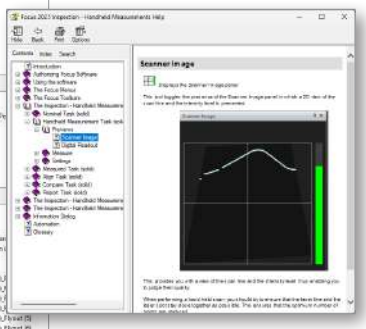
Progressively guides the user through an inspection:

- **NOMINAL** part definition including features and GD&T from CAD, point cloud or mesh
- **HANDHELD MEASUREMENT** for scanning and probing of the actual part
- **MEASURED** scan processing and feature correspondence creation
- **ALIGN** or transform the measured part to the nominal part
- **COMPARE** the measured part to the nominal part with various analyses
- **REPORT** the results graphically or tabularly



On-line Help

Context-sensitive help with tutorials and search-by-topic



Inspection Tree

Separation of nominal, measured and comparison items for clarity

Automation Panel

Repetitive tasks can be recorded and edited using macro scripts

Advanced data handling

Easily handles large CAD models and assemblies as well as virtually unlimited point cloud size

Workflows

CAD, Mesh and Airfoil specific workflows

FOCUS BENEFITS

Focus Handheld and Inspection software covers a wide range of inspection applications and offers stunning performance, an intuitive user interface, and standard macro functionality to automate the entire inspection process.

- Full set of functions for digital surface and feature inspection
- Easy-to-interpret and interactive reporting to assist decision making
- Inspection automation without requiring programming skills
- Seamlessly integrated scanning and inspection handheld laser scanning inspection workflows for both operators and engineers
- Ribbon taskbar facilitating intuitive inspection workflows
- Intelligent feature detection and analysis algorithms resulting in high productivity and consistent results

Introducing Focus

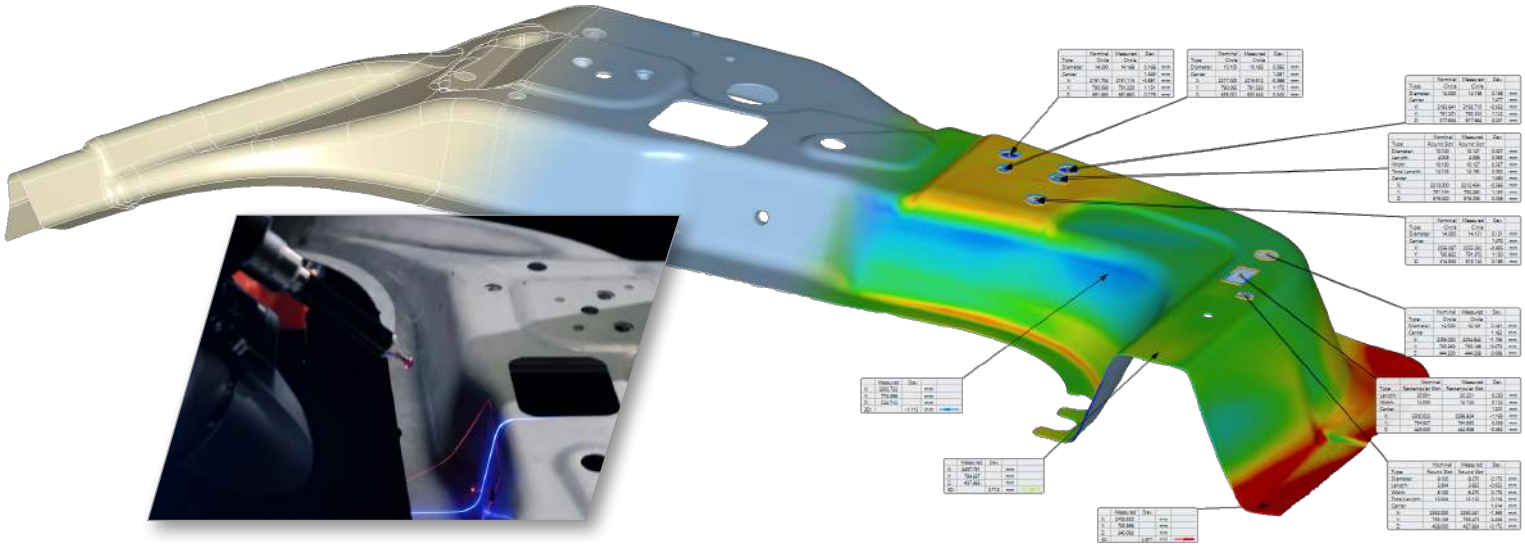
A DIGITAL INSPECTION PROCESS

LK Metrology solutions feed critical geometric measurement data into today's digital information streams that drive new product development and manufacture. Smart digital inspection solutions, such as Focus software and laser scanners, accurately digitize the complete geometry of freeform surfaces and features.

Digitizing components up front and running inspection on the digital copies of the samples can streamline metrology operations and embed them into the digital CAD-centric development process. As a Digital Inspection Process provides more profound metrology insight, it is an essential tool for improving and accelerating styling, tooling, prototyping and serial production.

PART-TO-CAD INSPECTION WORKFLOW

1. IMPORT CAD
2. IMPORT OR SCAN POINT CLOUDS
3. ALIGN SCAN TO CAD
4. COMPARE AND REPORT



Work with common CAD formats

- Neutral formats: STEP, IGES
- Native formats: CATIA, Creo®, NX , SolidWorks®, ACIS®, VDA-FS, Parasolid®
- Imports GD&T & CAD features

Complete part-to-CAD inspection toolbox

- Comparison of parts against CAD or other scanned parts
- 3D deviation colour maps make interpretation straightforward
- Array of user-configurable flyout choices
- Reporting templates based on inspection type

Superior point cloud handling

- Analyzes virtually unlimited point clouds (> 100 million)
- Comprehensive set of point cloud tools (filtering, meshing, refinement, etc.)
- FUSE intelligently and automatically processes the scanned point cloud data into an accurate, high quality polygon mesh

Alignment tools

- 3D and 2D (section) best fit, RPS (feature-based), 3-2-1

Automation

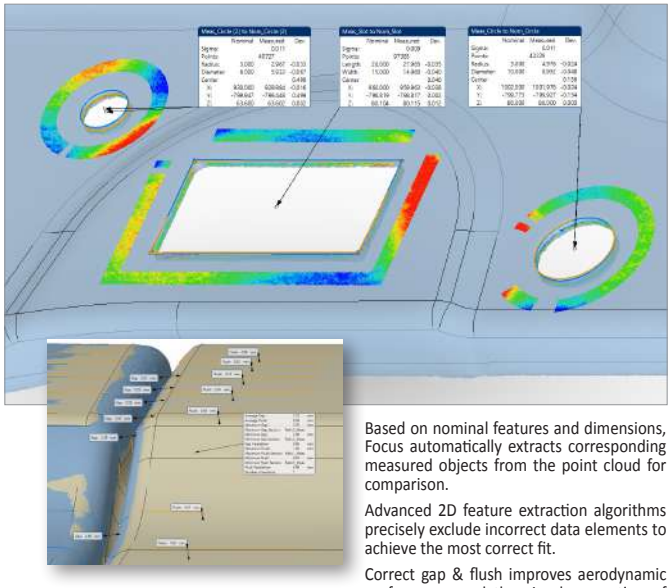
- Macro recording and playback for repetitive tasks

Focus is a state-of-the-art metrology software with wide ranging functionalities for surface and feature inspection on laser scanned point cloud data.

SURFACE INSPECTION

Part-to-CAD inspection compares the acquired point cloud with nominal CAD data and displays geometric deviations in a clear graphical report.

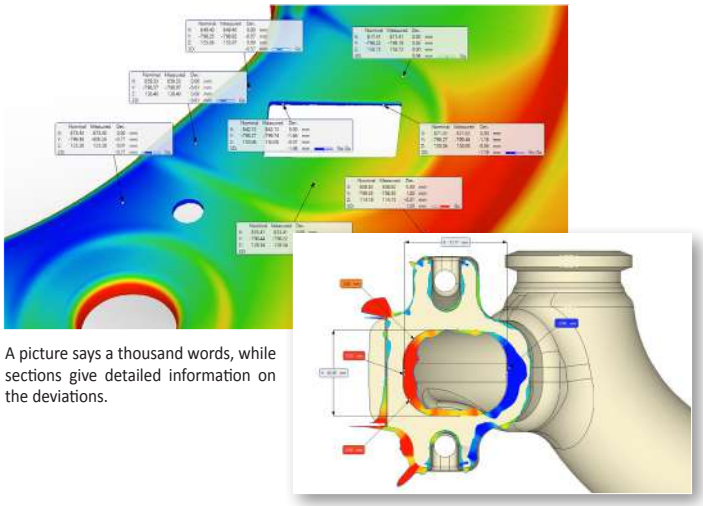
- Full part-to-CAD inspection
- 2D and 3D sections
- Wall thickness, edge analysis, etc.
- Customizable flyouts for clear interpretation



Based on nominal features and dimensions, Focus automatically extracts corresponding measured objects from the point cloud for comparison.

Advanced 2D feature extraction algorithms precisely exclude incorrect data elements to achieve the most correct fit.

Correct gap & flush improves aerodynamic performance and the visual perception of quality.

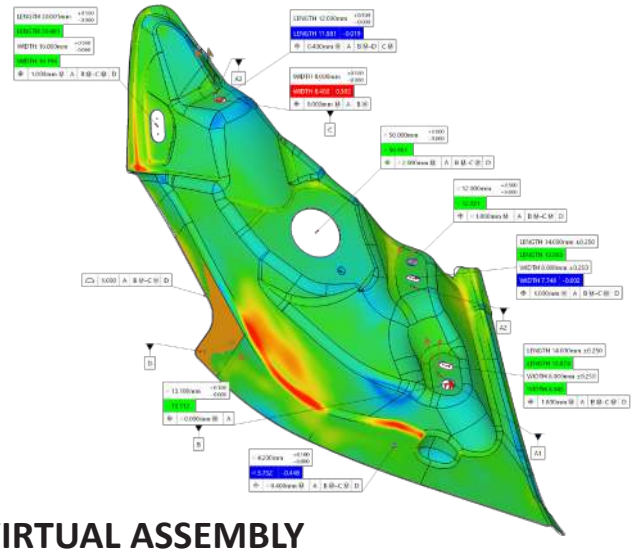


A picture says a thousand words, while sections give detailed information on the deviations.

FEATURE INSPECTION

Checking the position and dimensions of component features is crucial to guarantee an optimal fit later in the assembly process.

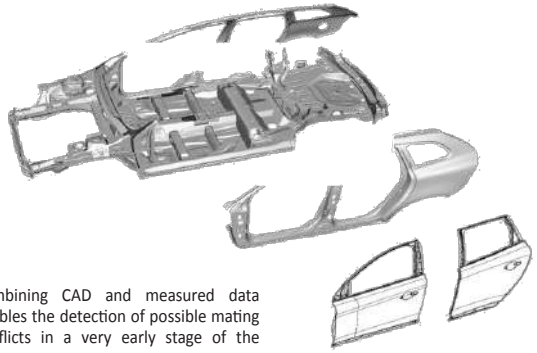
- Automatic and semi-automatic feature detection
  - 2D features: surface point, hole, slot, etc.
  - 3D basic features: cylinder, sphere, plane, etc.
  - 3D advanced features: T-stud, key, pin, fir tree, etc.
- Sectional inspection of gap & flush between assemblies (closure panels, interior trim, etc.)
- Definition of user-specific flush & gap gauges
- Combi hem: creation of virtual edge points



TRUE METROLOGY SOLUTION

A perfect assembly is guaranteed when the feature geometries meet the specified tolerances. Focus Inspection supports the internationally accepted ASME Y14.5 GD&T standard, making it a true metrology solution.

- Imports GD&T data from nominal CAD
- Complete set of certified GD&T functions to define tolerances on form, orientation and location
- PTB certified feature calculation algorithms



Combining CAD and measured data enables the detection of possible mating conflicts in a very early stage of the process.

VIRTUAL ASSEMBLY

Digital copies of reference parts are used to build an assembly with the CAD model or other point cloud data. This approach saves material by avoiding expensive templates, fixtures and scrap. It saves additional time by avoiding lengthy physical assembly builds, resulting in faster decisionmaking and shorter pre-production processes.

Inspection functionality

AUTOMATION

Focus Inspection incorporates standard automation functionality that supports non-stop execution of repetitive inspection tasks. This allows multiple scan files or even the complete inspection cycle of a series of parts to be processed automatically.

- Automation of scan processing and inspection analysis
- Macro-based recording of actions:
  - No specific programming skills required
  - No editing of text files needed

Macros can automate the entire inspection workflow, from nominal CAD import to final reporting.

REPORTING

Correct decision making is based on the fast and unambiguous interpretation of measurement results. 3D graphical deviation reports provide results in an easy understandable format, with which Focus Inspection facilitates communication between operators, managers and suppliers.

- Customizable Microsoft Excel template-based reporting
- Statistical Process Control (SPC): QStat, QC-Calc, DMIS, .txt
- Data export to a variety of file formats to flexibly share results with other users and applications

	FOCUS HANDHELD	FOCUS HANDHELD & INSPECTION
NOMINAL CAD / POINT CLOUD / MESH TOOLS		
IGES & STEP CAD import	■	■
Native CAD import	□	□
Point cloud & mesh import	■	■
Nominal point cloud meshing and processing tools	■	■
Feature creation, fitting and detection	■	■
Directional surface points	—	■
Edge detection (combi-hem)	—	■
Gap & flush calipers	—	■
Feature construction tools	—	■
GD&T creation	—	■
Nominal dimensions	—	■
CAD cleanup tools	—	■
Cross sections	■	■
Rails (grouped cross sections)	—	■
HANDHELD MEASUREMENT		
Handheld scanning	■	■
Tactile probing	■	■
Move device / Leapfrog	■	■
MEASURED POINT CLOUD / MESH TOOLS		
Point cloud & mesh import	■	■
Point cloud meshing and processing tools	■	■
Feature creation, fitting and detection	■	■
Surface comparison points	—	■
Edge detection (combi-hem)	—	■
Gap & flush calipers	—	■
Feature construction tools	—	■
Cross sections	■	■
Rails (grouped cross sections)	—	■
Golden template	—	■
ALIGNMENTS AND TRANSFORMATIONS		
N point and Best Fit alignment and transform	■	■
Iterative N point, 3-2-1 and Interactive alignment	■	■
Move transform	■	■
RPS alignment and transform	—	■
2D Best Fit transform	—	■
COMPARISON		
Global comparison (scan to CAD, scan to scan)	—	■
Directional surface point comparison	—	■
Edge / gap & flush caliper comparison	—	■
Curvature analysis	—	■
Wall thickness analysis	—	■
Feature comparison	—	■
Cross section comparison	—	■
Feature construction tools	—	■
Airfoil inspection	—	□
REPORTING		
Comparison and feature flyouts	■	■
Auto-arrange flyouts	—	■
Rail flyouts	—	■
Annotation	■	■
New comparison report creation	—	■
Prior comparison report update/recreation	■	■
Feature reporting	—	■
Manual dimensions (distance, angle, diameter…)	■	■
Advanced manual dimensions (gap & step)	—	■
Export features, sections, mesh borders & deviations	■	■
Export section planes & feature comparison info	—	■
AUTOMATION		
Macro playback	■	■
Macro record	—	■

■ Included □ Additional option — Not available

Focus Handheld provides a perfectly integrated, high precision and efficient scanning experience for LK Metrology handheld scanner and portable arm users.

Focus Handheld's FUSE meshing algorithm automatically and quickly generates clean, accurate, high-quality meshes by utilising meta data from the scanner which is unavailable in other software.

PORTABLE, HANDHELD INSPECTION

Portable CMMs are flexible scanning solutions typically used on- or off-site for inspection jobs, such as pre-series troubleshooting. Preparation effort is limited to system setup, followed by scanning the part and performing the analysis. Focus Handheld's perfectly integrated experience with LK Metrology hardware streamlines the scan data acquisition and processing.

Tactile probing
Launch a dedicated probing environment and switch to / from tactile measurement seamlessly

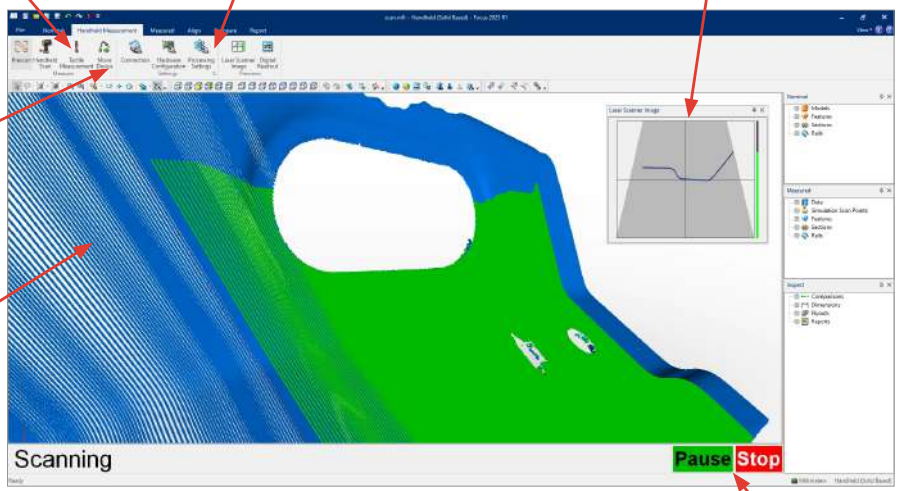
Leapfrog
Move device to measure very large parts

Live Scan Shading
Realistic data visualization using scan normals

Remote Operation
Arm buttons are used to remotely scan, pause, delete, change view and switch to the probing UI

Automatic processing
Automatic high-quality meshing using FUSE

Laser Scanner Image
Live laser profile guides the operator



Large Text
Operate from a distance

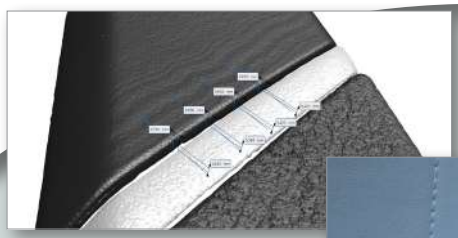
AIRFOIL INSPECTION

The Focus Airfoil Inspection module offers a wealth of functionalities for inspection of blades. A wide range of airfoil profile measurements can be precisely calculated from crosssections through the airfoil and easily conveyed graphically or via dedicated airfoil report templates.

- Chord, tangent and edge angles
- Maximum thicknesses
- Edge radii and thickness
- Chord and tangent length and width
- Angular width
- Mean (camber) line
- Line profiles
- Profile thickness
- Stacking points
- Lean, bow & twist

Applications

The versatility of Focus Handheld & Inspection's point cloud measurement and analysis capabilities benefit a wide range of industrial and nonindustrial sectors and applications.

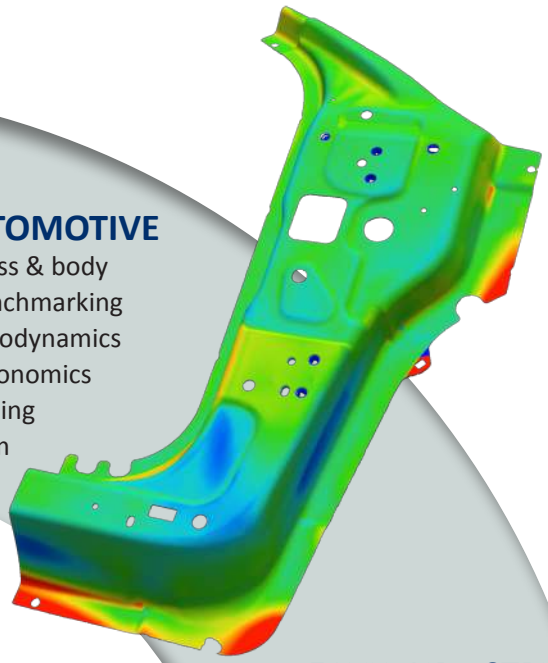


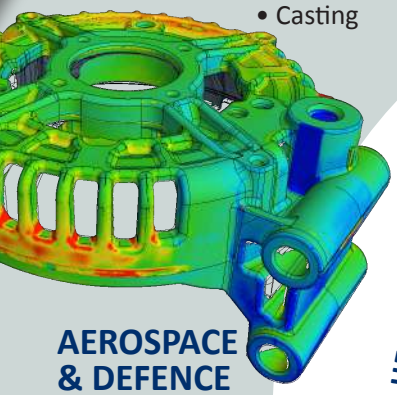
MANUFACTURING

- Additive manufacturing
- Injection molding
- Machining
- Stamping
- Casting

AUTOMOTIVE

- Press & body
- Benchmarking
- Aerodynamics
- Ergonomics
- Styling
- Trim





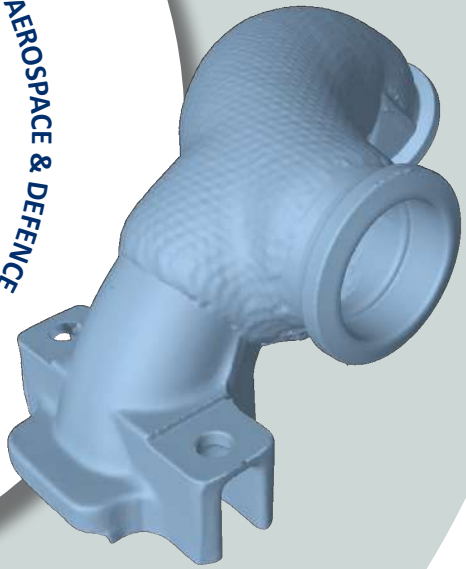
CONSUMER
MANUFACTURING
AEROSPACE & DEFENCE
AUTOMOTIVE
HEALTHCARE
POWER GENERATION
HEAVY INDUSTRY

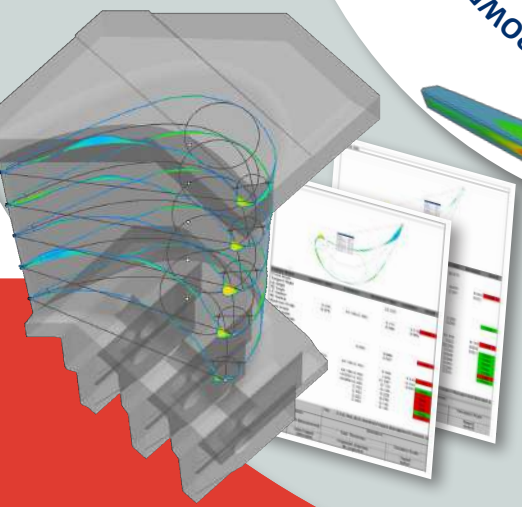
HEAVY INDUSTRY

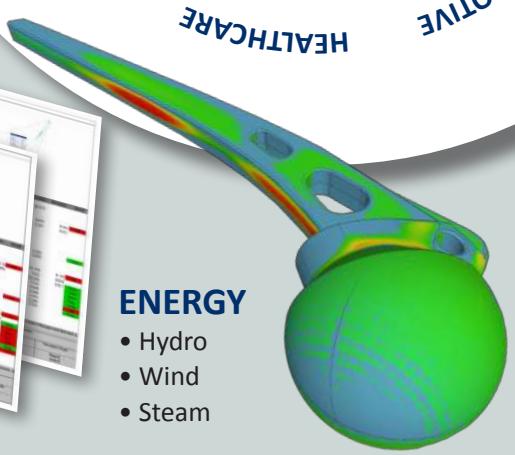
- Rail infrastructure
- Shipbuilding
- Construction

AEROSPACE & DEFENCE

- Landing systems
- Engine (blades)
- Structures & actuation
- MRO







CONSUMER

- Cultural heritage
- Virtual reality
- Education

ENERGY

- Hydro
- Wind
- Steam

HEALTHCARE

- Prosthetics
- Orthotics
- Implants

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