Marposs Group
for
Aerospace Industry

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Product LINE for AEROSPACE

MARPOSS GROUP know-how for Aerospace applications

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Bentivoglio, Bologna
ITALY
Headquarters &
Main Mfg. Plant
757 employees

OMG

Travagliato, Brescia
ITALY
156 employees

KERN

Chelles,Paris
FRANCE
43 employees

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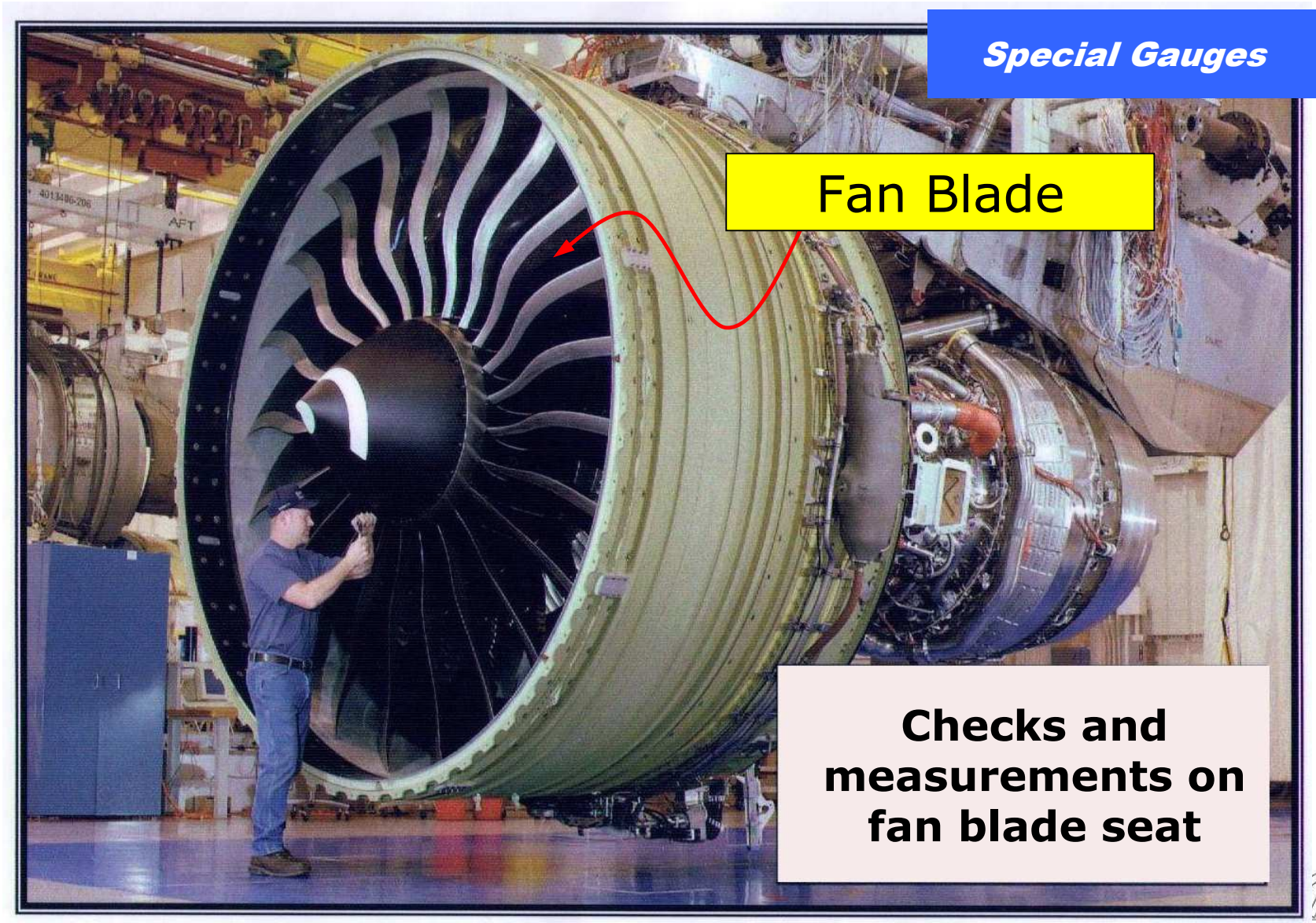
Special Gauges



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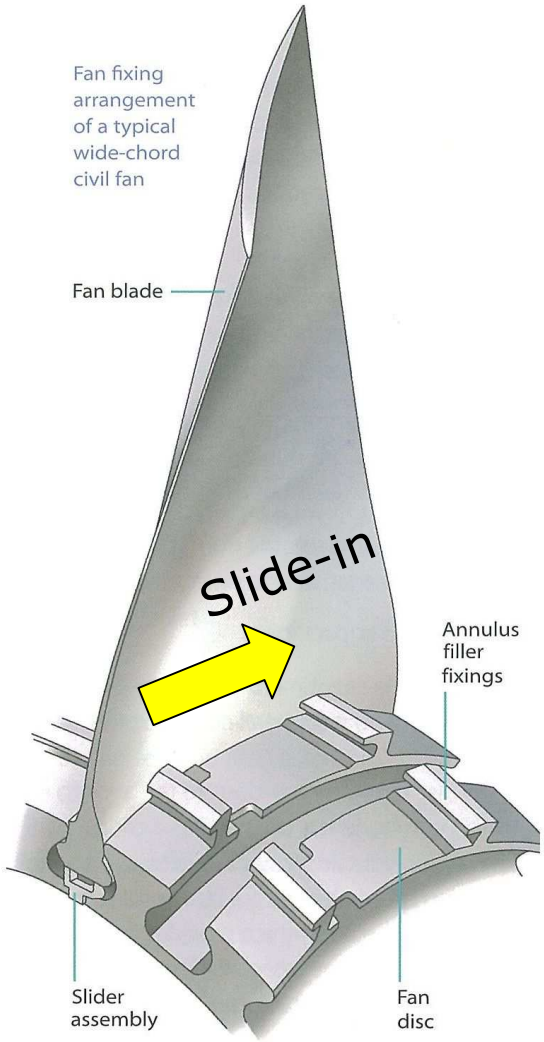
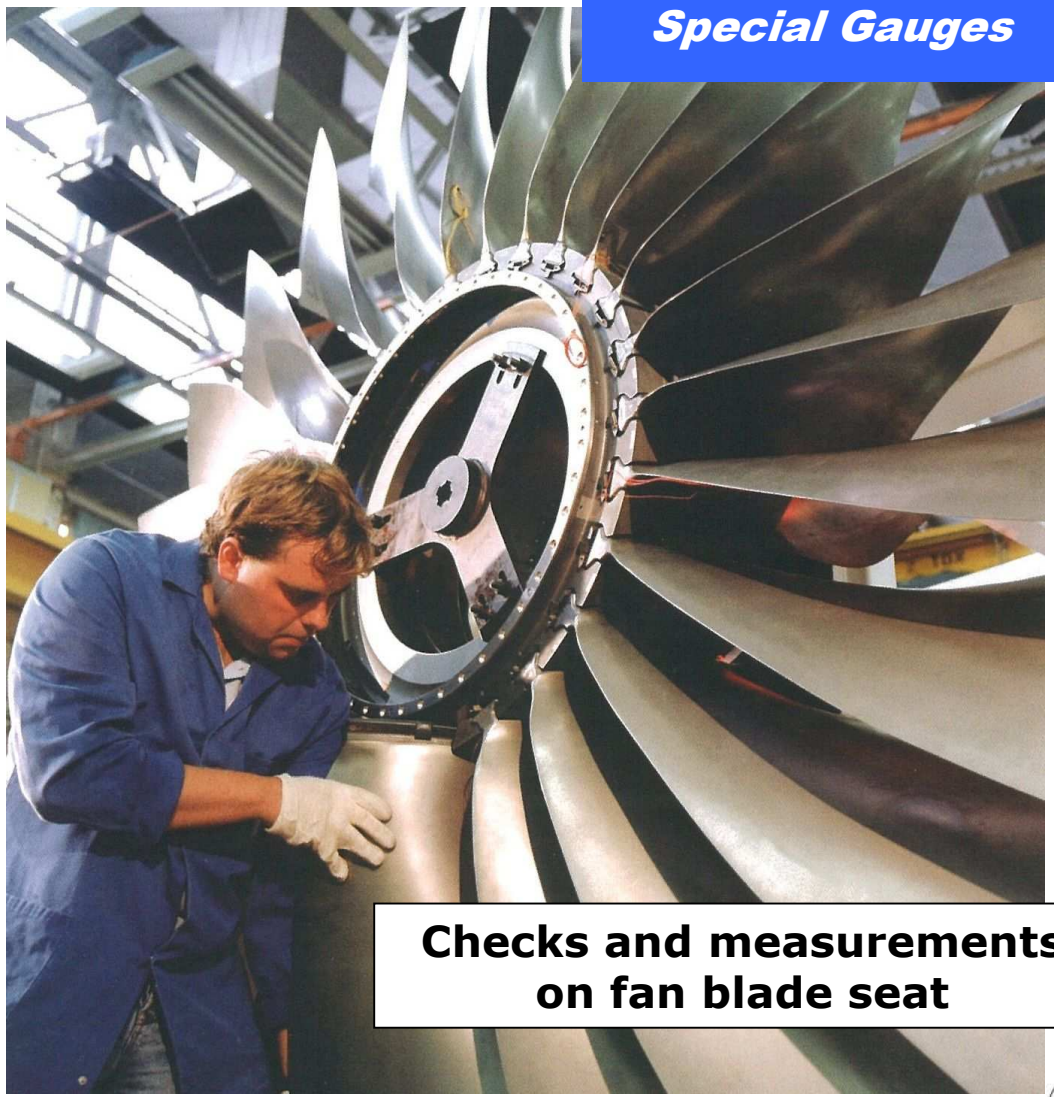
Special Gauges





Checks and measurements on fan blade seat

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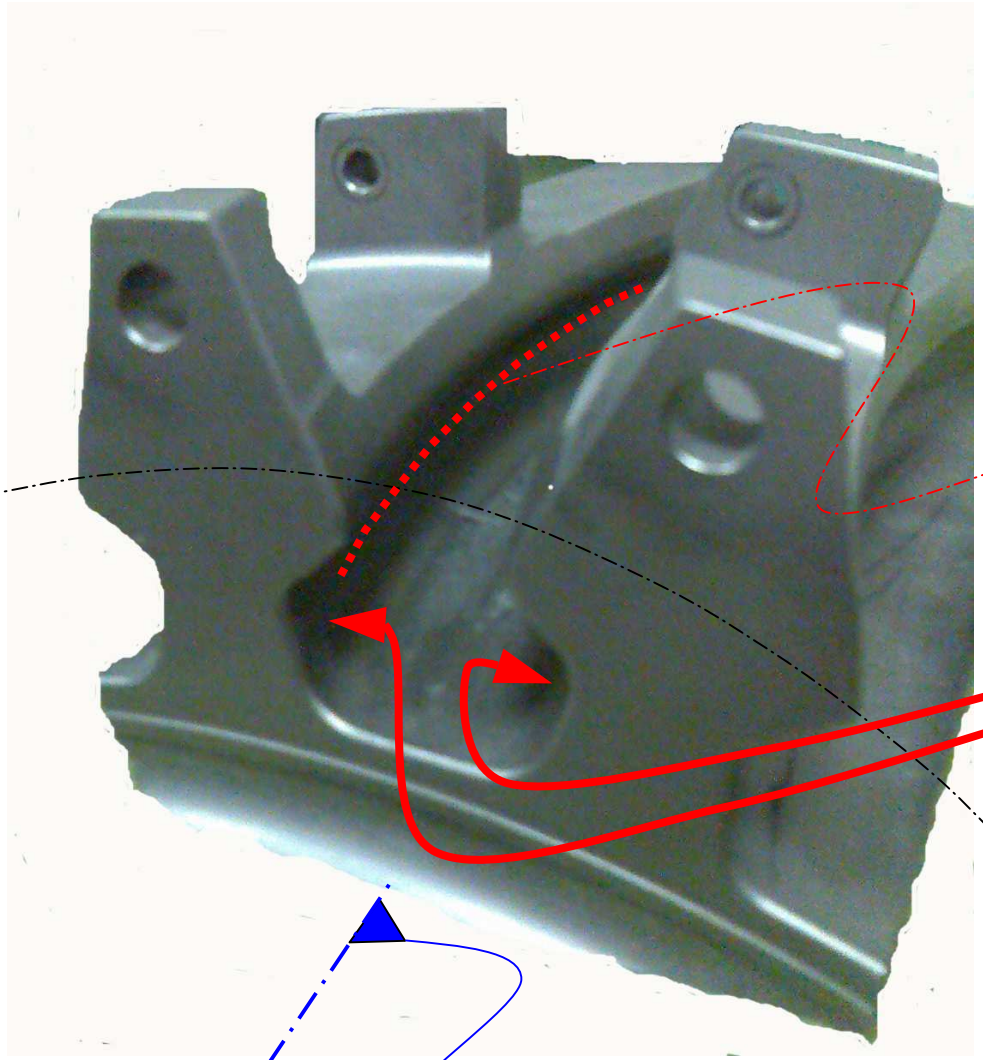
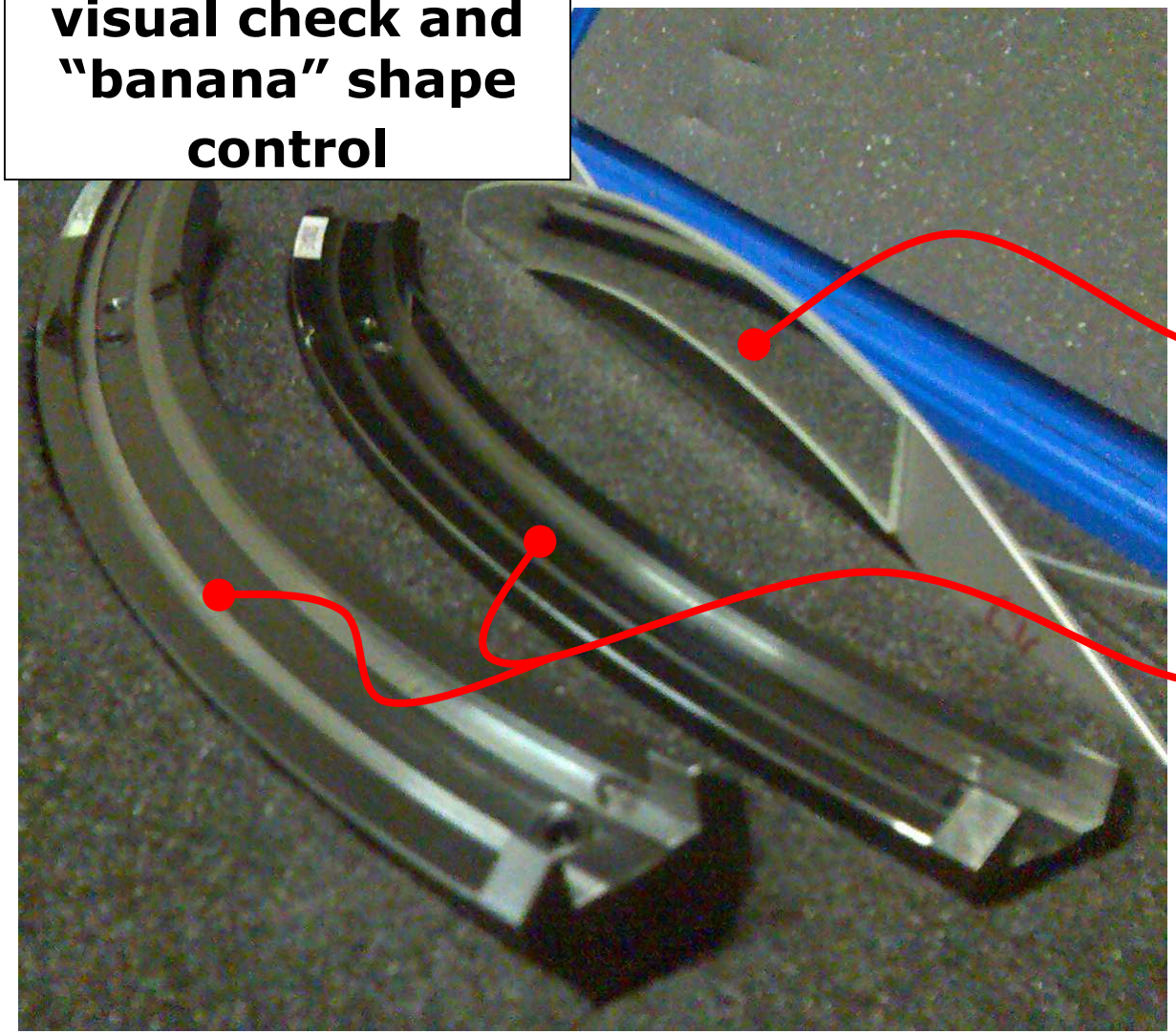
Checks & Measurements on fan blade seat

Visual check and "banana" shape control



Tool kit for visual check and "banana" shape control

Checks & Measurements on fan blade seat



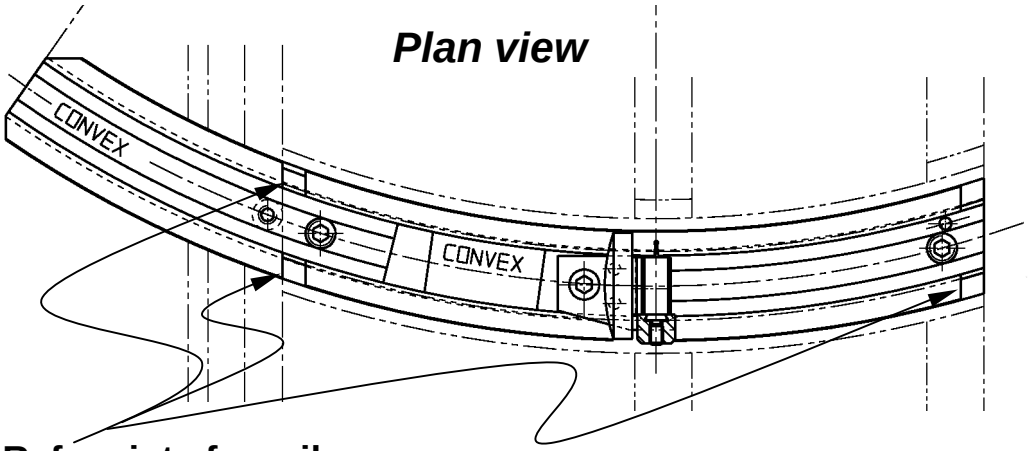
Shaped mirrors for visual check

Special rails for sliding dial indicator over profile

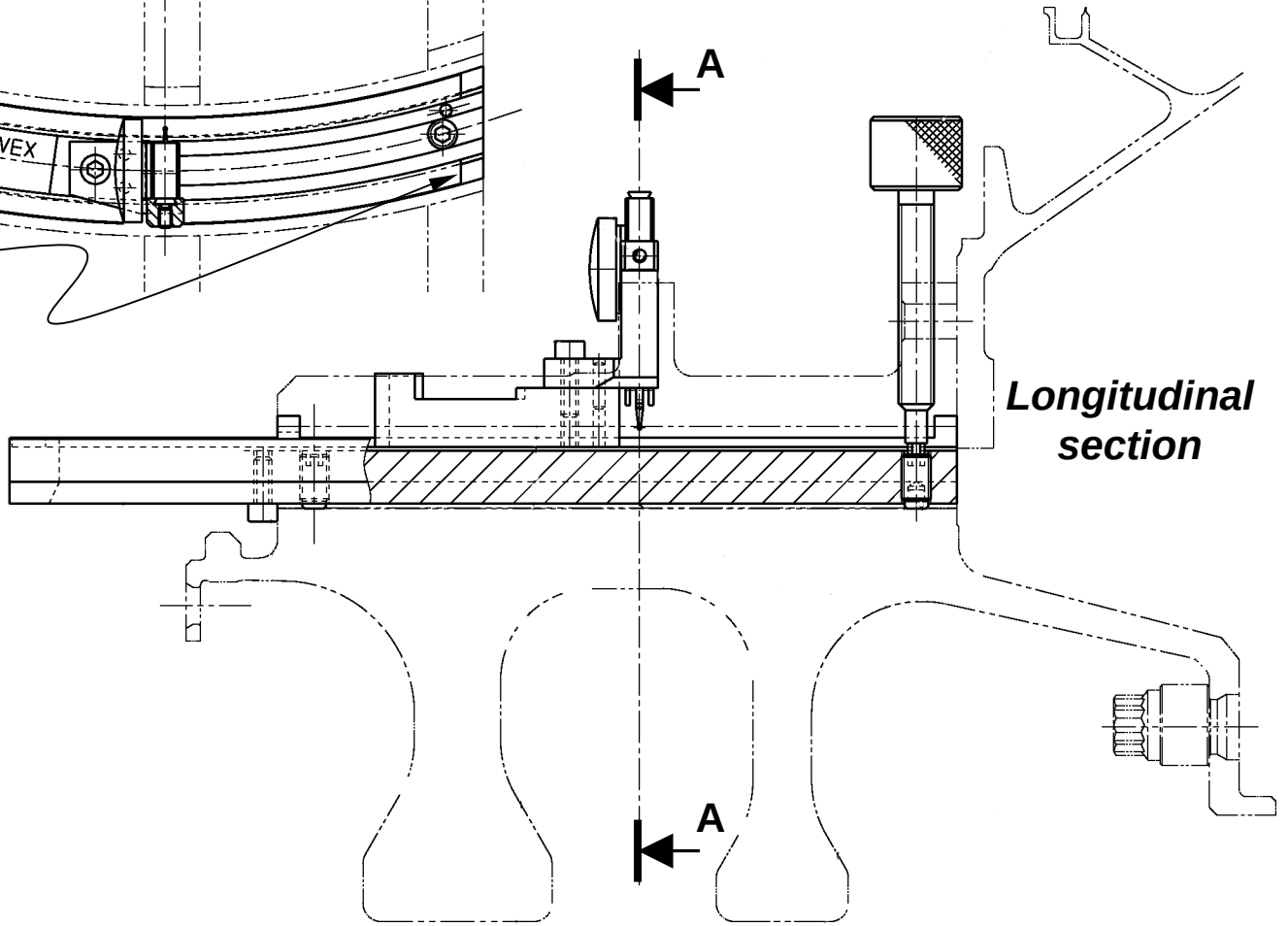
Tool kit for "banana" shape control – Convex side

Measurements on fan blade seat

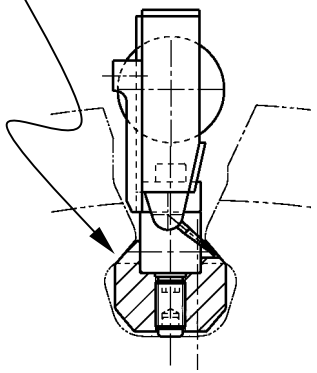
Plan view



Ref. points for rail location



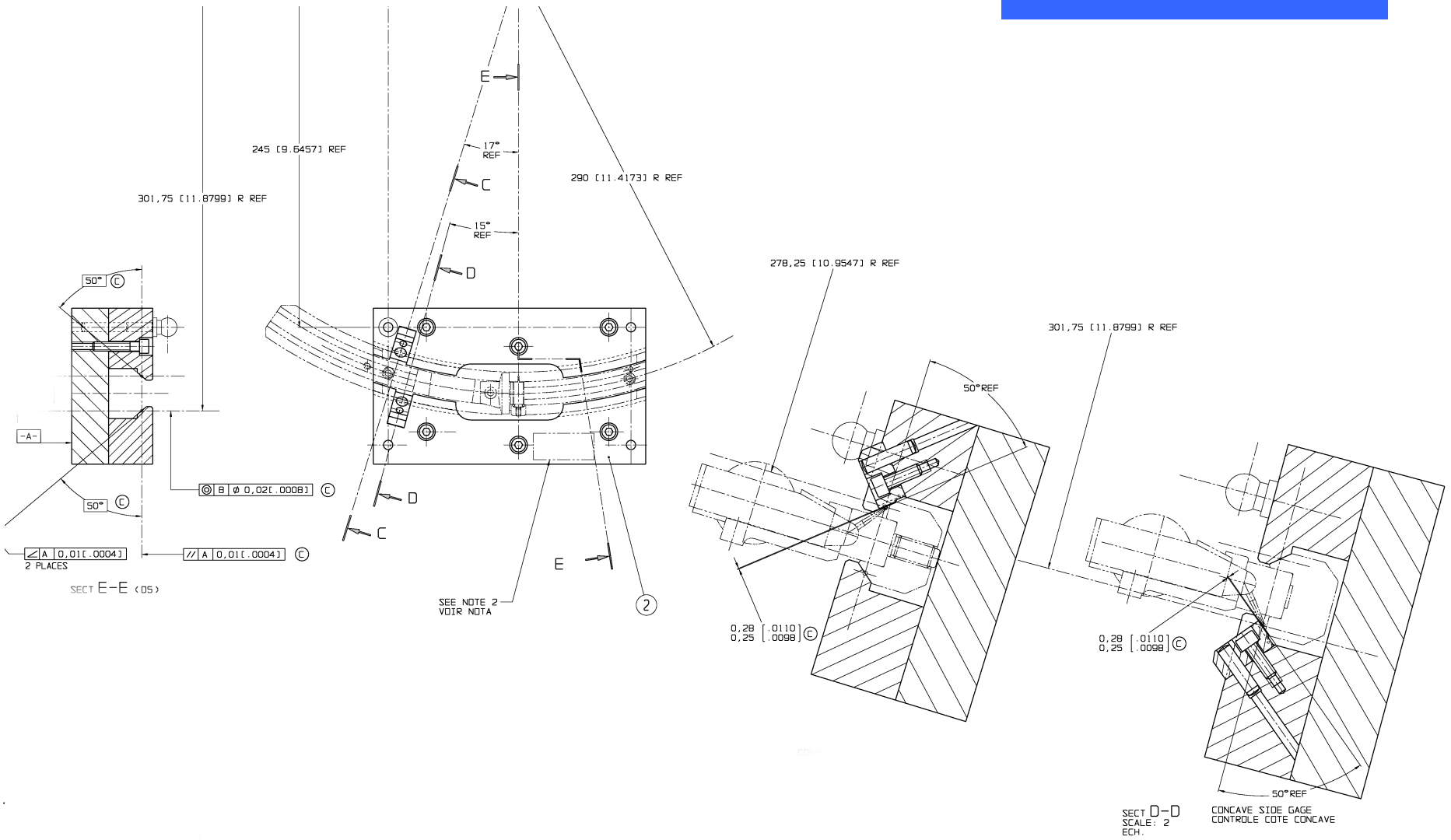
Longitudinal section

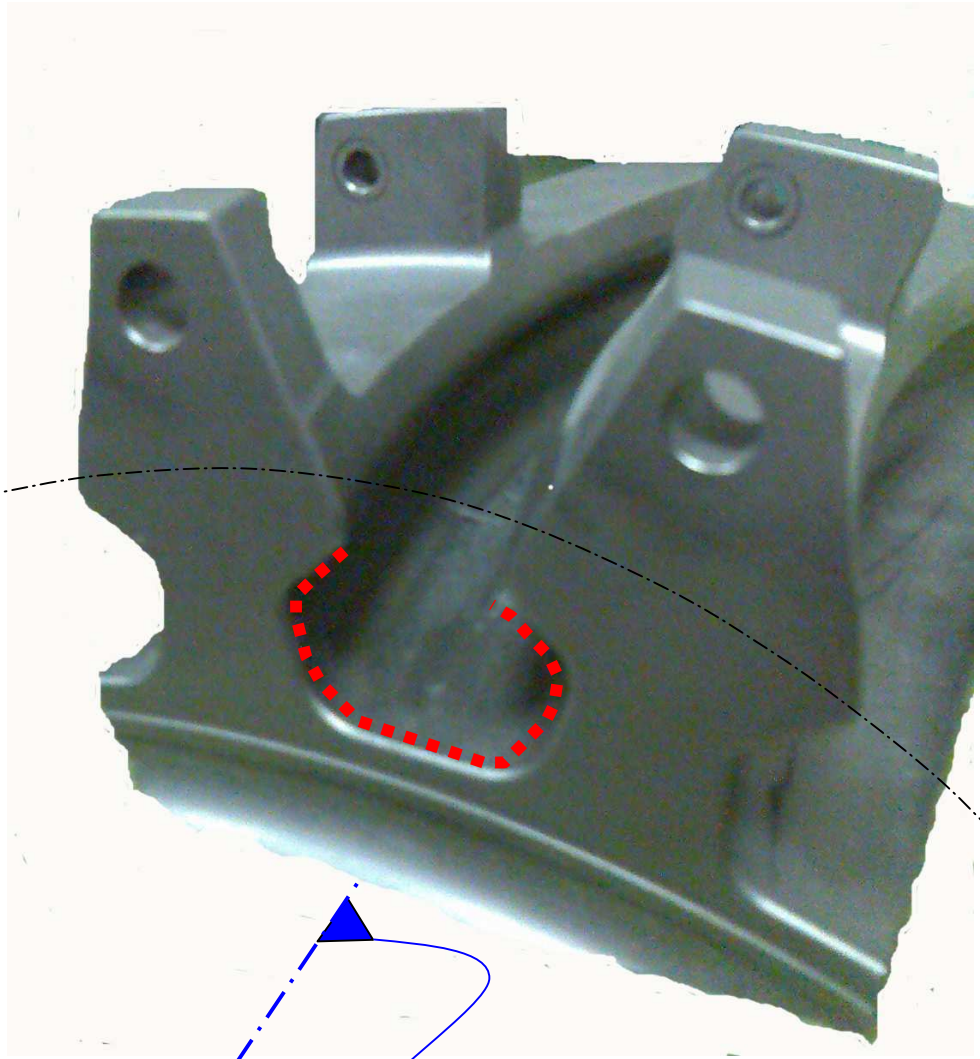


Cross section A-A

Tool kit for "banana" shape control – Zeroing master

Measurements on fan blade seat





Measurements on fan blade seat

Profile measurement of seat cross sections (manual scanning)

Fan axis

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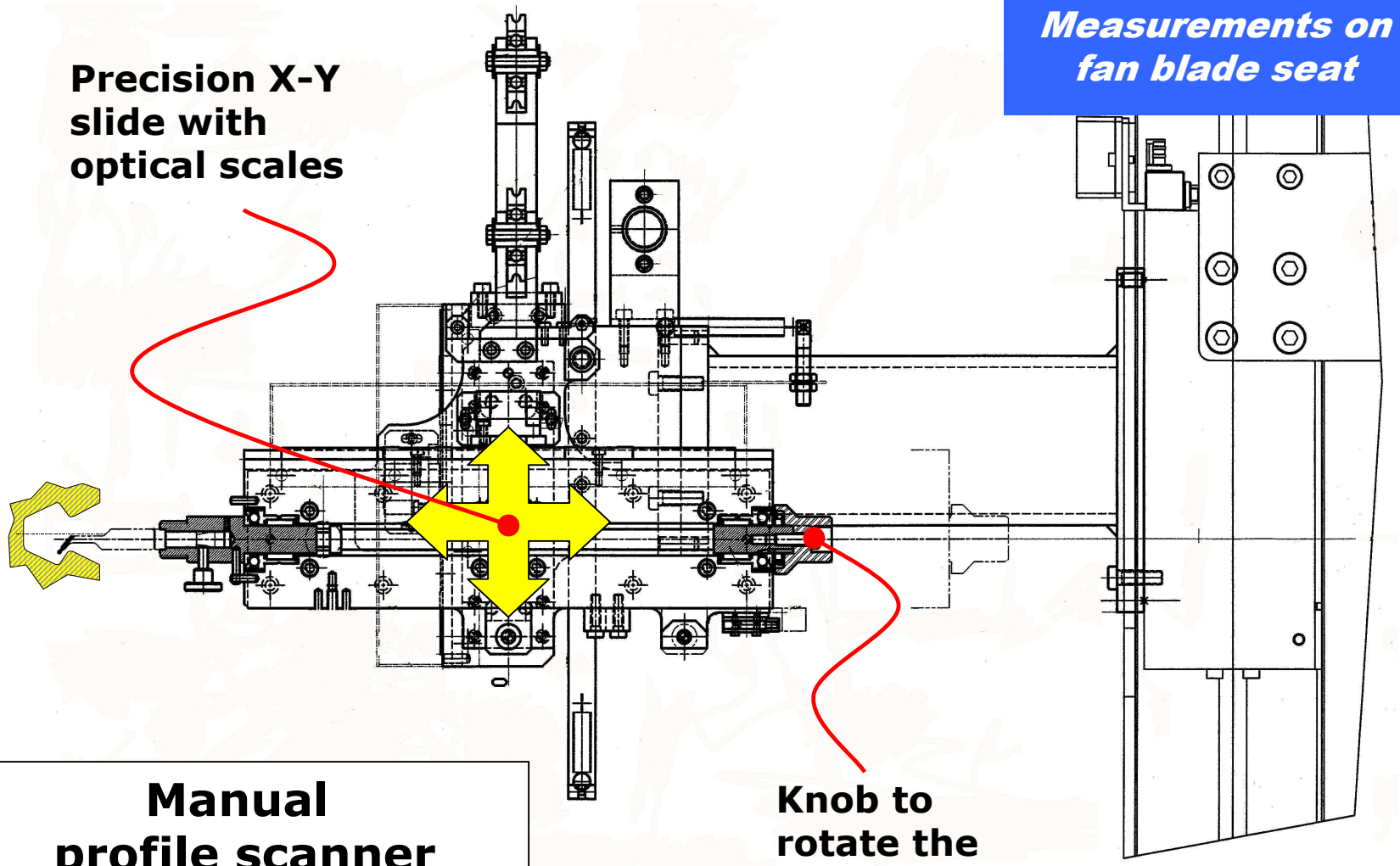
Measurements on fan blade seat



Manual profile scanner for seat cross section

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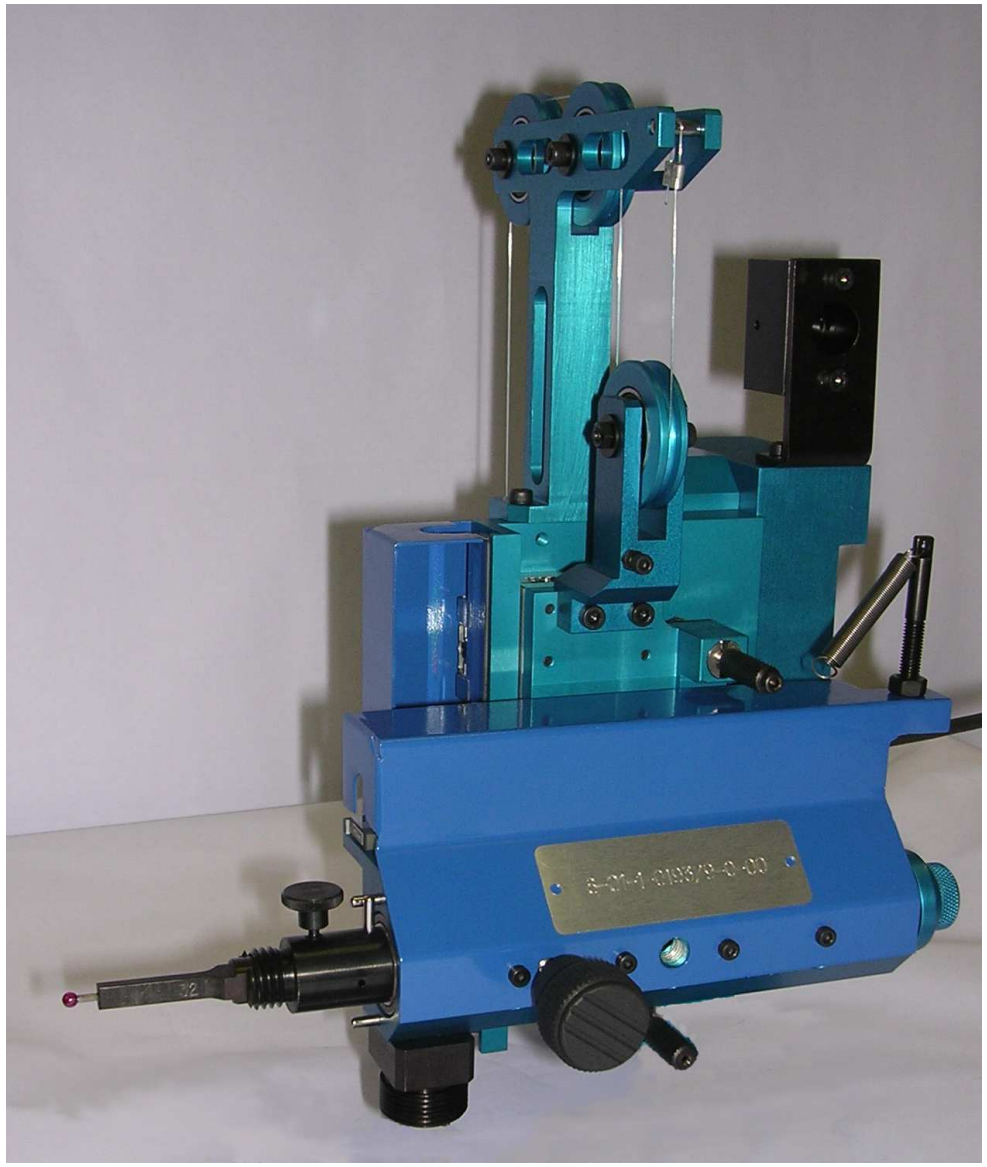


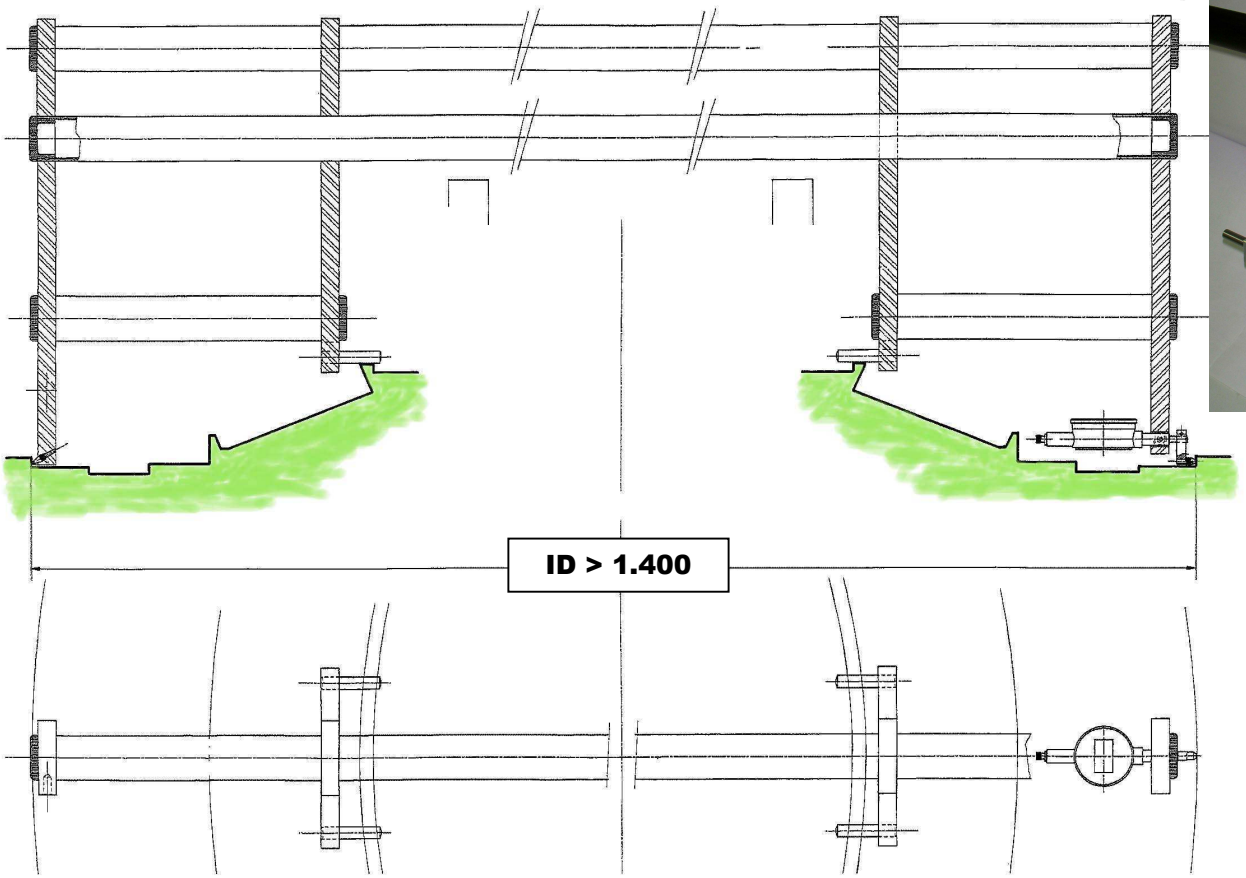
Measurements on fan / compressor blade seat

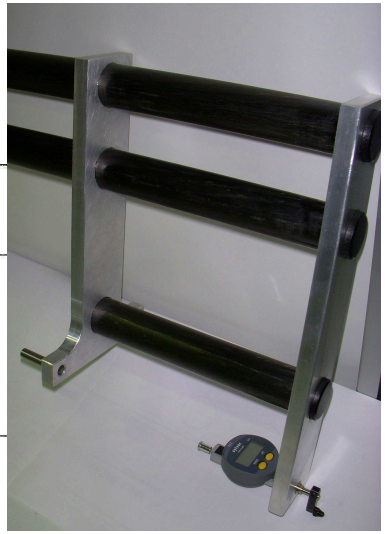
Manual profile scanner for seat cross section

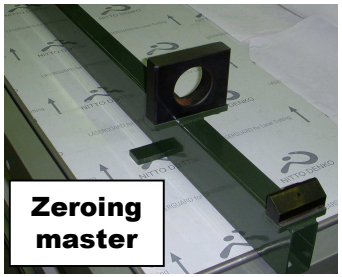
Marposs – Kern can provide the complete system structure, with scanner mounting column and fixturing for location of the component to be measured (e.g. compressor drum)

Special Gauges

Carbon fork for very large ID







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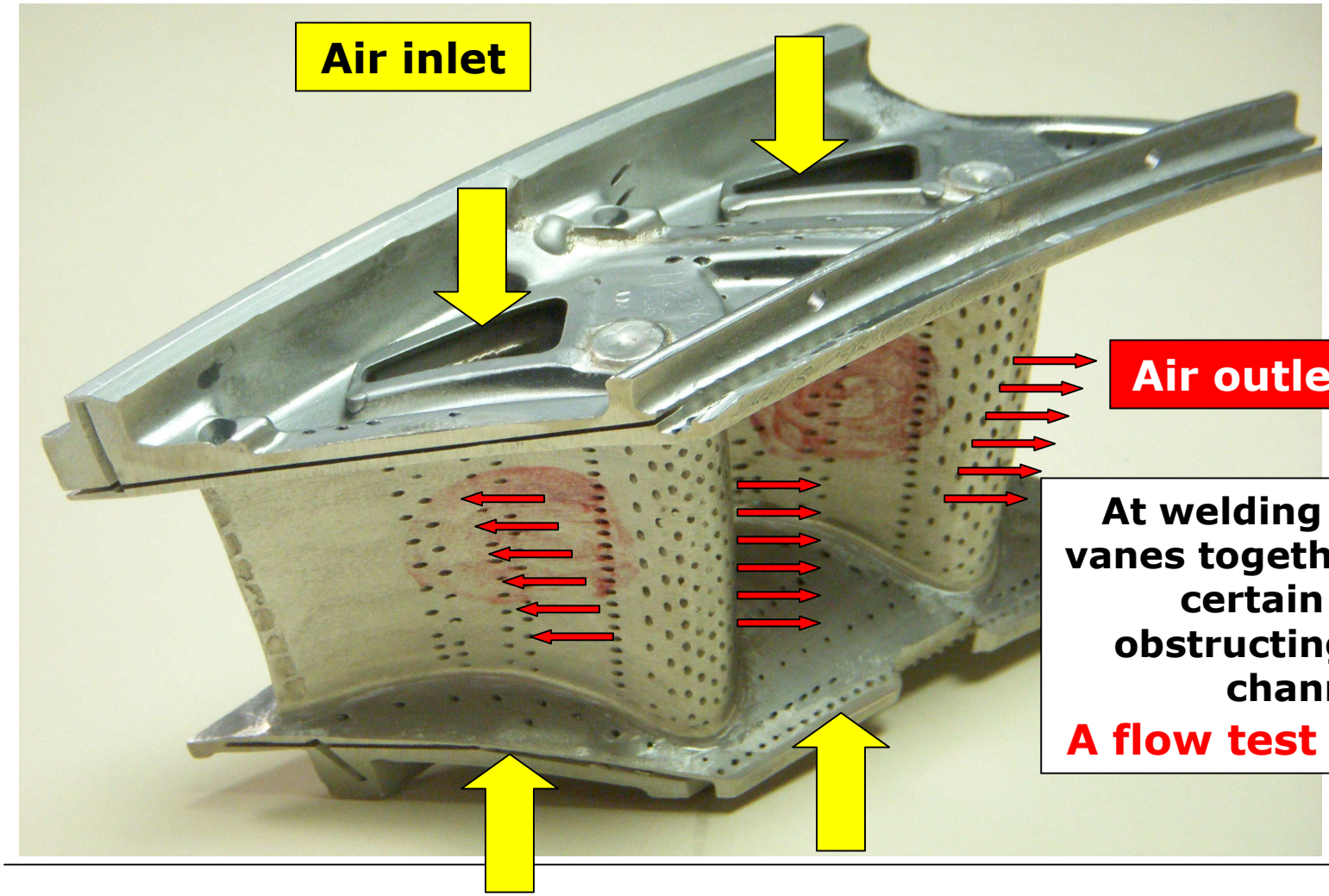
Airflow test on repaired vanes



At welding of the two vanes together there is a certain risk of obstructing the vent channels.

A flow test is required

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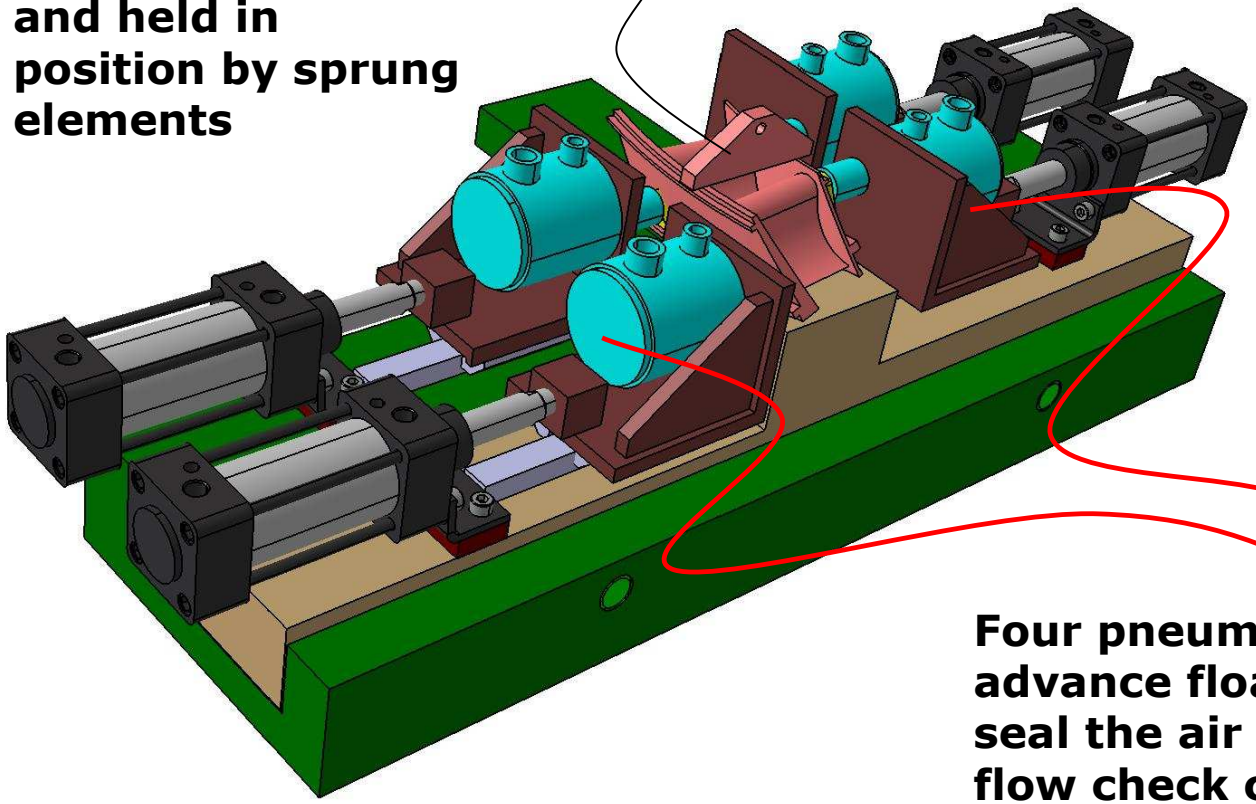
Airflow test on repaired vanes

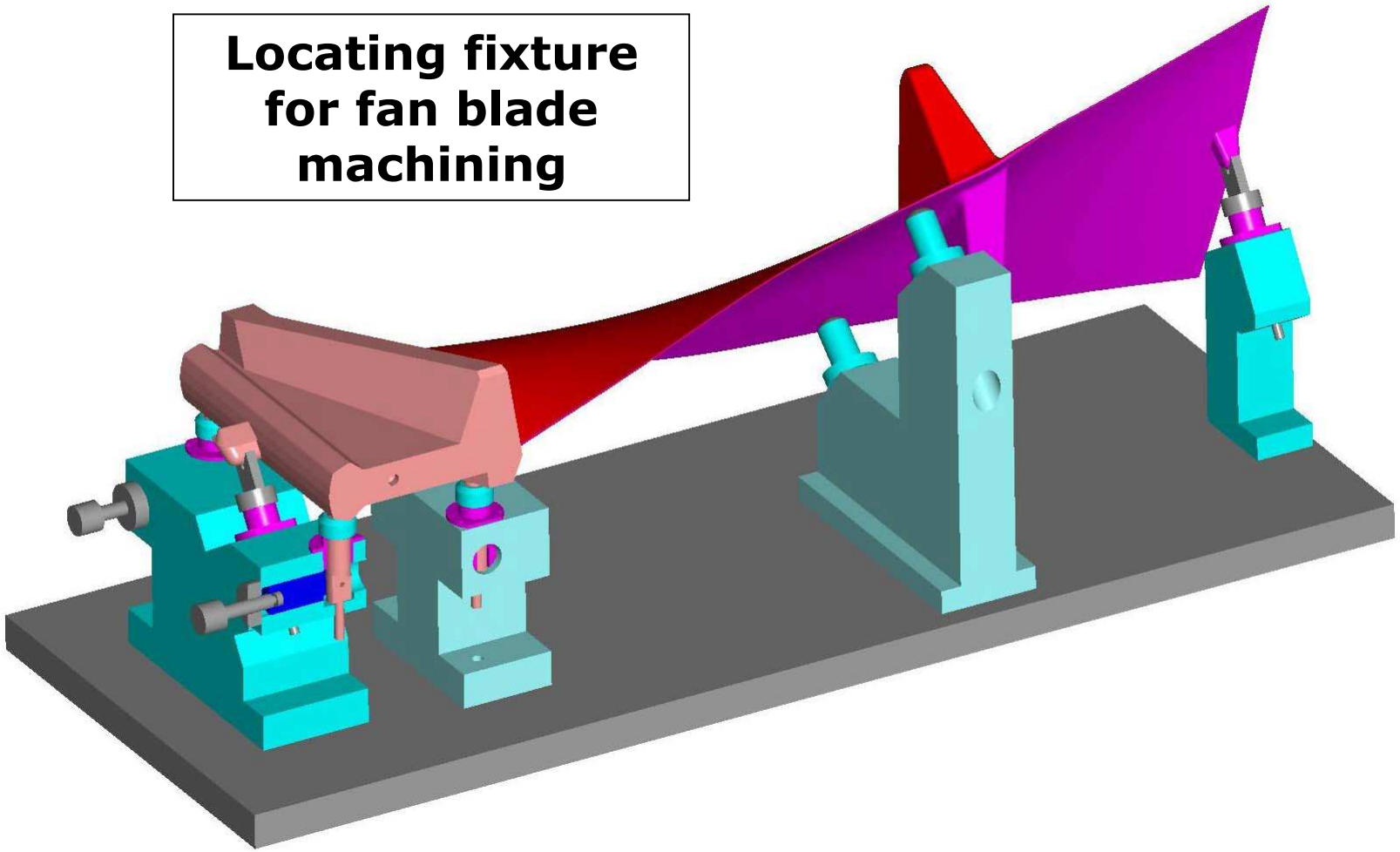
The vane segment is manually loaded and held in position by sprung elements



Four pneumatic cylinders advance floating plugs to seal the air inlet ports. The flow check can then start.

Special Tooling

Locating fixture for fan blade machining



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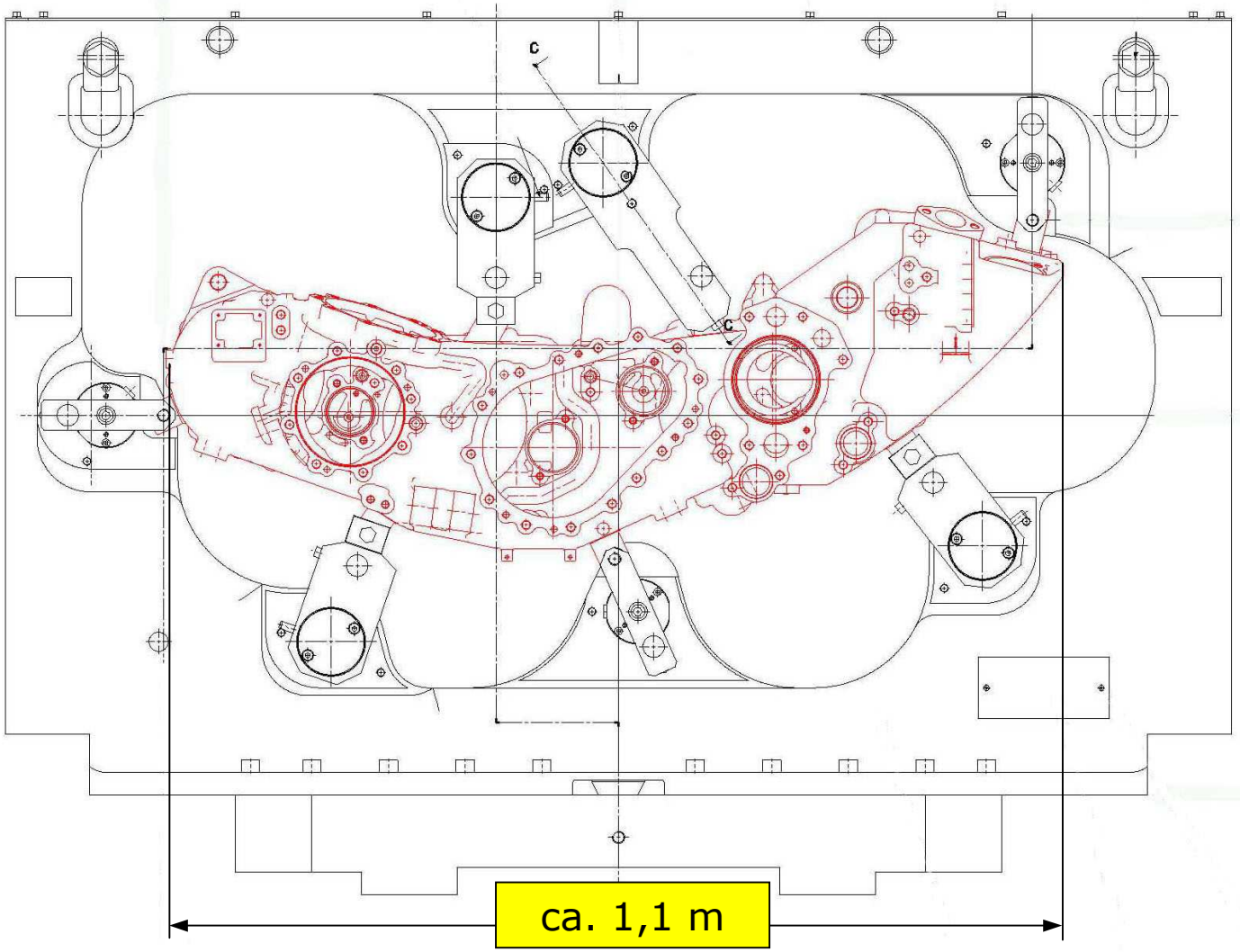
Locating fixture for transmission case machining

Special Tooling



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Locating fixture for transmission case machining

Special Tooling

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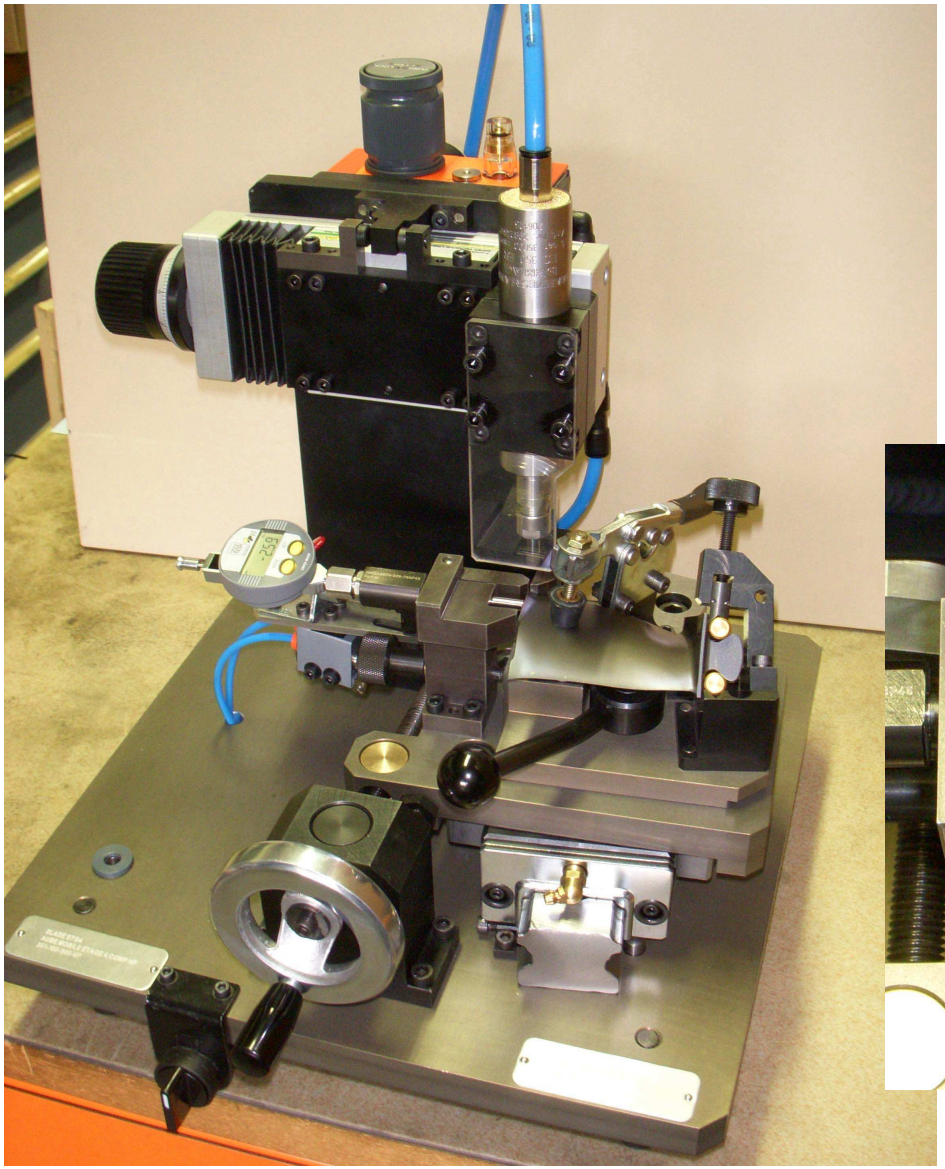
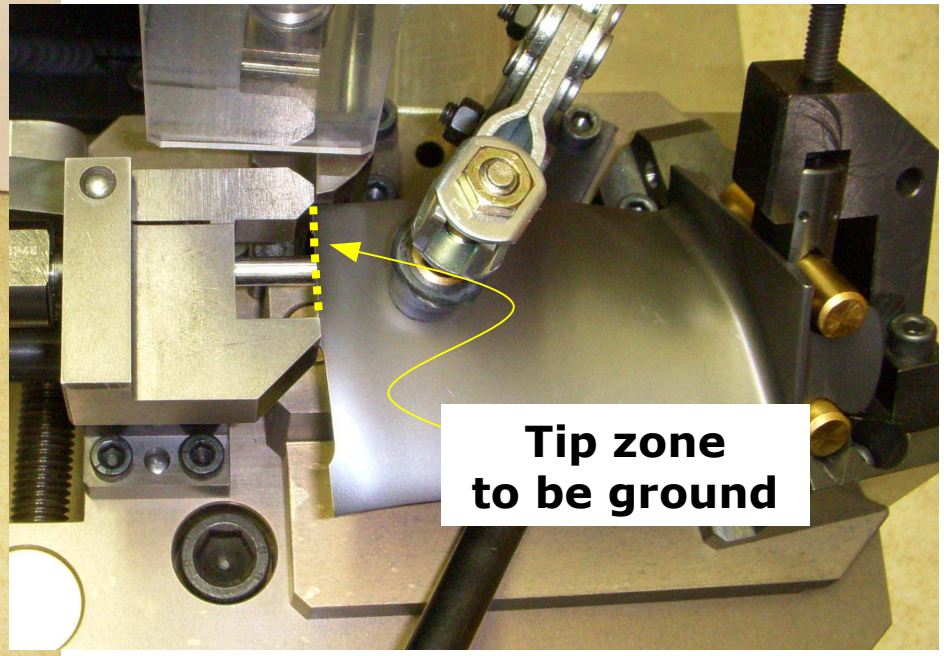
Special Tooling

Mini manual grinder for blade tip tweaking





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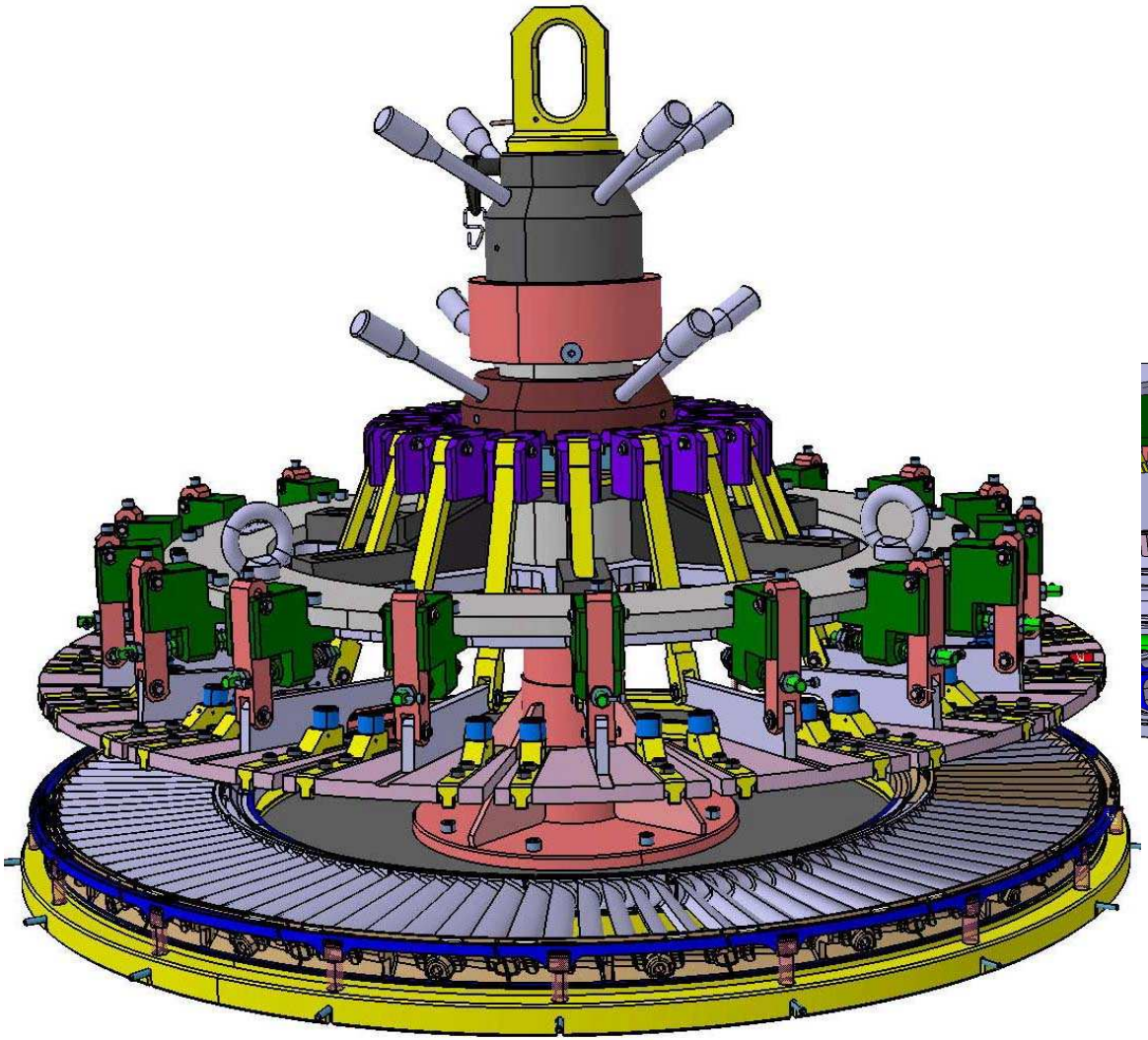
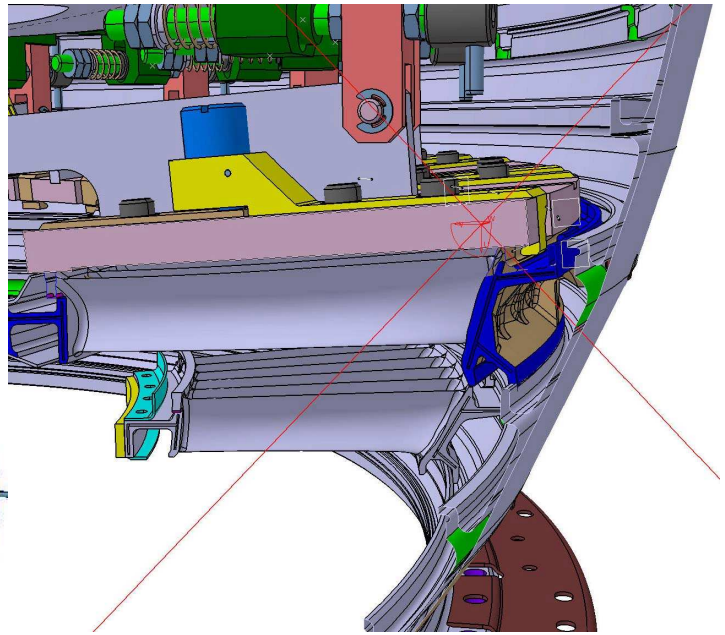
Special Tooling for assembly op's

Insertion of vane clusters into the turbine case





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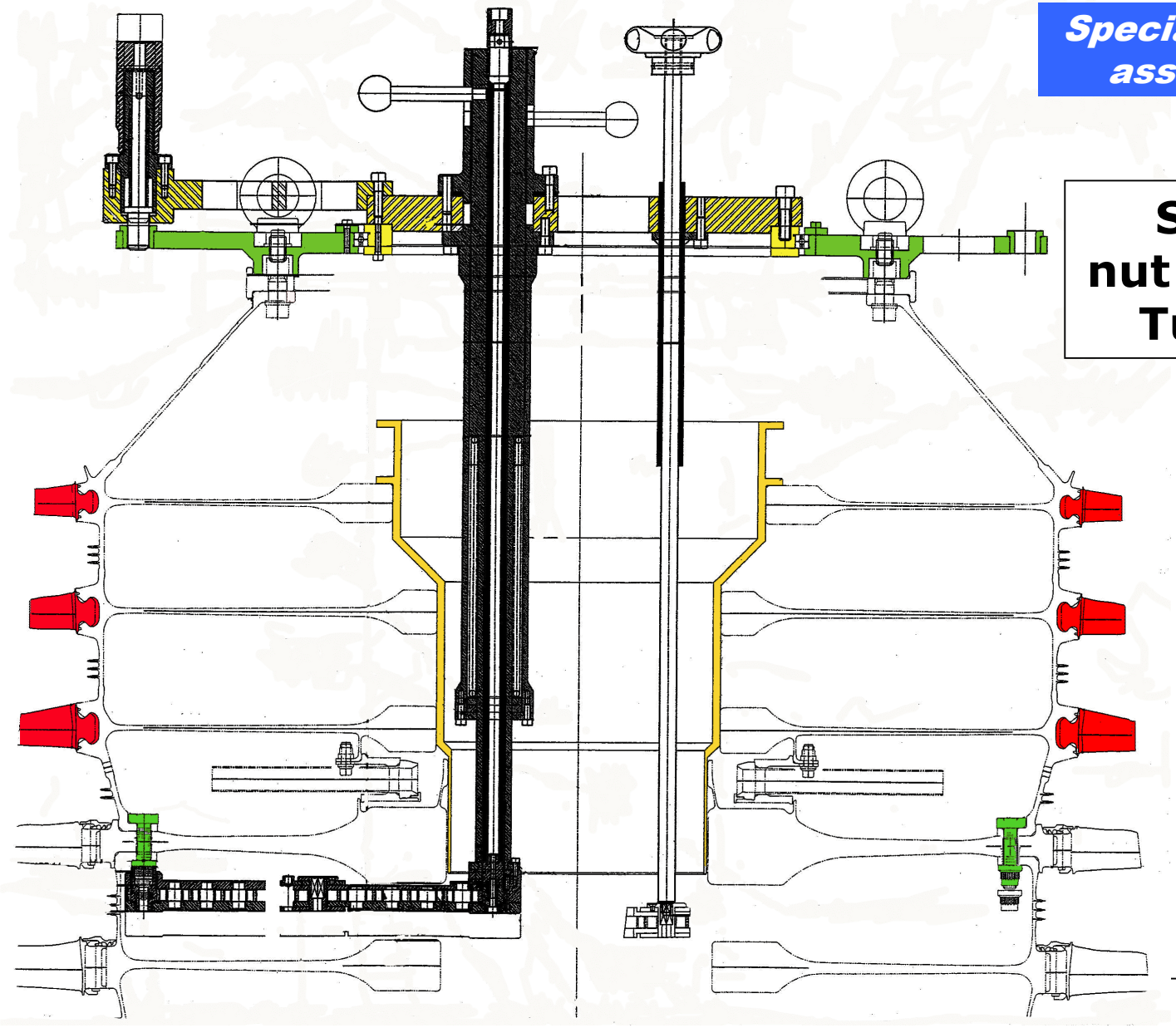
Special Tooling for assembly op's



Spindle for nut unscrewing- Turbine disc

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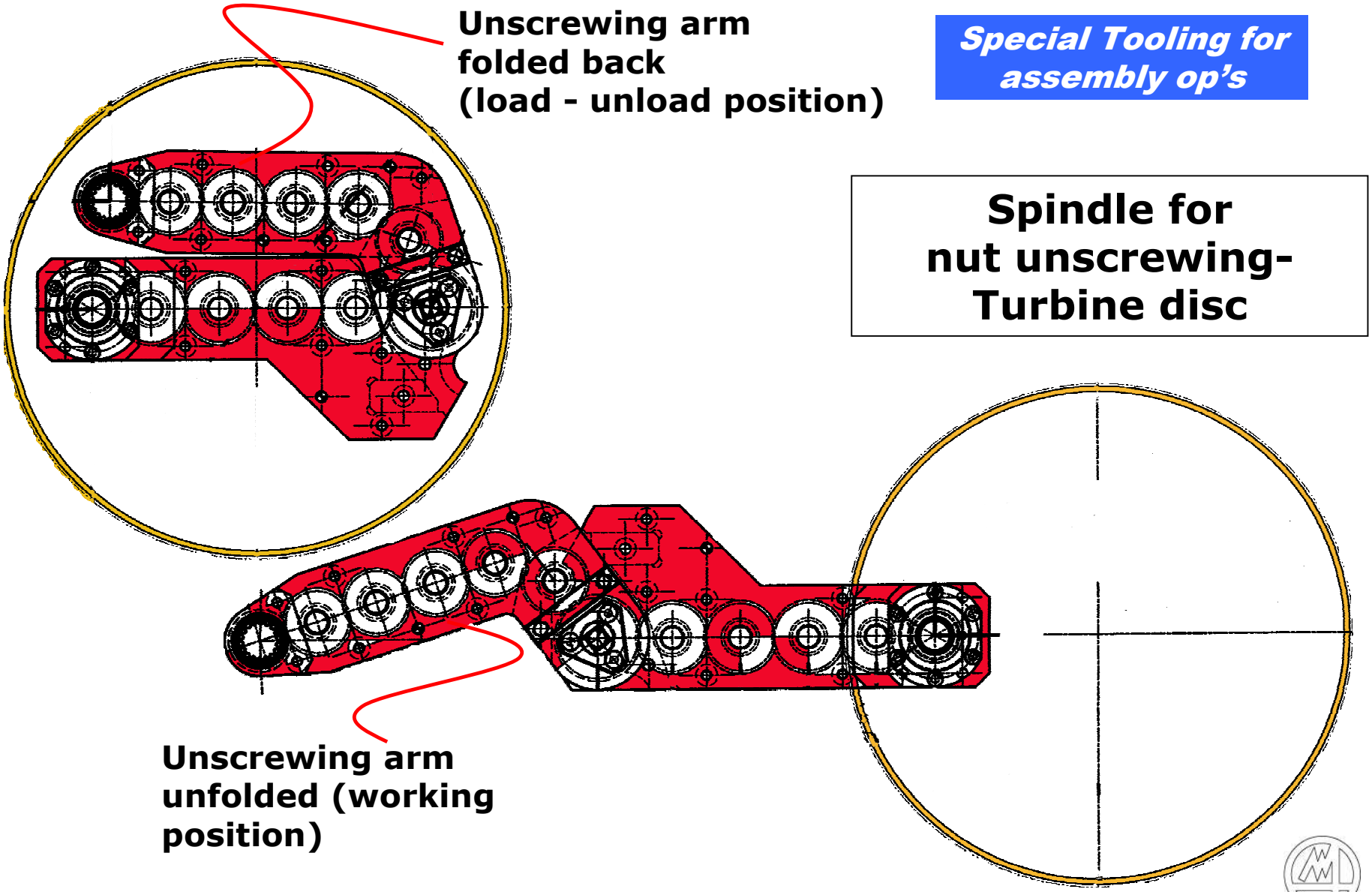
Special Tooling for assembly op's

Spindle for nut unscrewing- Turbine disc



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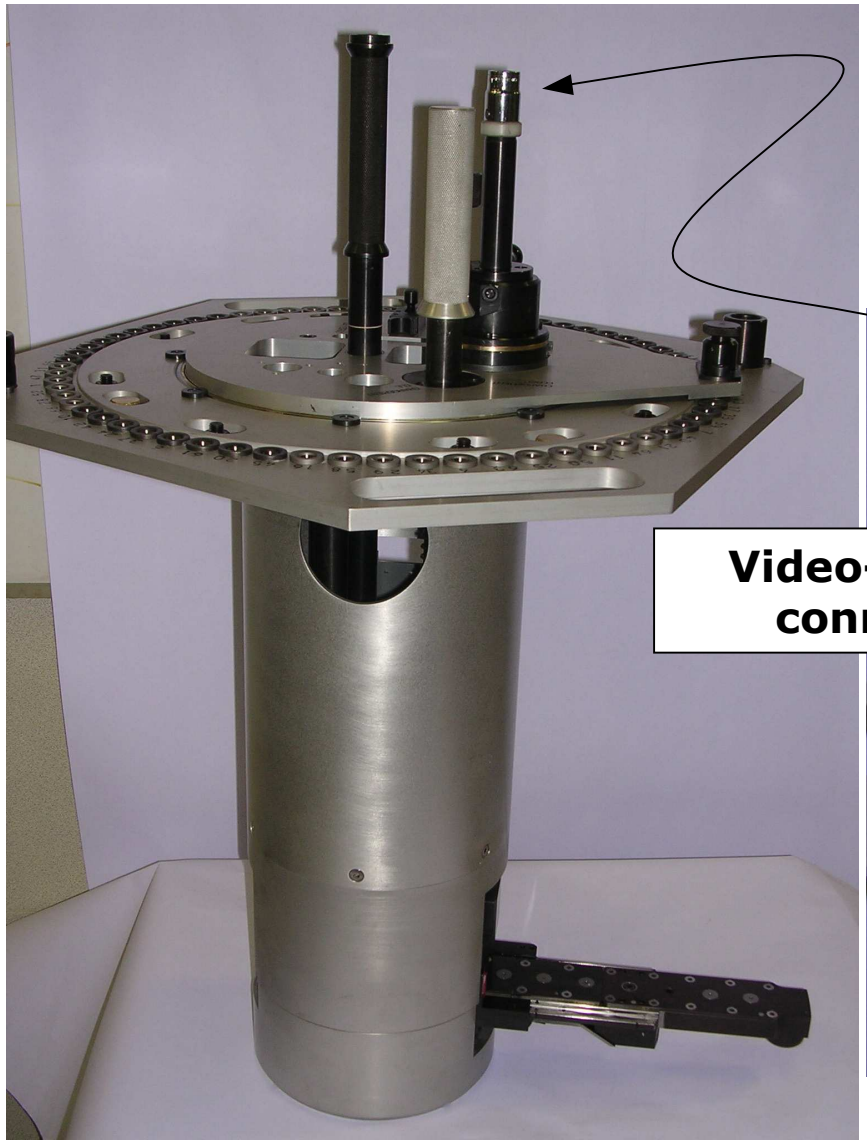
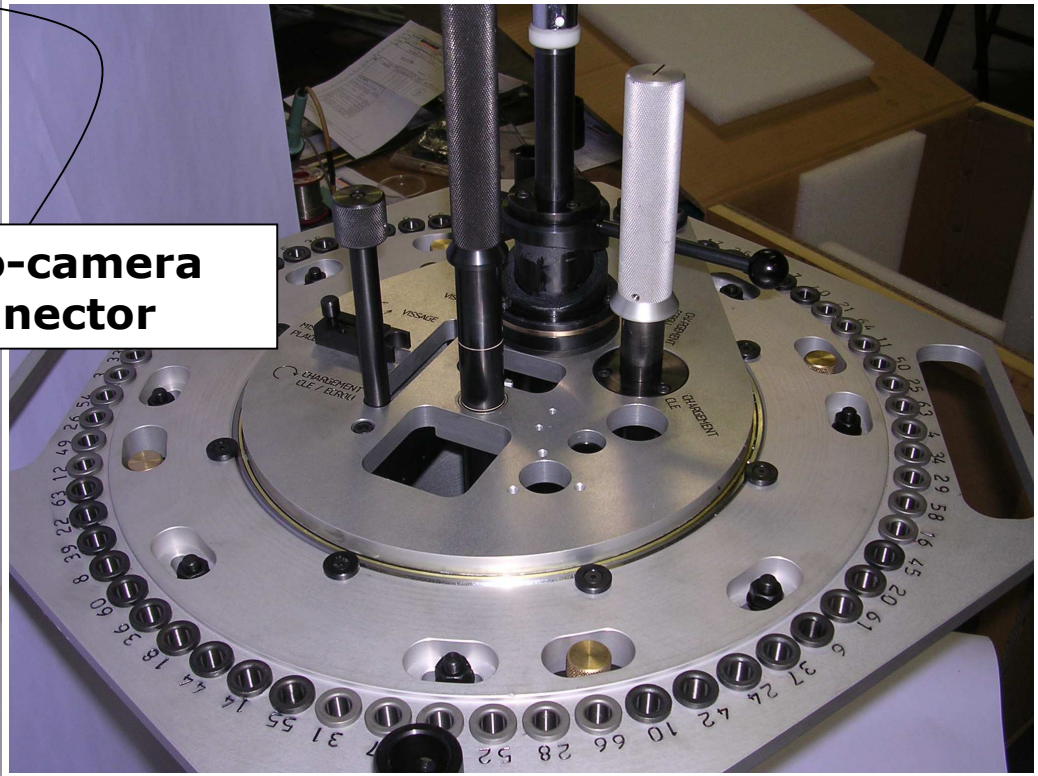
Special Tooling for assembly op's

Manual torqueing system for turbine disc



Video-camera connector



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Special Tooling for assembly op's

Manual torqueing system for turbine disc

Video-camera housing

(camera not shown)

Light source

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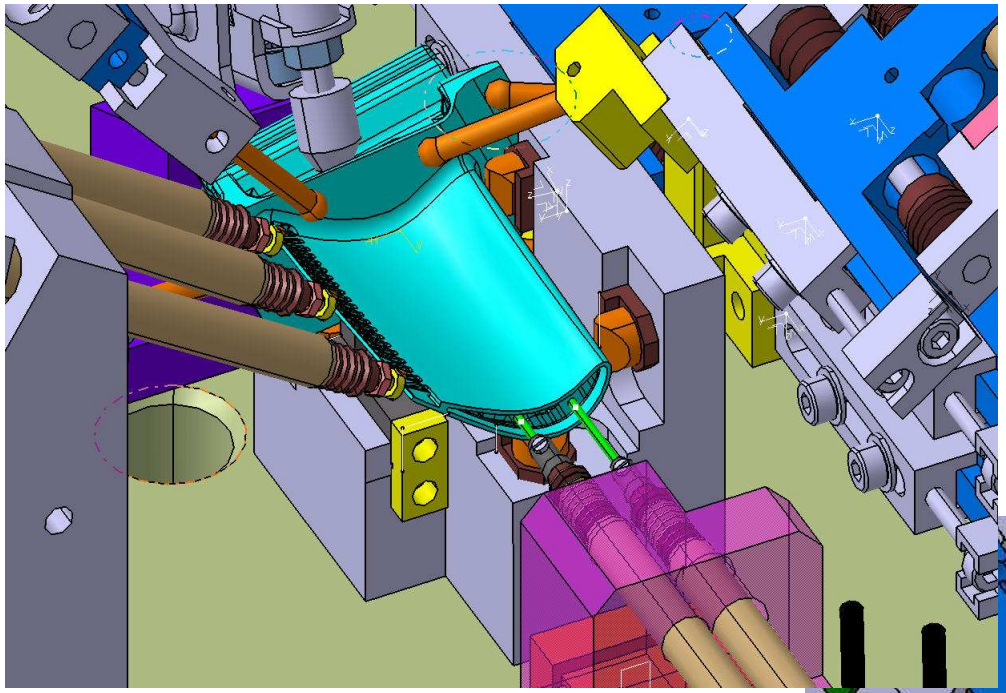
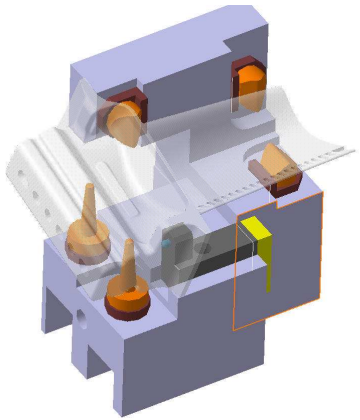
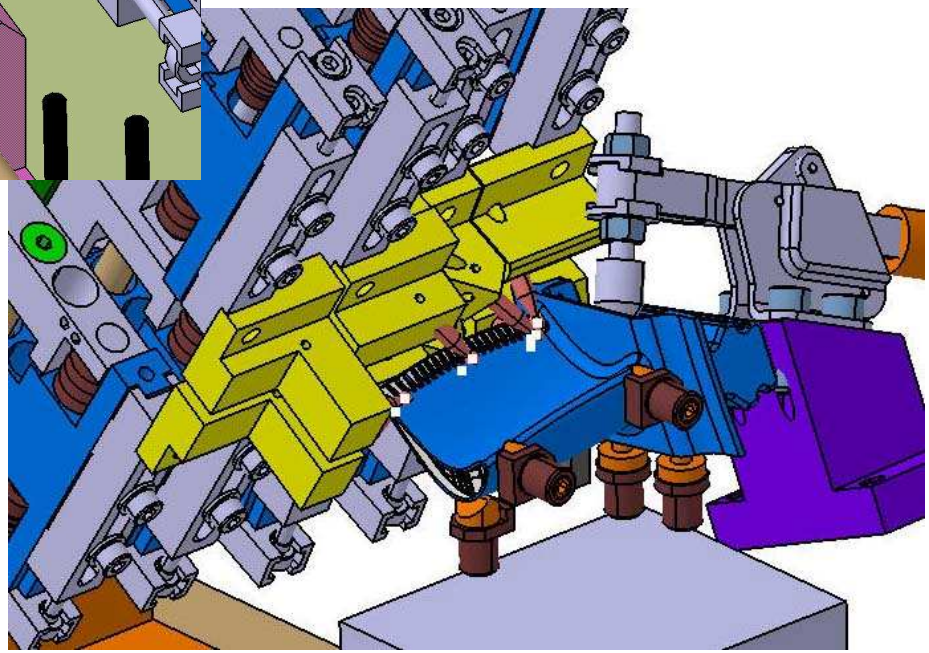
Gauge Fixtures

Dedicated/re-toolable systems for blade measuring at various mfg. stages







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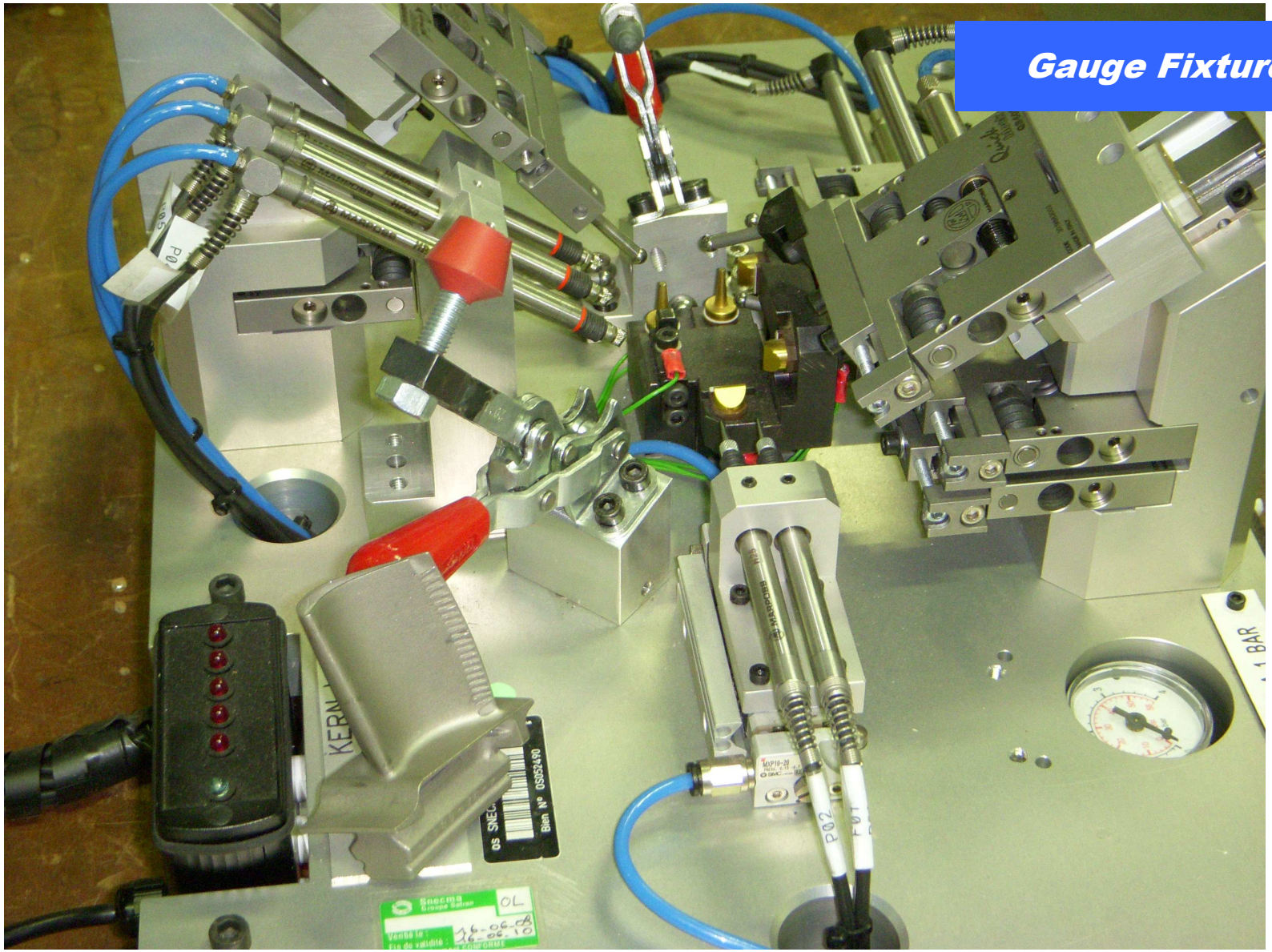
Gauge Fixtures



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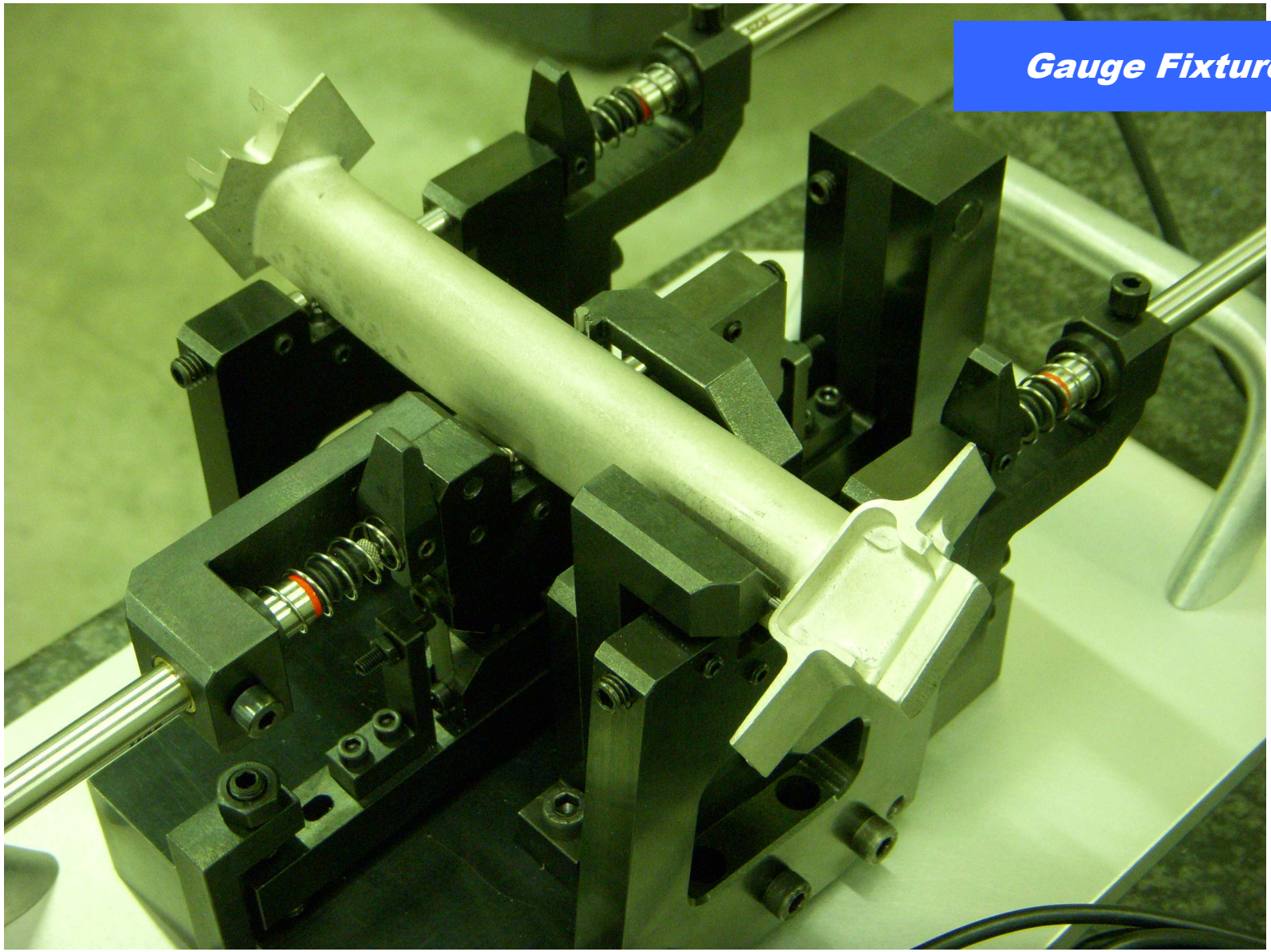
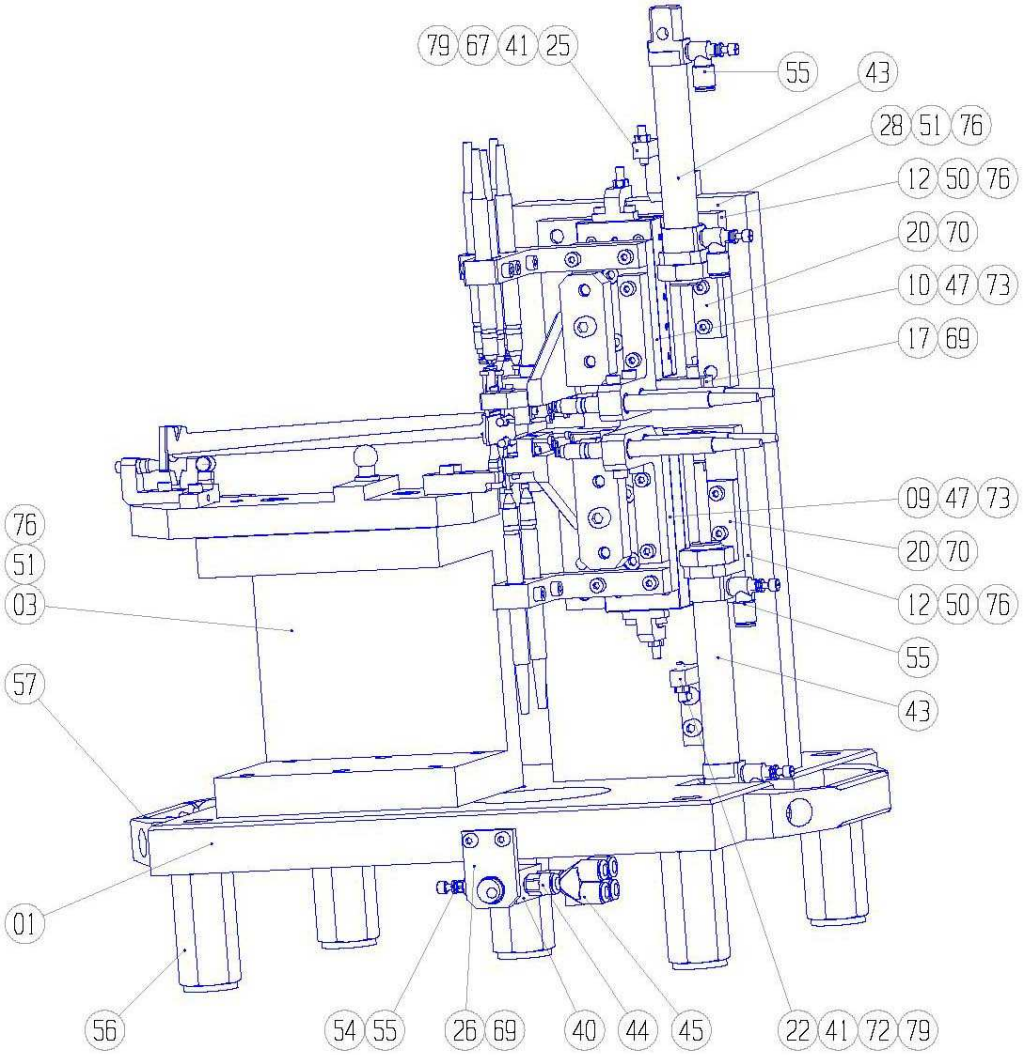
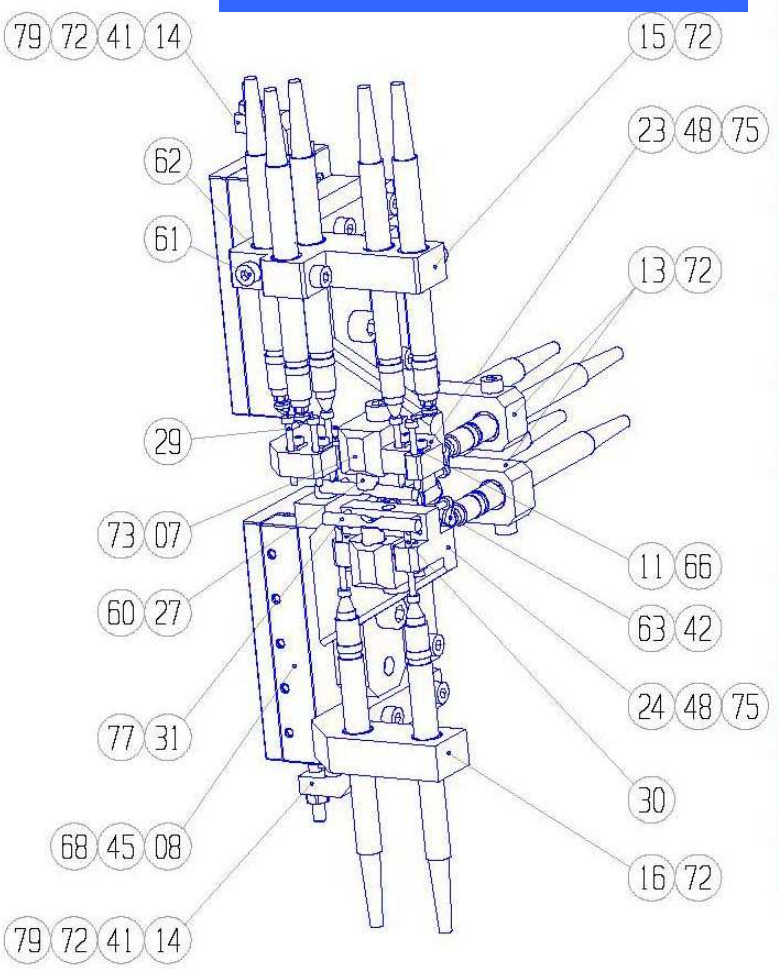
Gauge Fixtures



Fir-tree root measuring



Gauge Fixtures



Gauge ass'y detail

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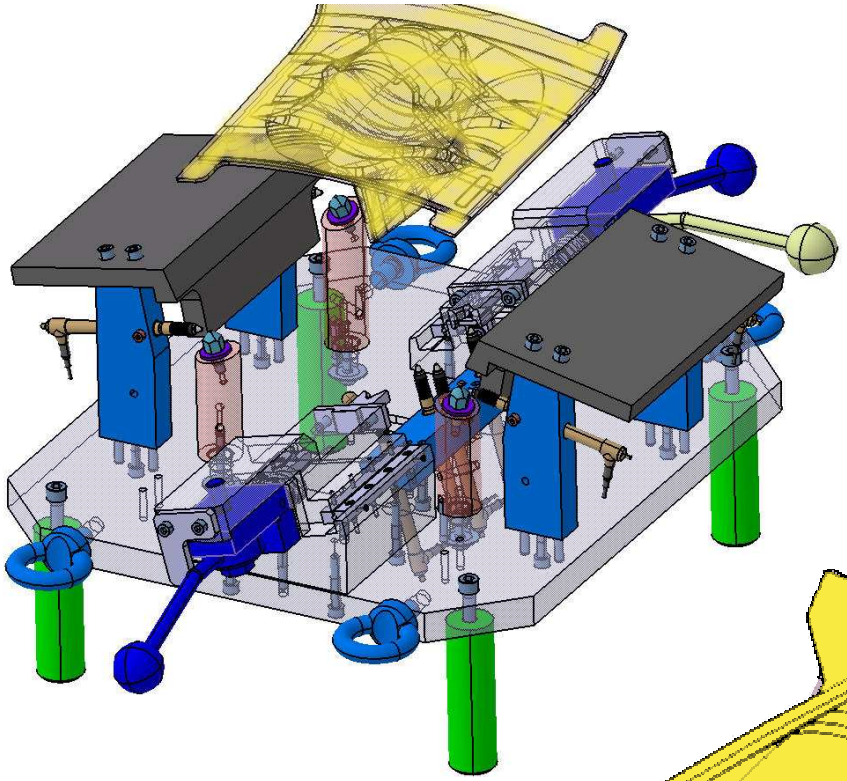
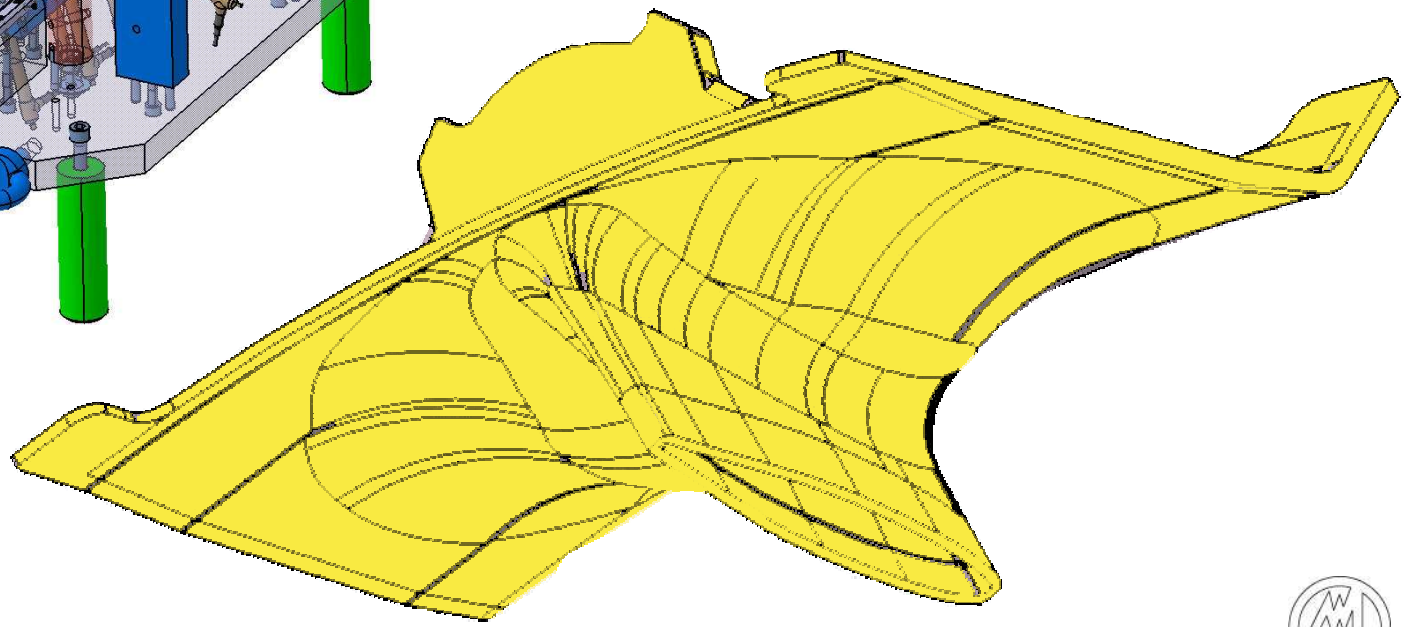
Gauge Fixtures

Special systems for various components. Example shown : engine cover





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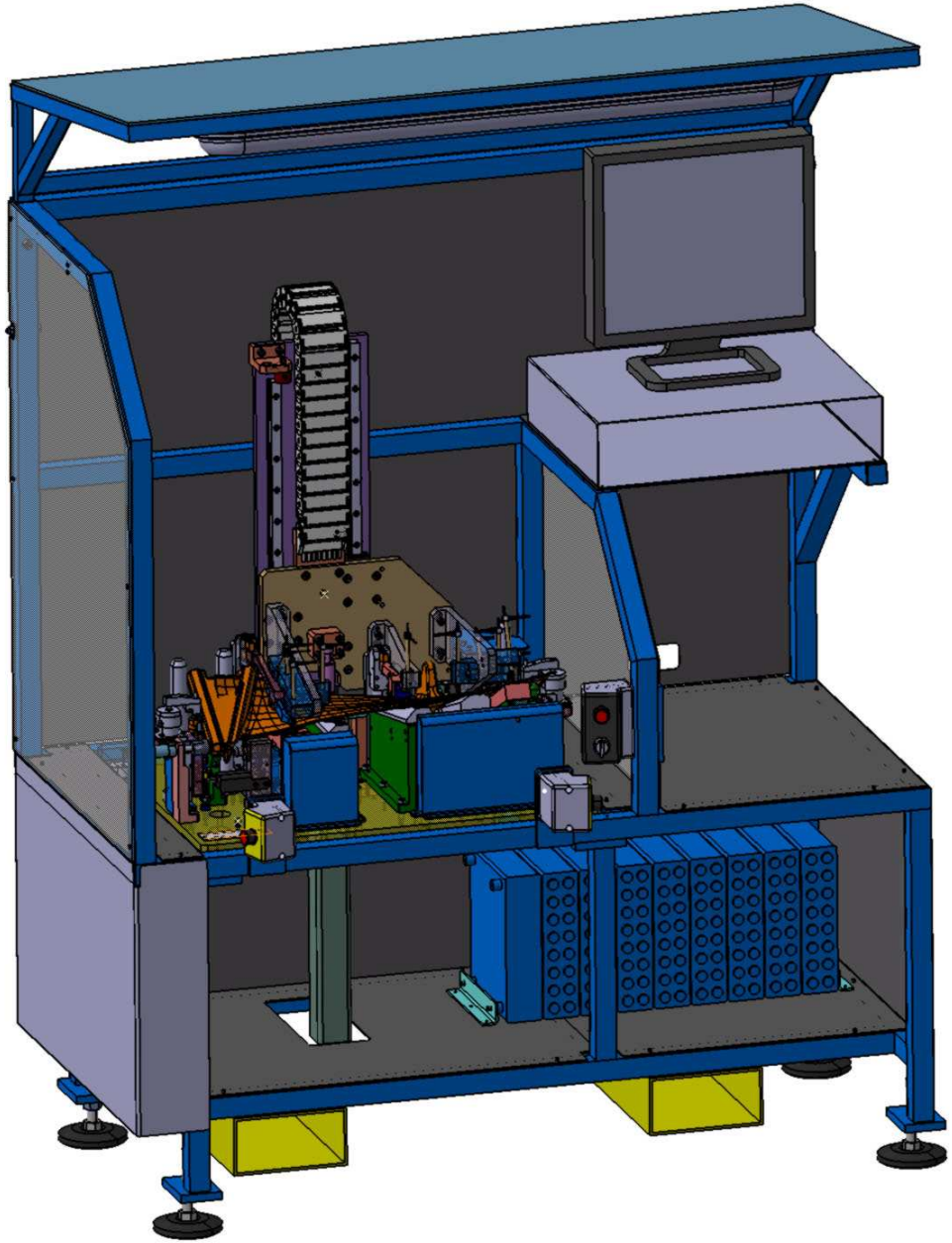

Semi- or Full-automatic gauge stations

Free-standing gauge station for fan blade measuring

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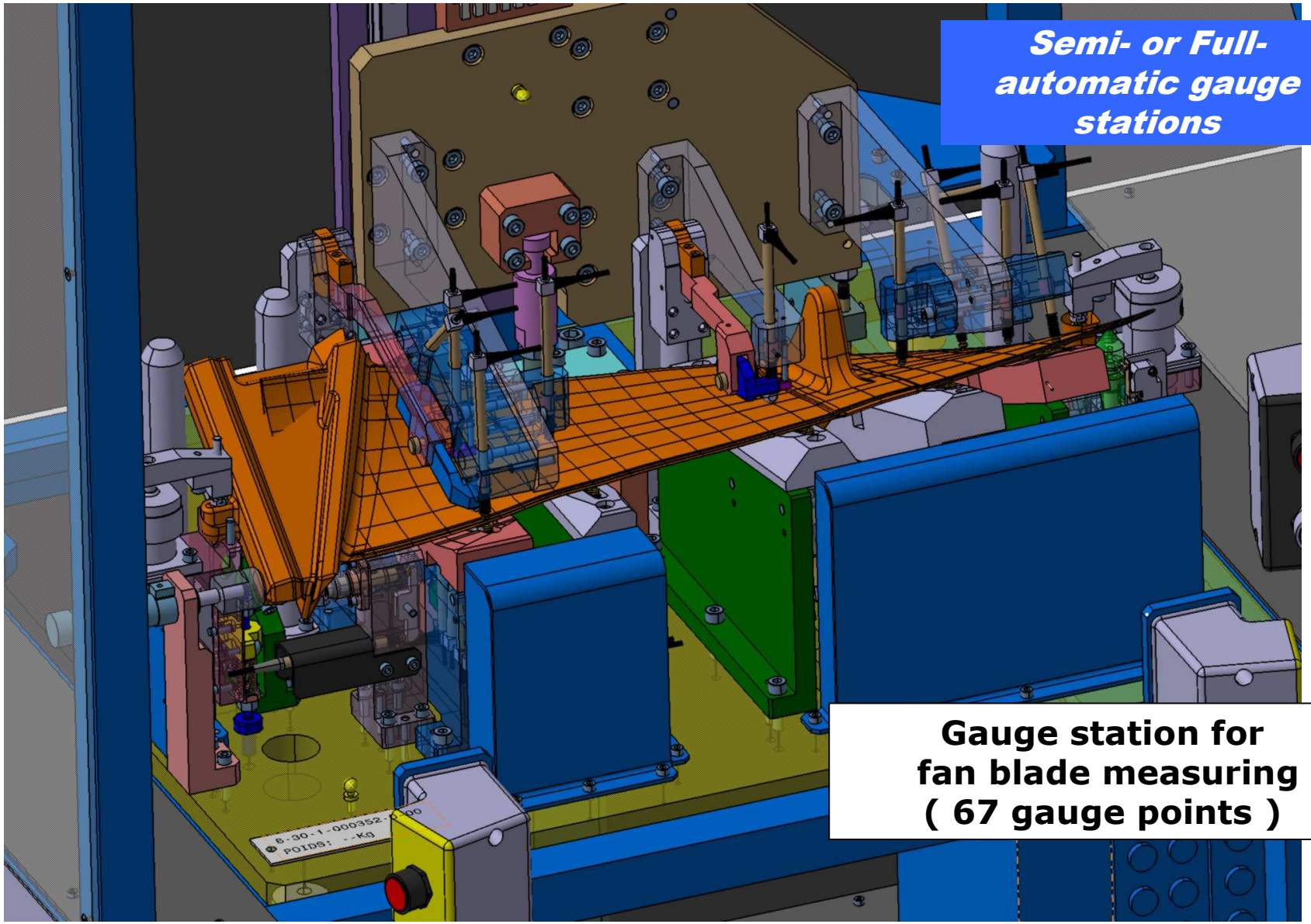

Semi- or Full-automatic gauge stations

Gauge station for fan blade measuring (67 gauge points)

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Go-noGo Gauges

- Plain, thread, spline gauges
- Master gears
- Special masters

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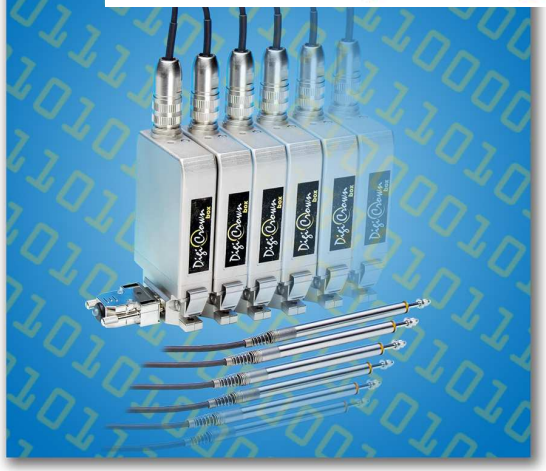
Standard Gauge Components

Red Crown

Probes, gauge blocks, plugs, snaps, rings (contact or pneumatic gauging) .... and more

Digi Crown probing line



M1 Star MBG EBG

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Interface boxes to any PC

Standard Gauge Components

E9066

Easy box

E4N

Merlin

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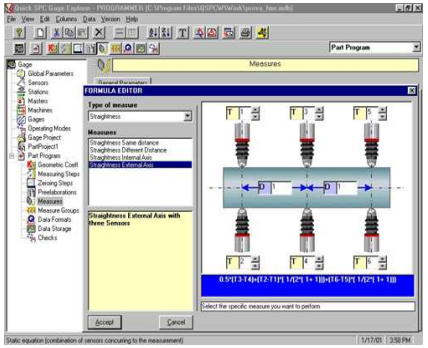
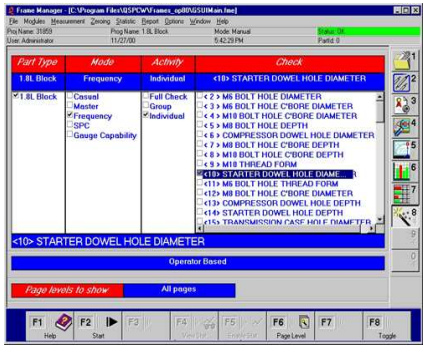
Standard Gauge Components

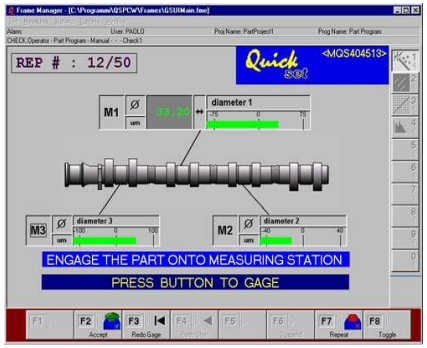
Quick spc™ Software

Measurement programming, elaboration, display

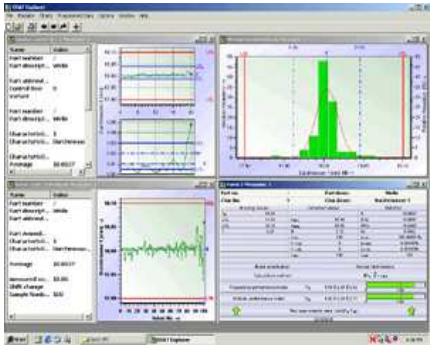


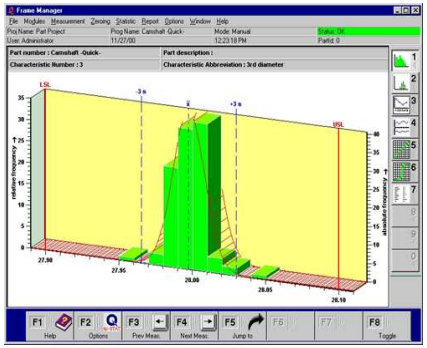
Clear, easily programmable prompts for manual operations





Statistics, Network interface, M/C tool compensation





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M1 Wave

Bore gauge

and many other Marposs gauge tools are now available with

Bluetooth®

Standard Gauge Components

wireless connection to:

E4N Wave

E9066

Merlin

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Standard Gauge Components

Bluetooth® connection of Wave Gauge tools (plugs, snaps etc.)

Wi-Fi data tx to host PC
(WPA encryption)

Merlin mobile

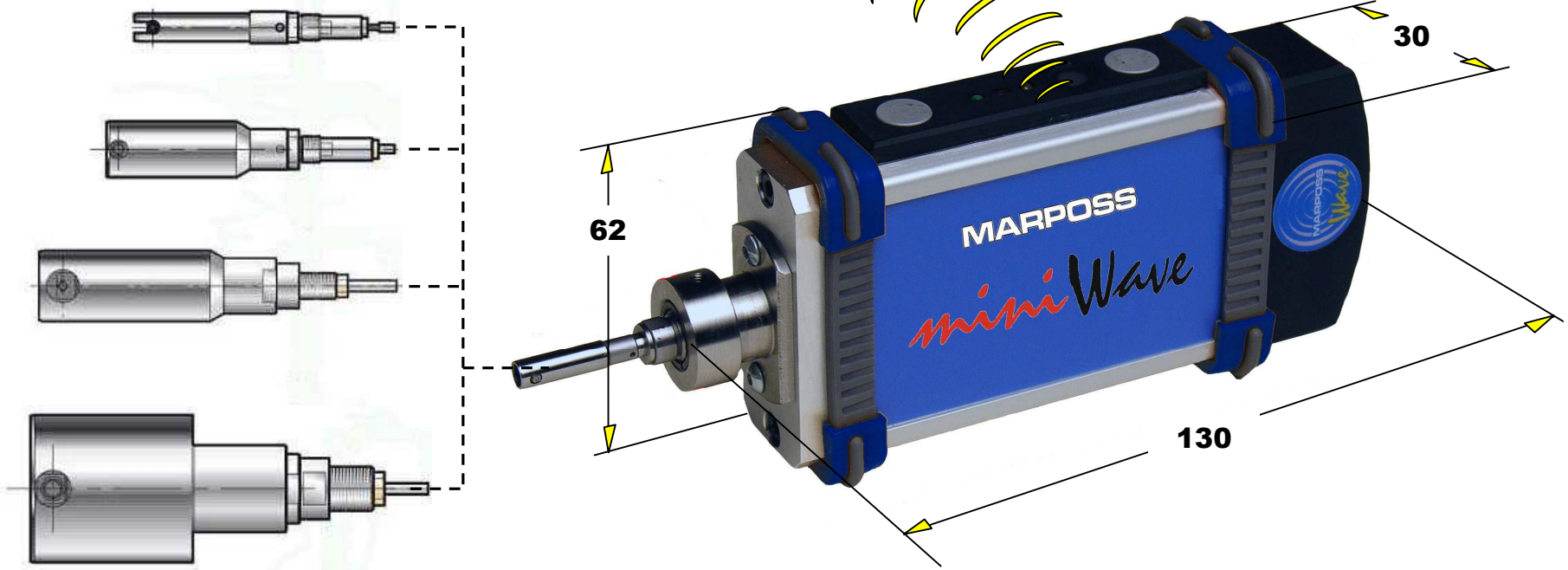
Wrist computer

Standard Gauges

miniWave

Bluetooth®

ID gauge



Interchangeable nosepieces
for ID check

Standard Gauges

miniWave

Countersink depth gauge

Bluetooth®

Interchangeable nosepiece for CSK depth check

(combining the measurements with two calibrated balls of different size also the contersink angle can be measured)

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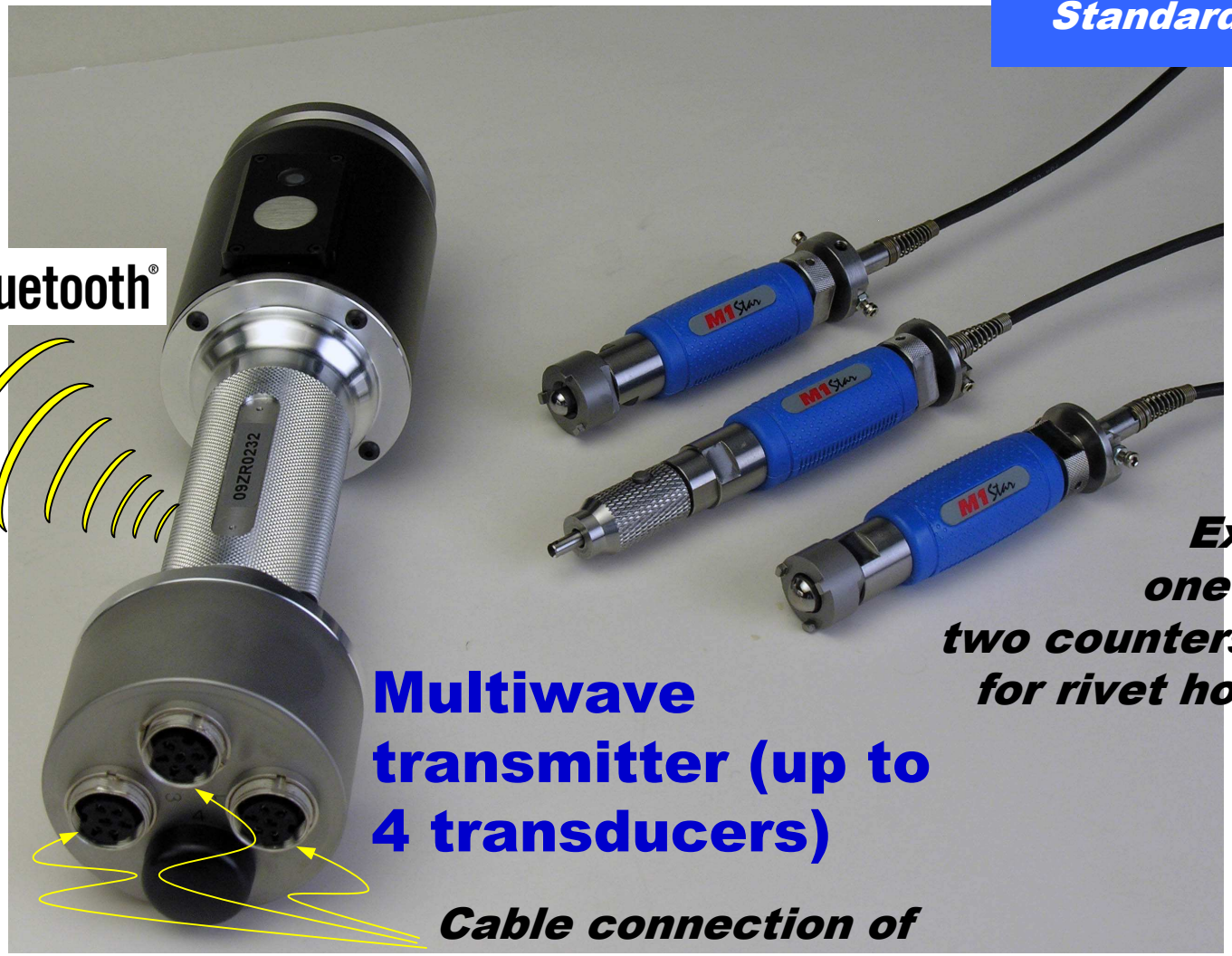
Standard Gauges



Multiwave transmitter (up to 4 transducers)

Cable connection of gauge tools

Example with one ID plug and two countersink gauges for rivet hole checking

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Functional check (CSK Depth & Squareness) of c'sunk rivet holes

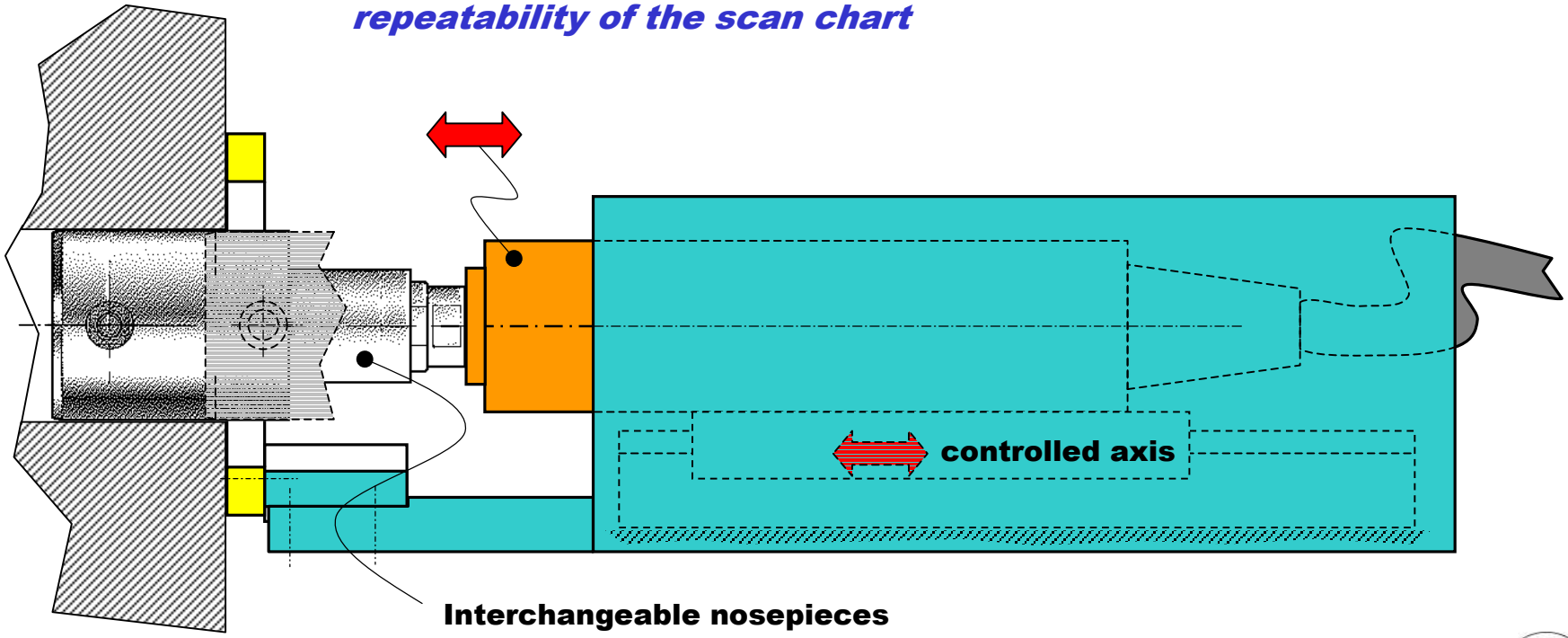
Special Gauges

The gauge can be either wired to a table-top gauge computer or connected to a Multiwave wireless transmitter

Rivet hole ID scan *(hand held gauge)*

Special Gauges

The gauge plug is advanced and retracted automatically with respect to the reference resting ring, so that ID and axial position are acquired in a very consistent sequence, hence granting excellent repeatability of the scan chart



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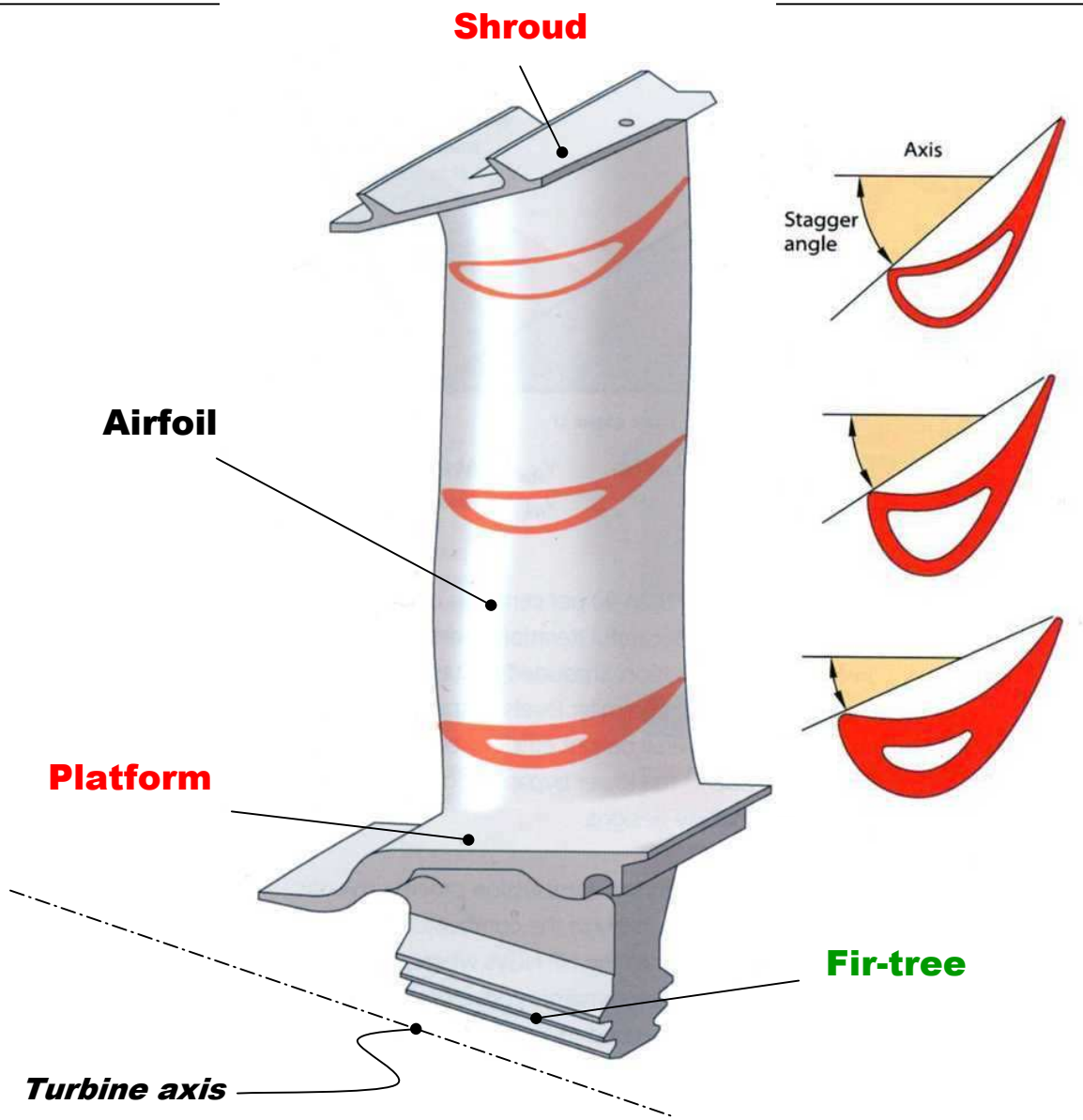


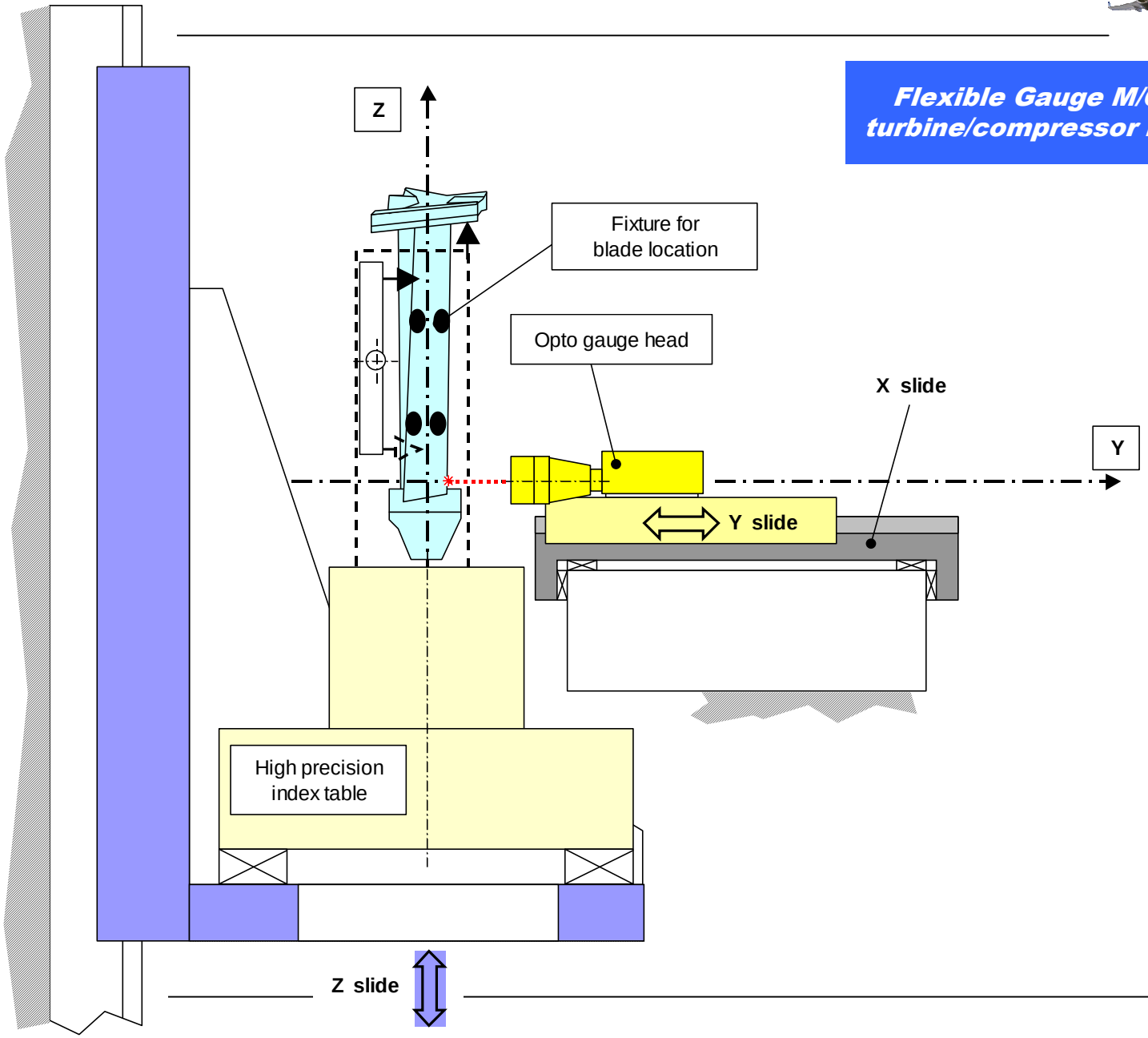
Flexible Gauge M/C for turbine/compressor blades

Measurements:

- Full airfoil profile check
- Add-on for height measurements platform - shroud
- Expansion to fir-tree checks

Product LINE for AEROSPACE

Flexible Gauge M/C for turbine/compressor blades



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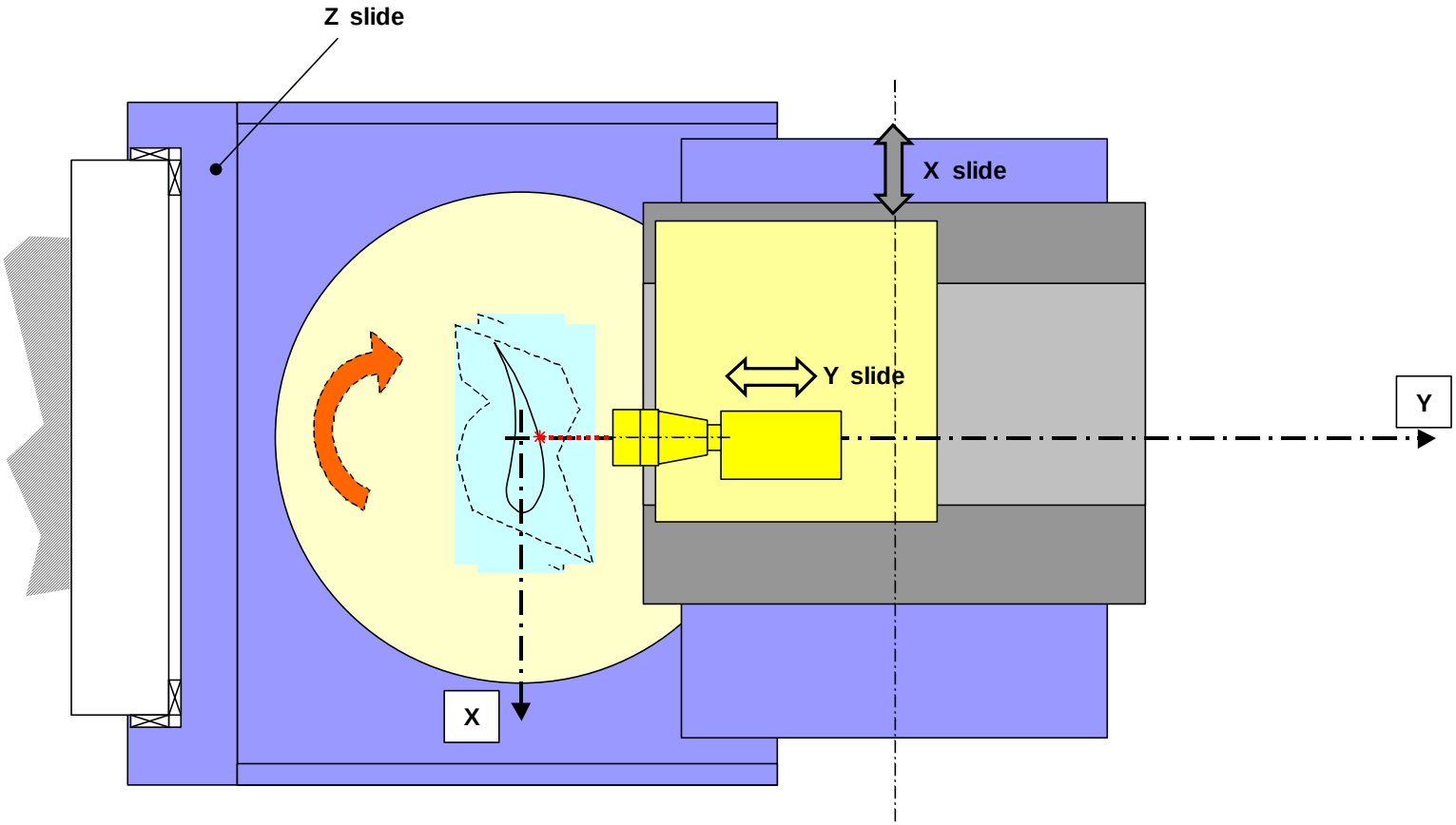
Flexible Gauge M/C for turbine/compressor blades



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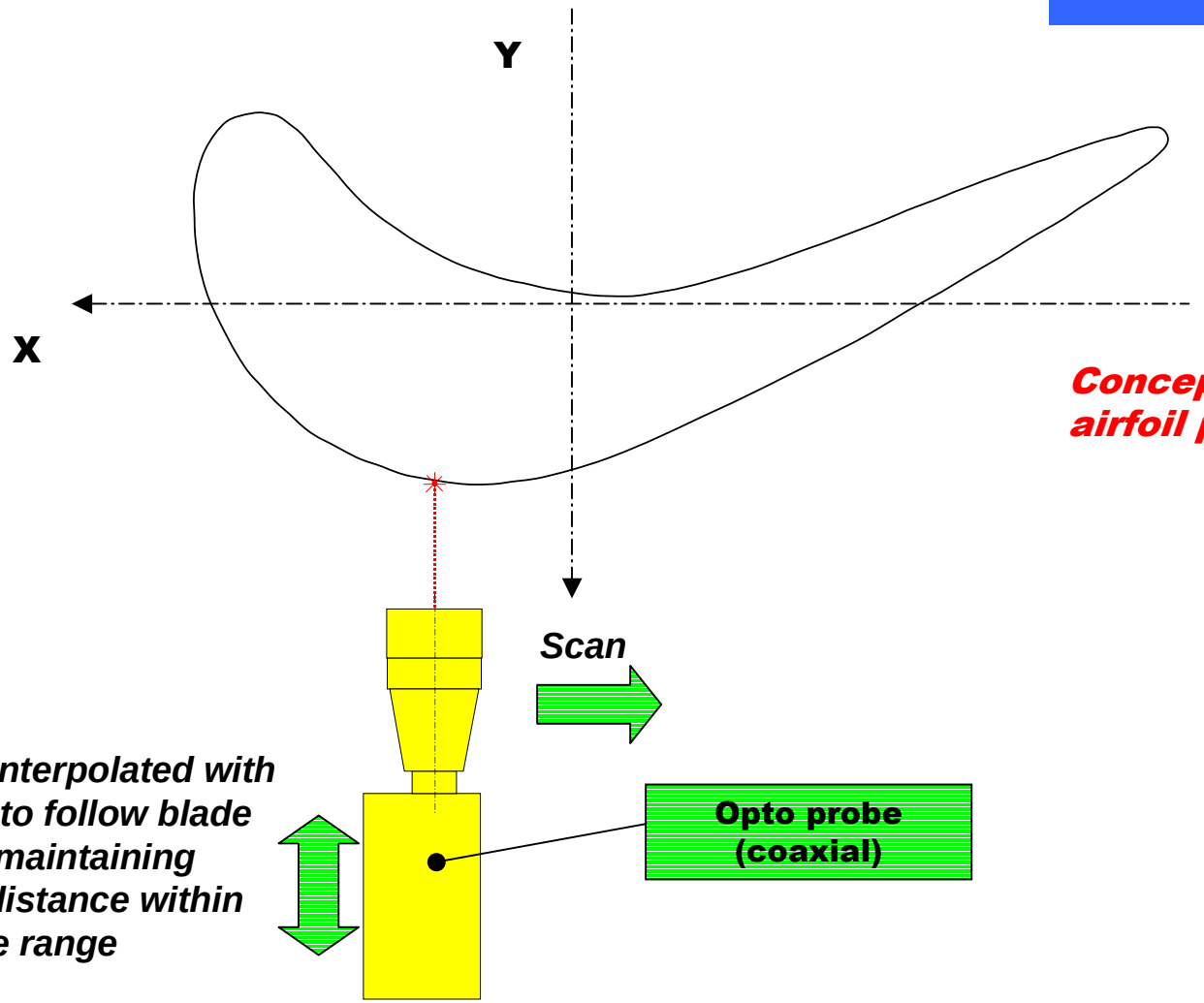

Concept schematic for airfoil profile scanning

Y axis interpolated with X scan to follow blade profile maintaining probe distance within suitable range

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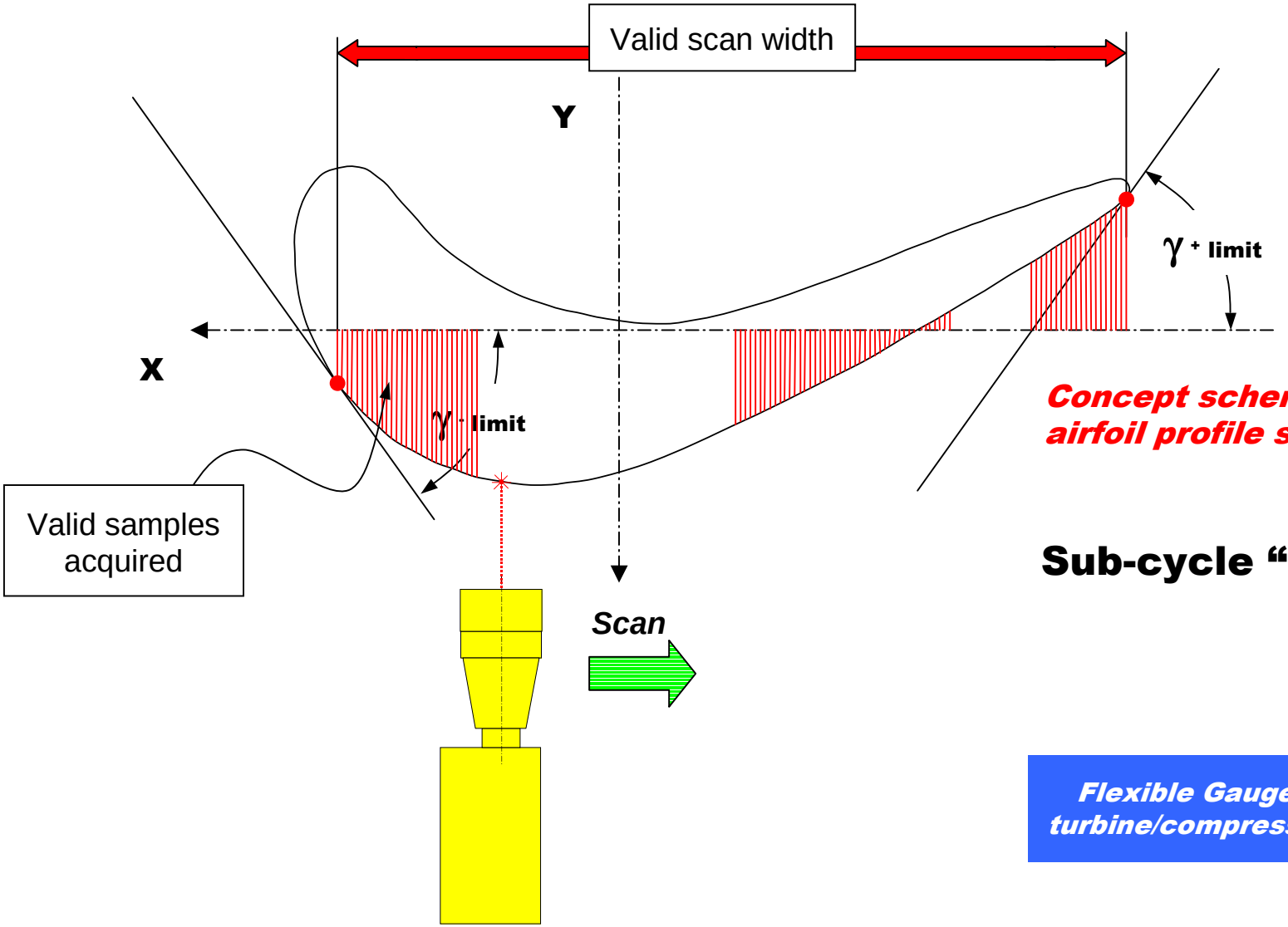

Concept schematic for airfoil profile scanning

Sub-cycle "a"

Flexible Gauge M/C for turbine/compressor blades

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α° blade rotation

Valid scan width

Y

X

γ - limit

γ + limit

Scan

Concept schematic for airfoil profile scanning

Sub-cycle "a + 1"

repeating as many sub-cycles as required the complete profile can be acquired

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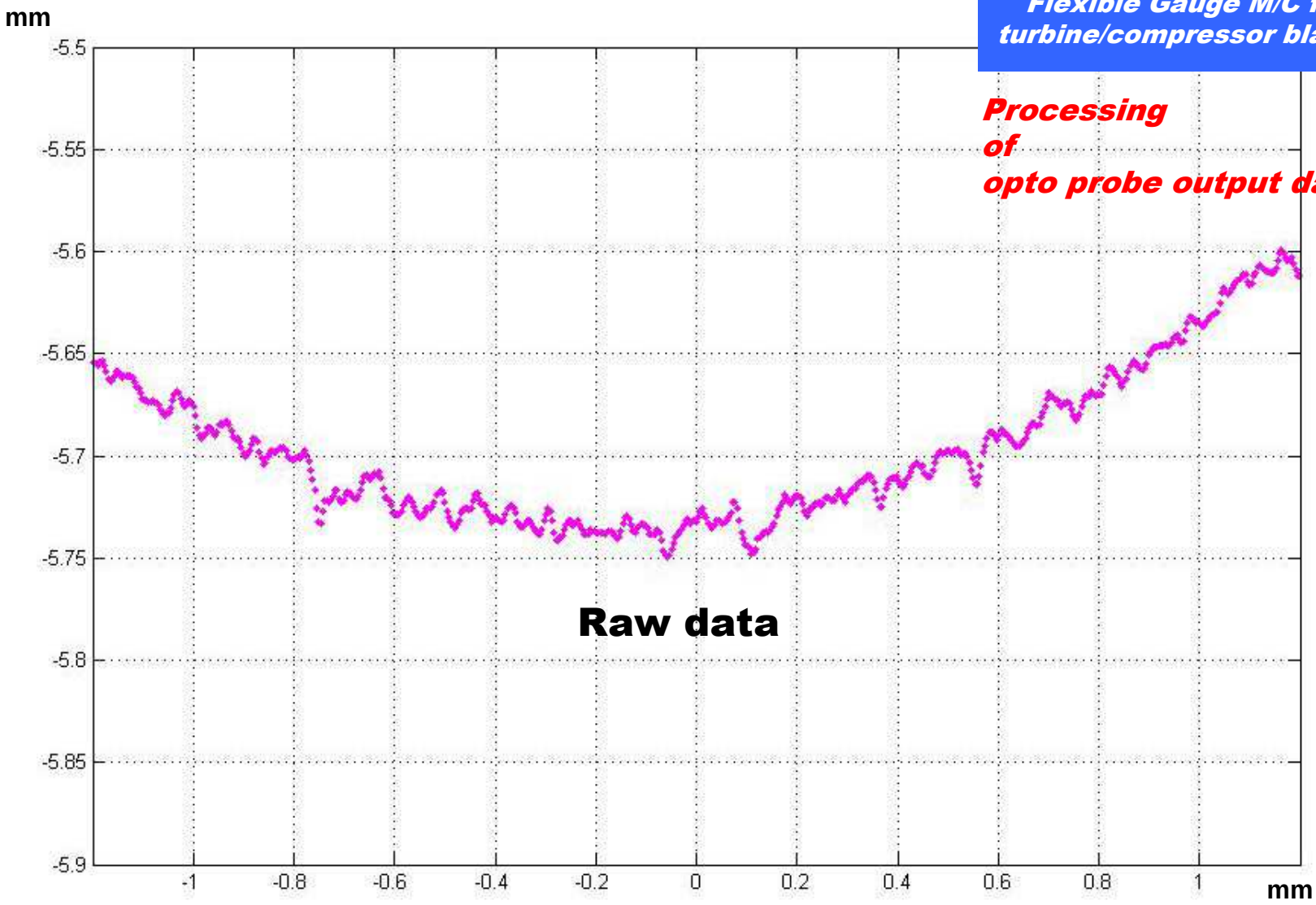
Processing of opto probe output data



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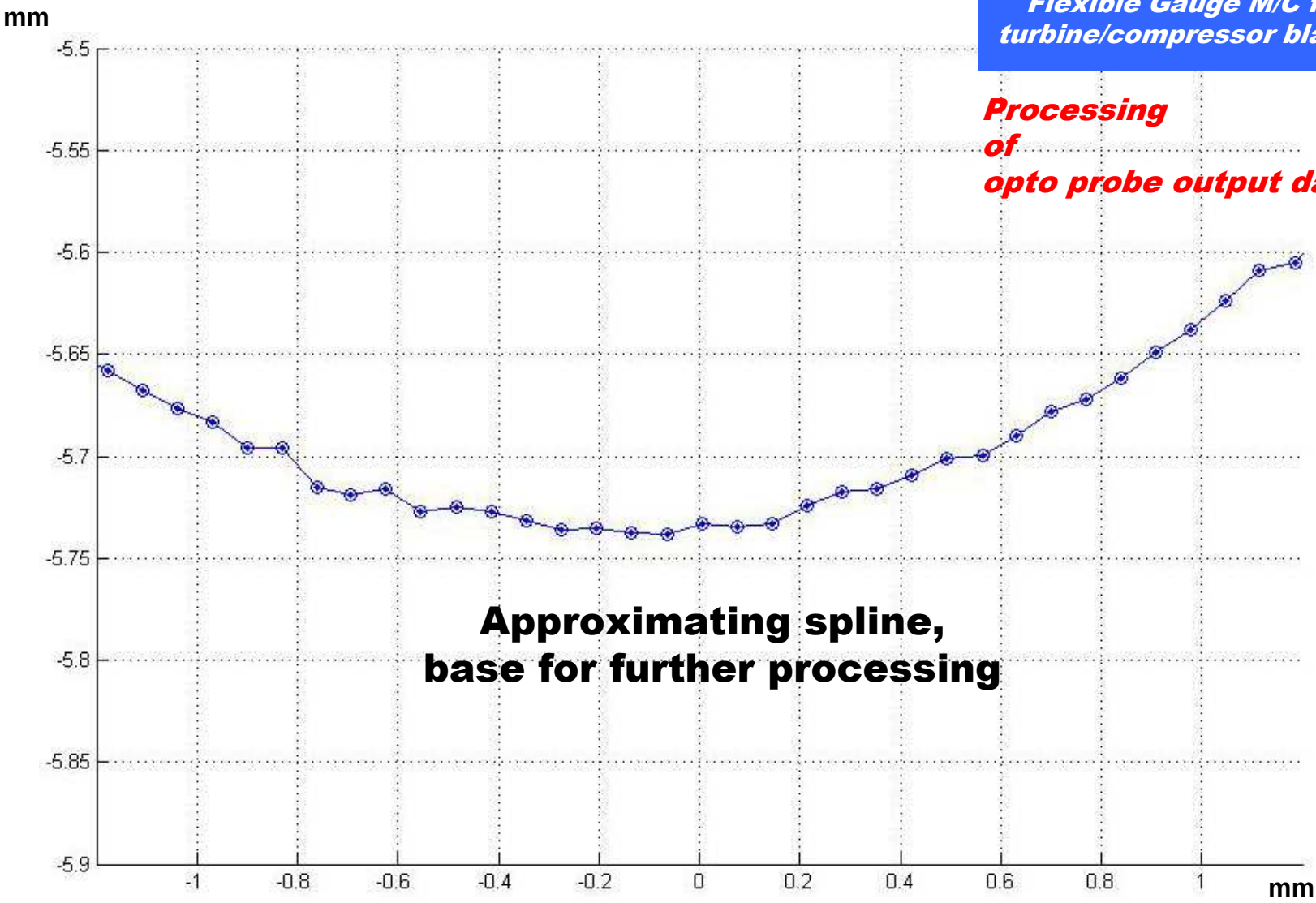
Processing of opto probe output data



Approximating spline, base for further processing

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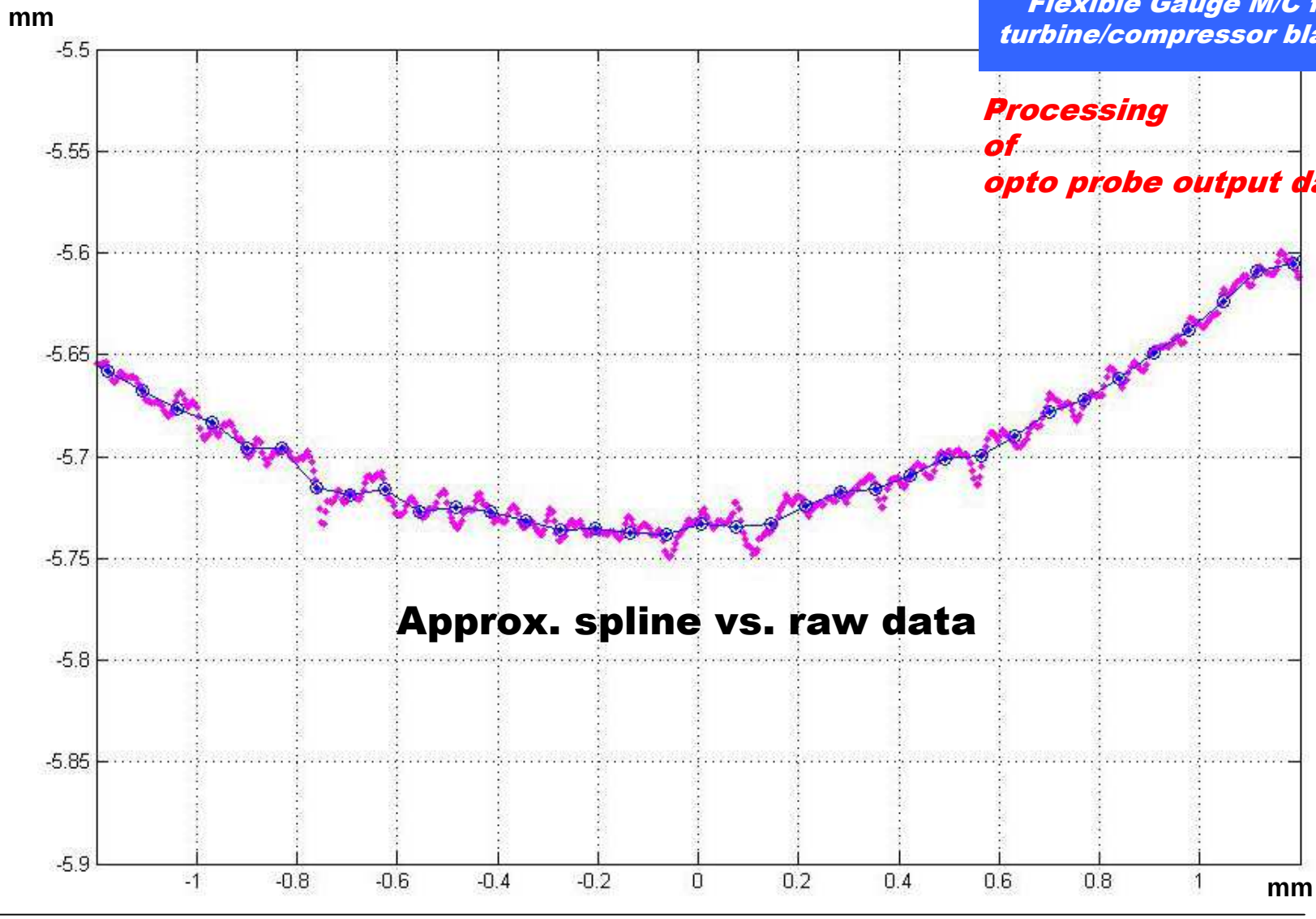
Processing of opto probe output data



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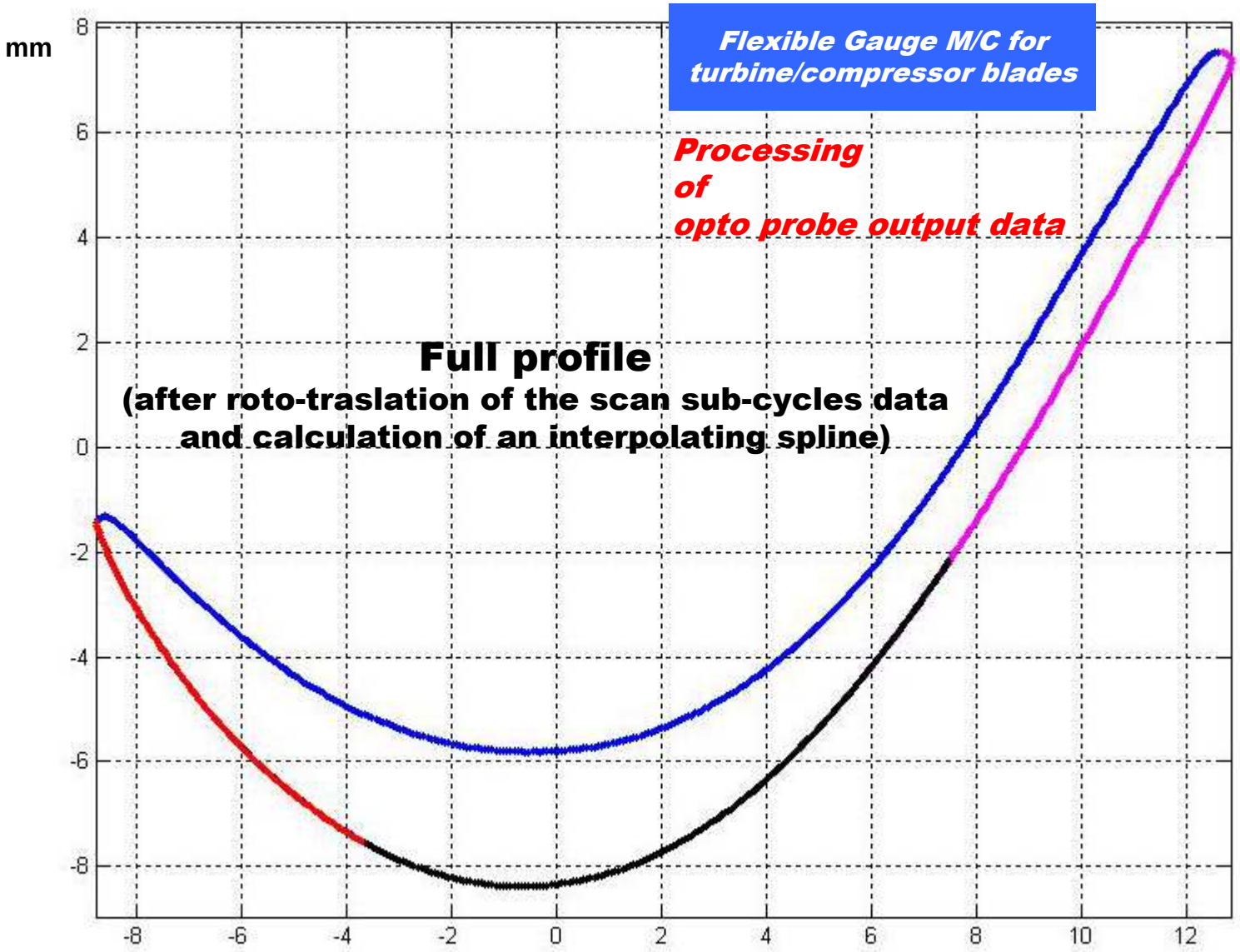
Processing of opto probe output data



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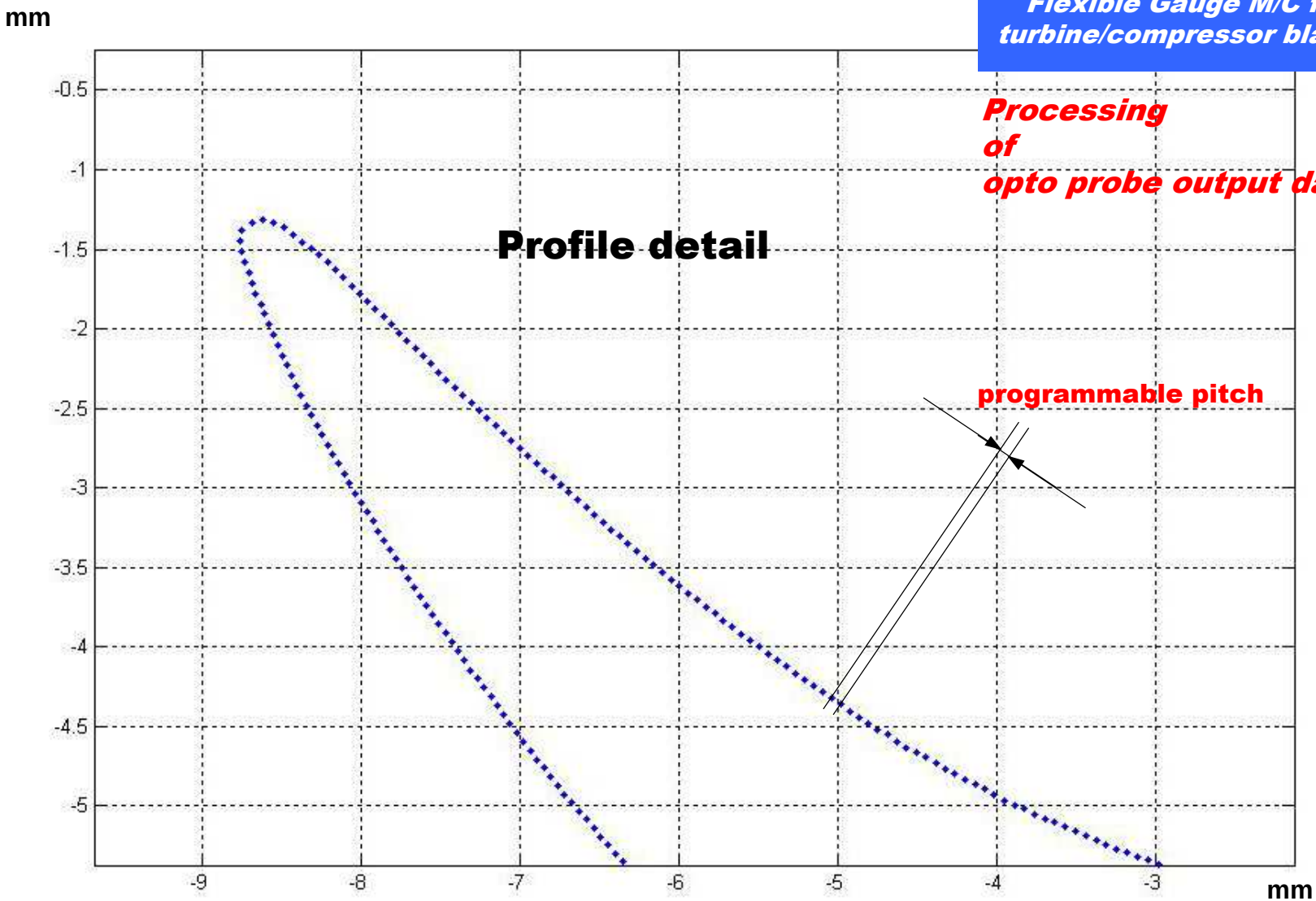
Processing of opto probe output data



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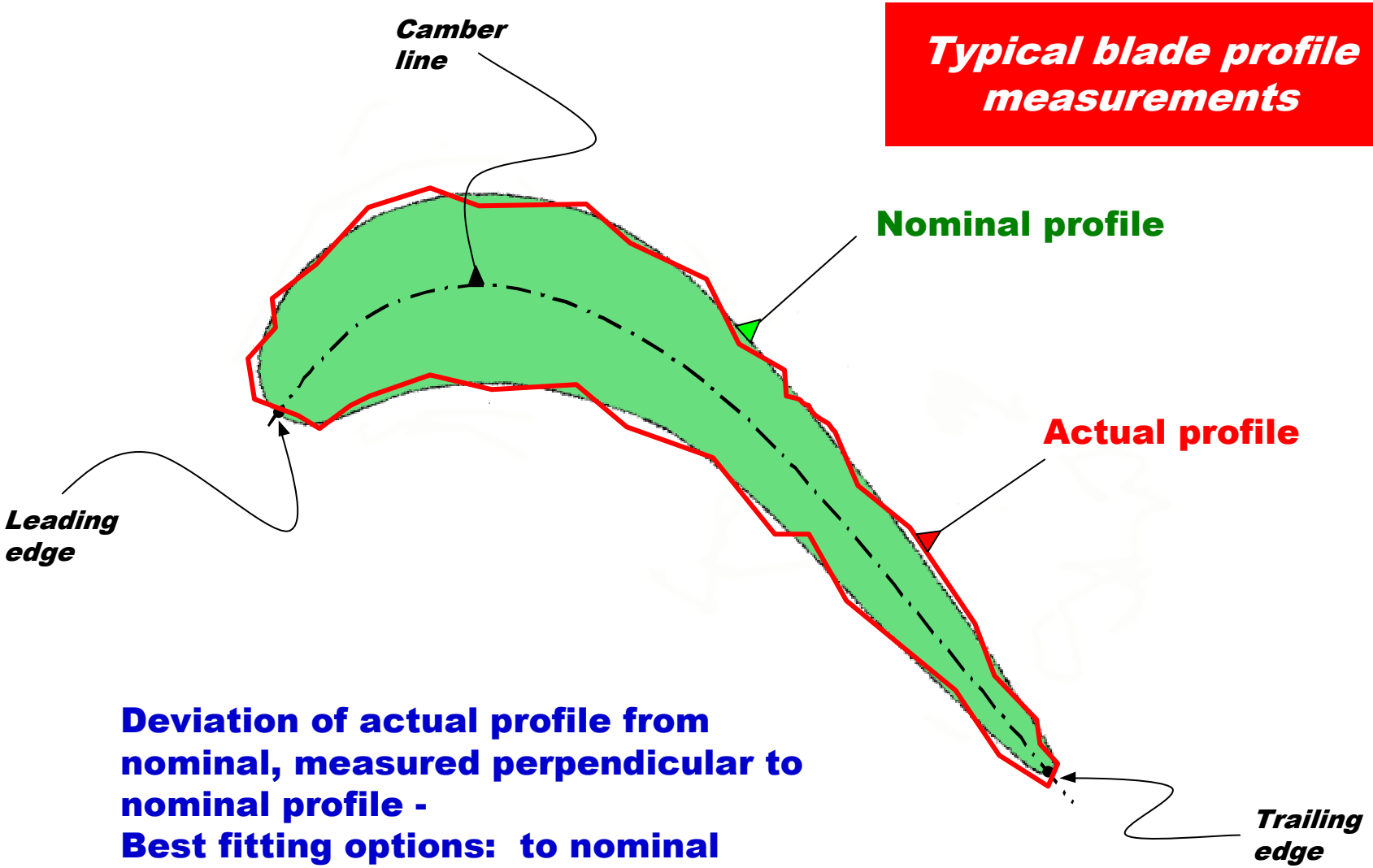
Typical blade profile measurements



Deviation of actual profile from nominal, measured perpendicular to nominal profile -
Best fitting options: to nominal profile and to tolerance band

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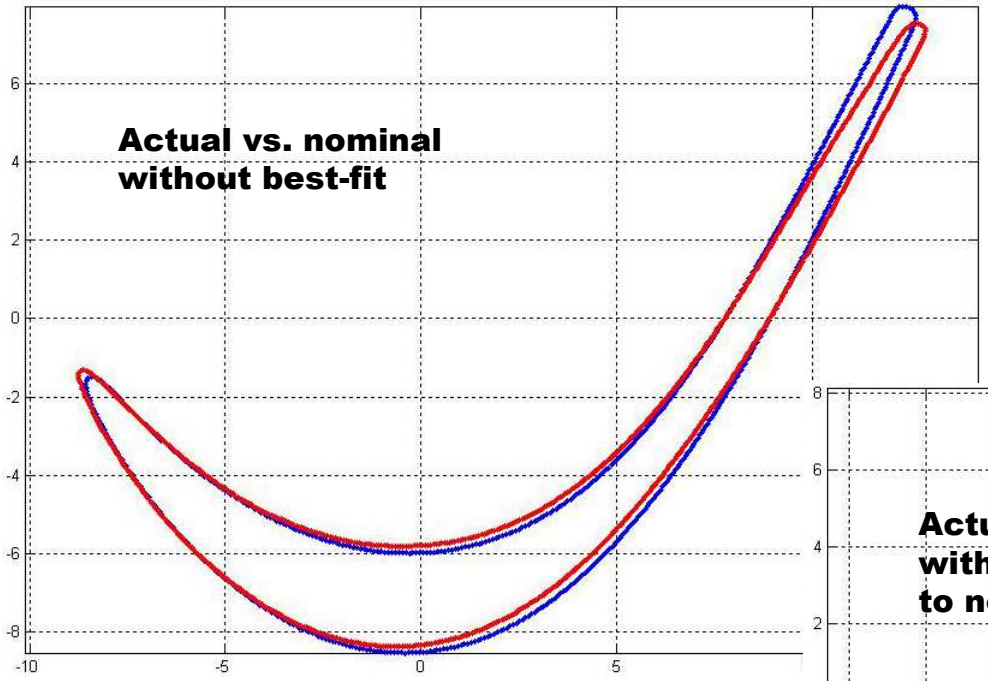
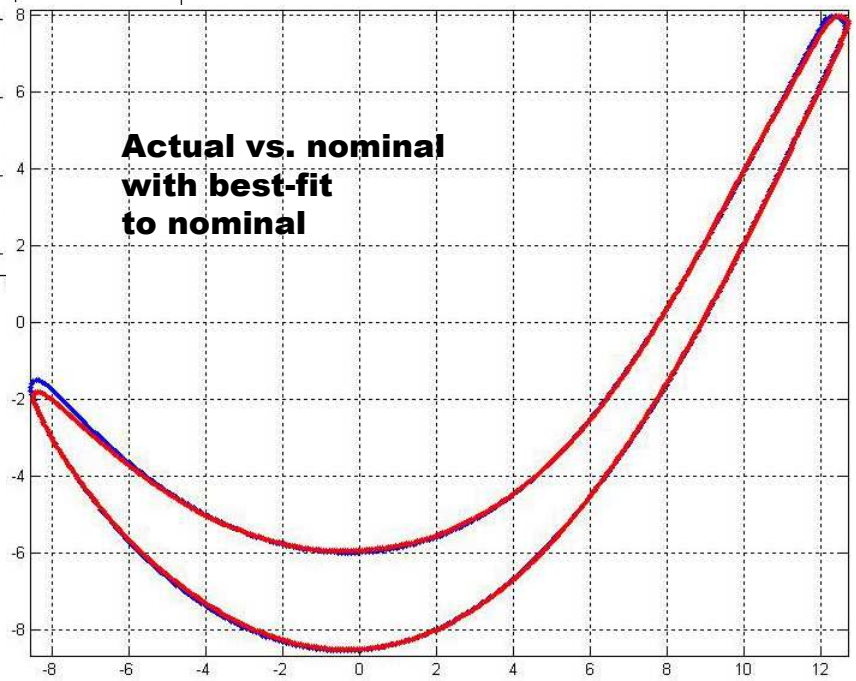
Typical blade profile measurements

Profile check





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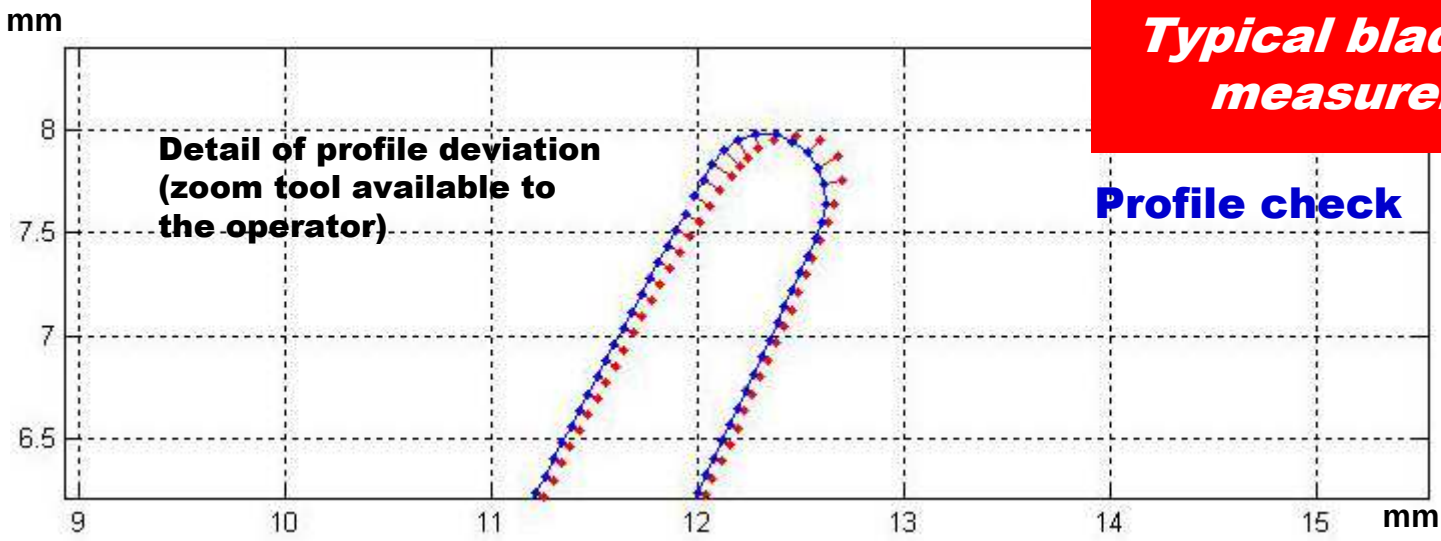
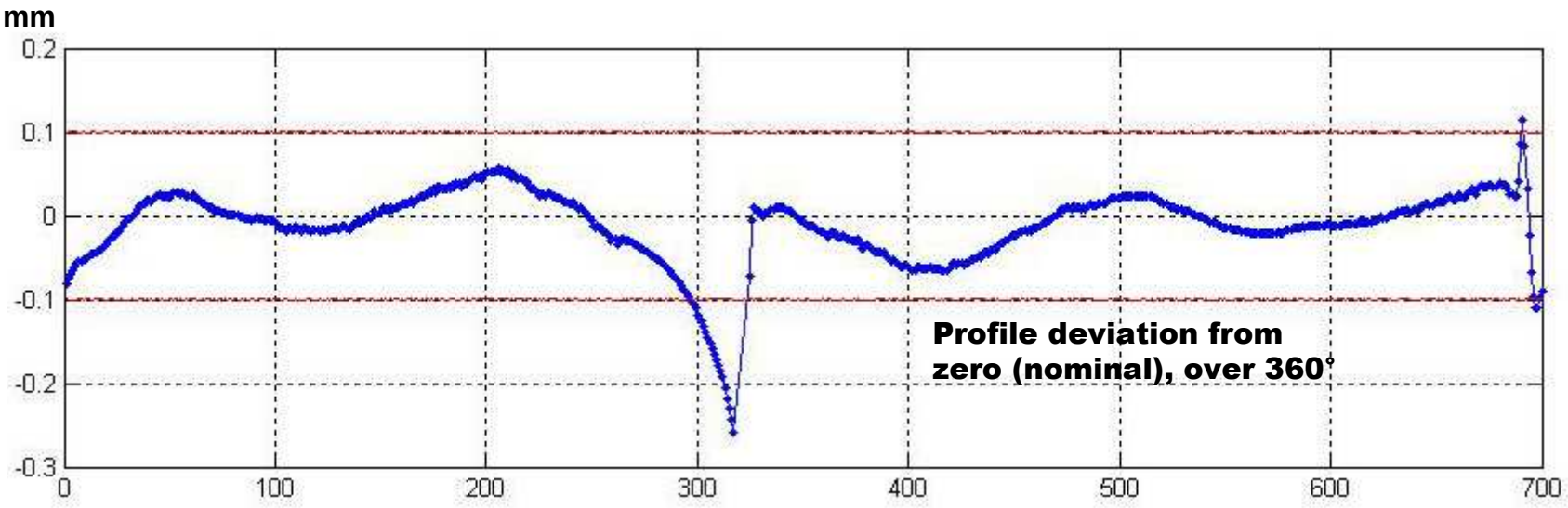
Typical blade profile measurements

Profile check





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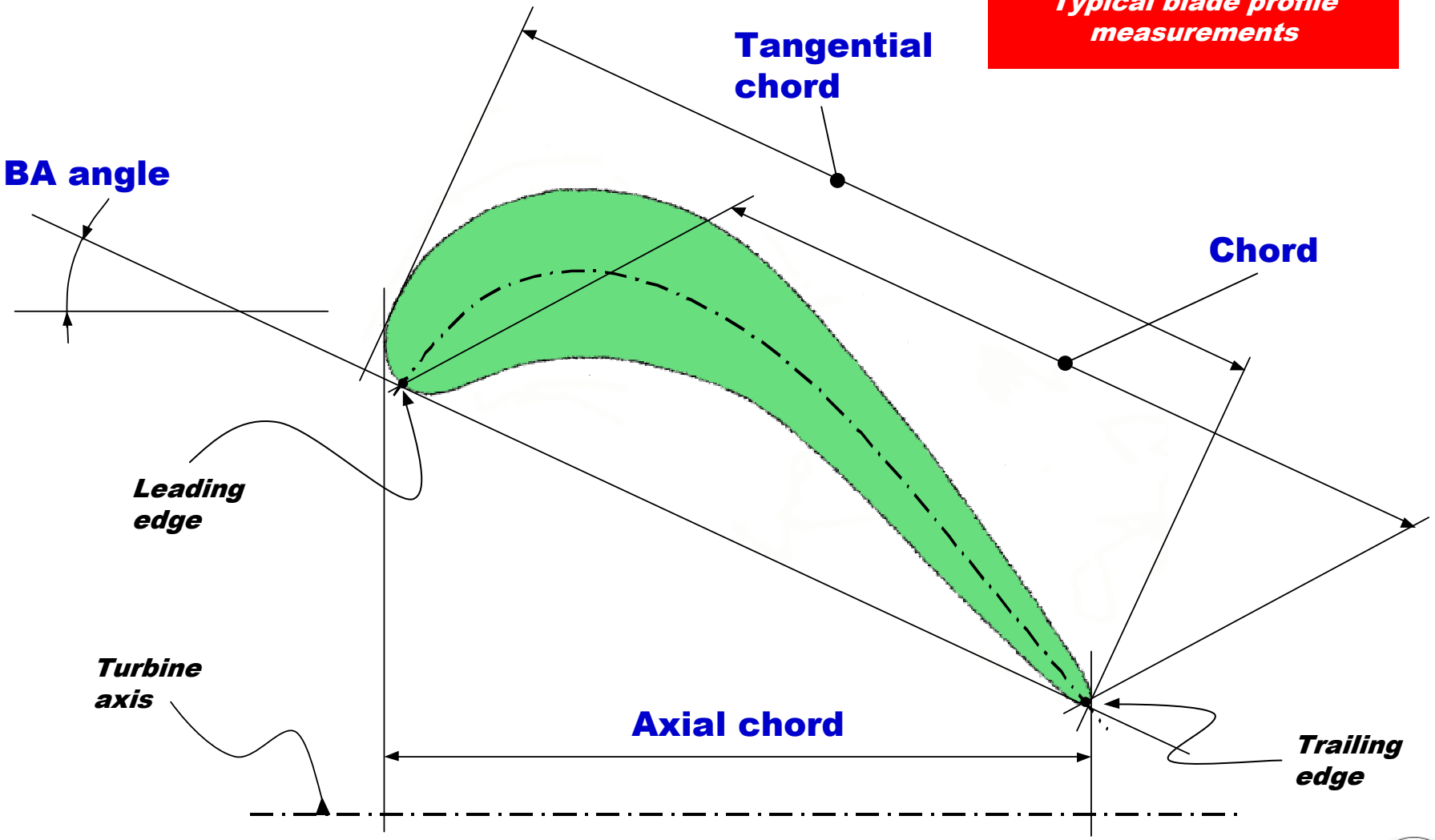
Typical blade profile measurements



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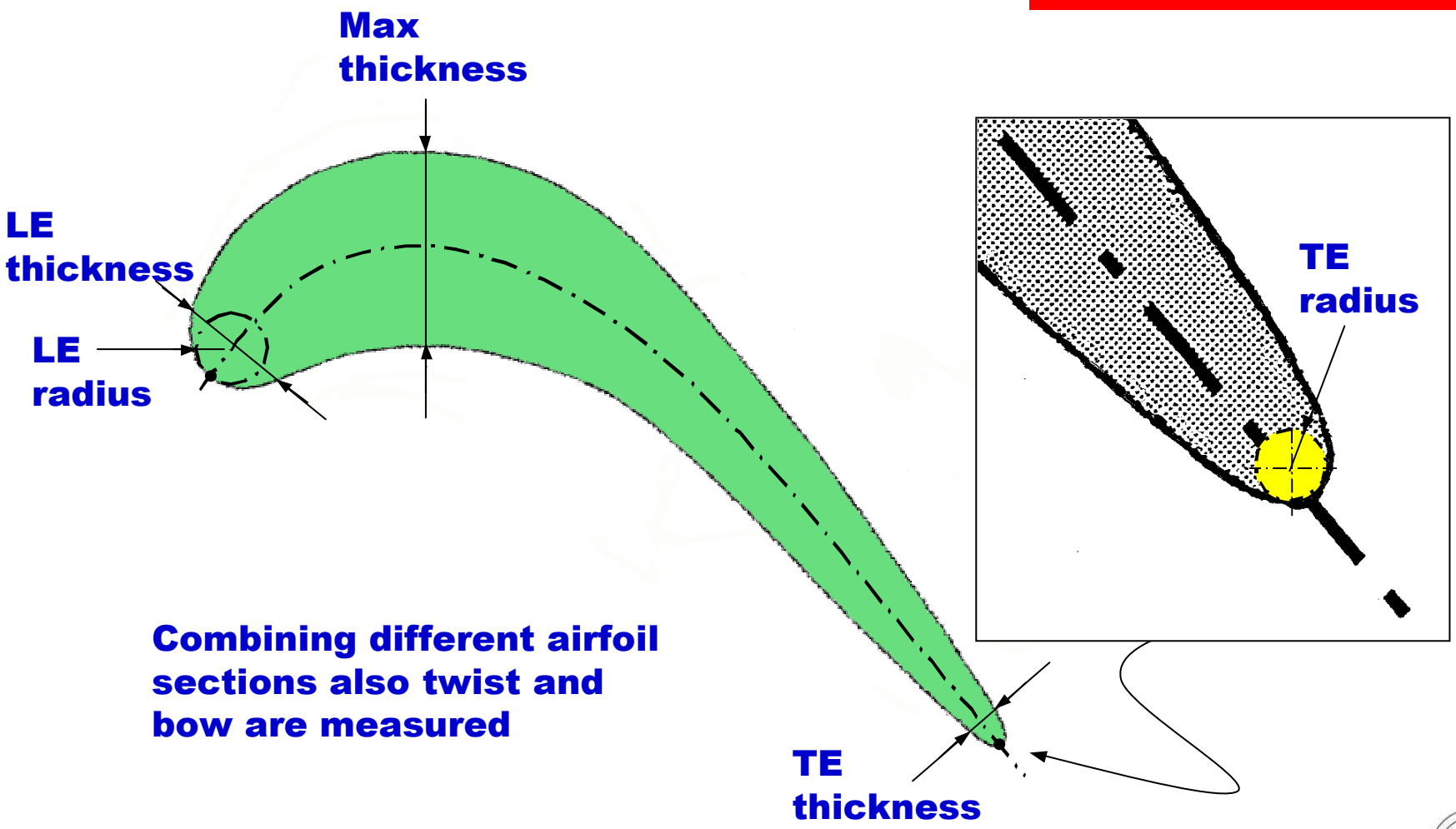
Typical blade profile measurements



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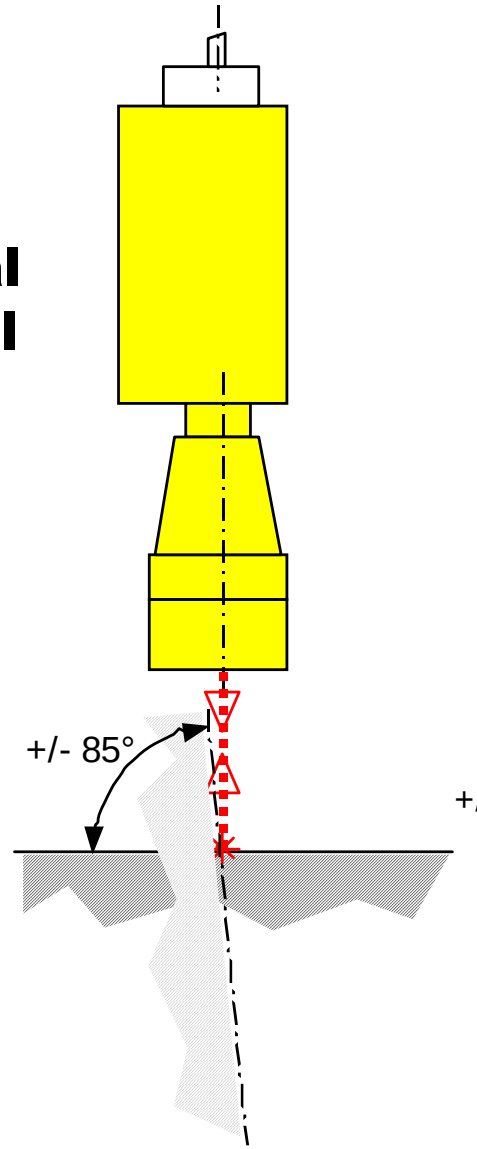
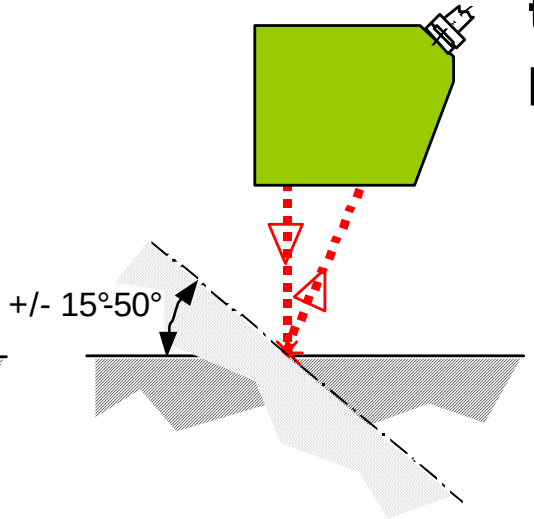
Flexible Gauge M/C for turbine/compressor blades

Special coaxial probe vs. traditional triangulation probe

Special coaxial probe



Traditional triangulation probe



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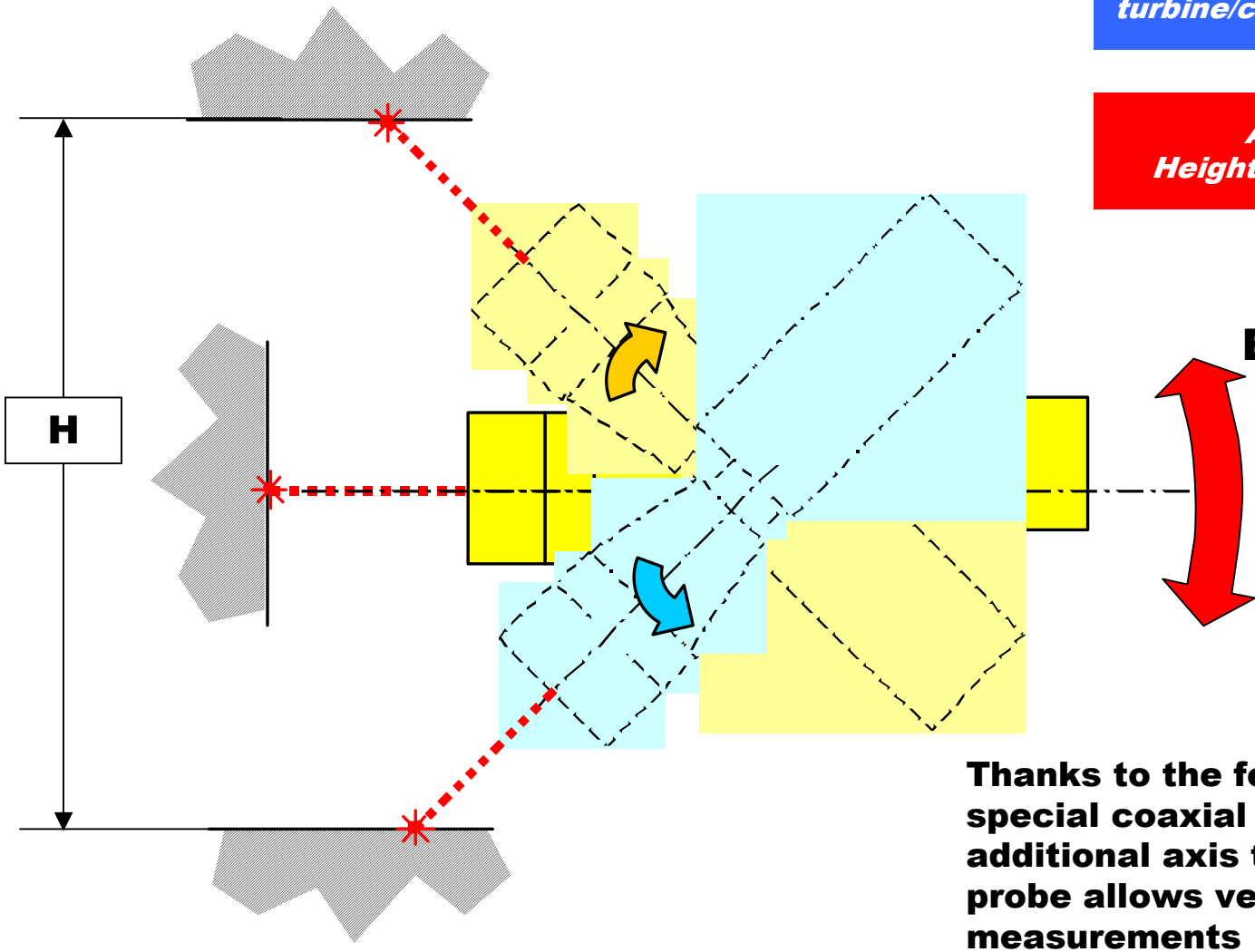
Flexible Gauge M/C for turbine/compressor blades

Add-on for Height Measurements



Thanks to the features of the special coaxial probe, an additional axis to pivot the probe allows vertical measurements

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Flexible Gauge M/C for turbine/compressor blades

Basic architecture of the Control System

All gauge transducers (opto probe, LVDTs as req.)

Axes encoders (linear or rotary)

Master controller Marposs E 9066

- Operator interface
- Part program generation
- Gauge transducer acquisition and measurement processing

Marposs Quick SPC software

Enable data acq.

TX of movement targets

Motion control system

Rexroth Indradrive servo modules

Motors

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Flexible Gauge M/C for turbine/compressor blades

without ***5th axis for Height Measurements***

Foot print 1200 x 1200 mm

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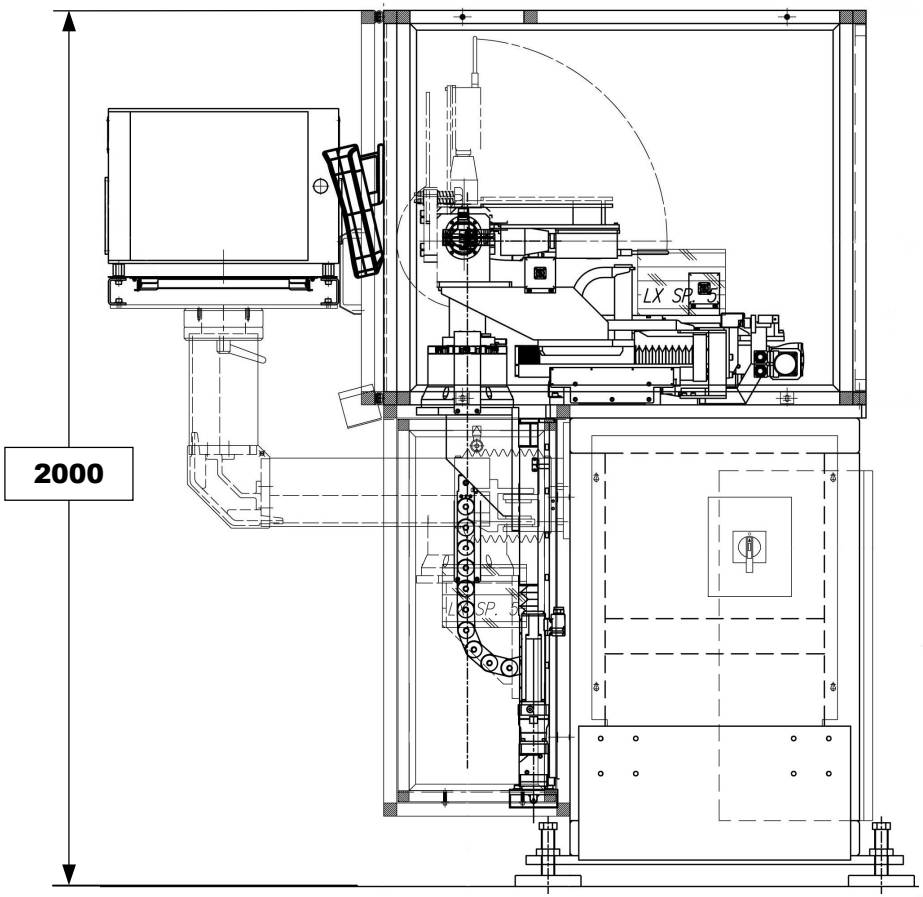
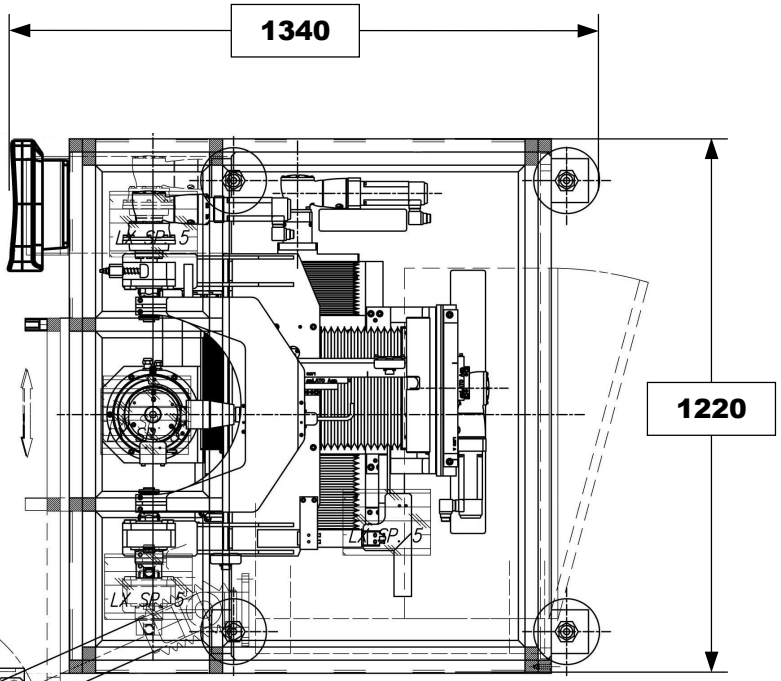
Flexible Gauge M/C for turbine/compressor blades

with 5th axis for Height Measurements



Side view



Plan view

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