VTS

VISUAL TOOL SETTER FOR CNC MACHINES

MARPOSS

The VTS is the top of the range tool setter device for CNC machines. This device consists of an image acquisition system based on a CCD sensor. This allows VTS to be the most accurate tool setter of work areas on the market (<1.3 µm for any shape and dimension).

Thanks to the LEDs positioned on the front it allows for the inspection of the cutting edge of tools, which would otherwise be invisible due to the projection of shadows, with a continuous light.

VTS uses the Total Tool Inspection concept so that all the cutting edges are measured and not just the one that projects the most in length and diameter.

Checks the state of the tool, even inserts, defining a sort of "digital fingerprint" with all its geometric specifications (DIAM, POS, CR, TIR) and any breakages or splintering.

Once of the main characteristics of VTS is its protection system, that allows excellent measurement performances even with machinings with coolant o dust. To resist the difficult machine conditions, pneumatic pistons and air barriers are used to protect the optical part. The double protection (pneumatic and mechanical) guarantees excellent measuring results.

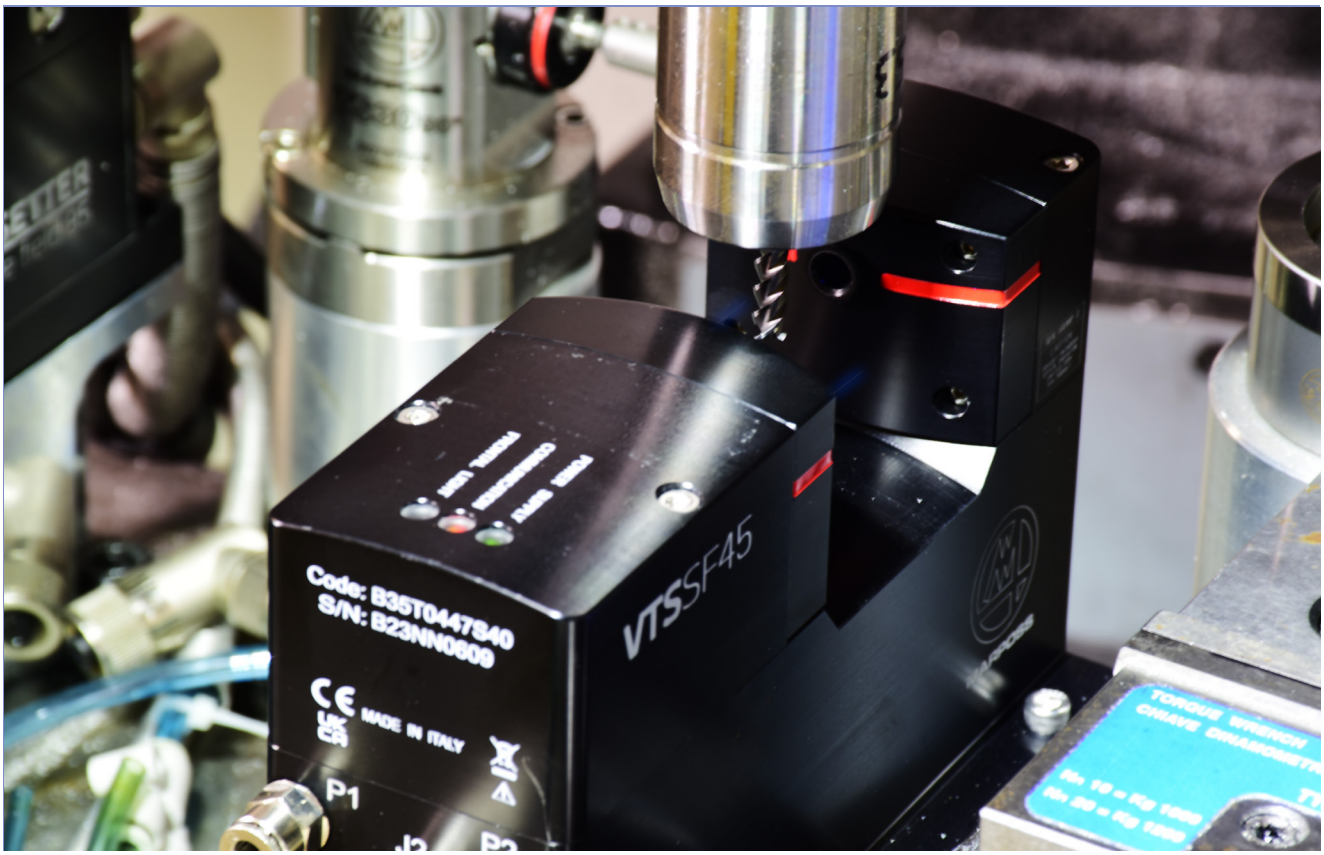
The VTS can easily be integrated on micro-milling machines and turning centres, multi task high precision lathes, for the following CNC machines: Fanuc, Siemens, Heidenhain, Mitsubishi, Okuma and Sodick. Specially designed automatic cycles ensure the correct positioning and the measurement of every type of tool.

Benefits

- Measurements independent of the geometry and dimension of the tool
- Excellent metrological performance thanks to the repeatability and resolution of around a tenth of µm
- Measurements can be obtained from a single photo
- Measurement of unknown tools
- Inspection of single cutting edge/insert
- Surface inspection with front LEDs
- Fast and efficient automatic cycles for various CNC machines

Applications

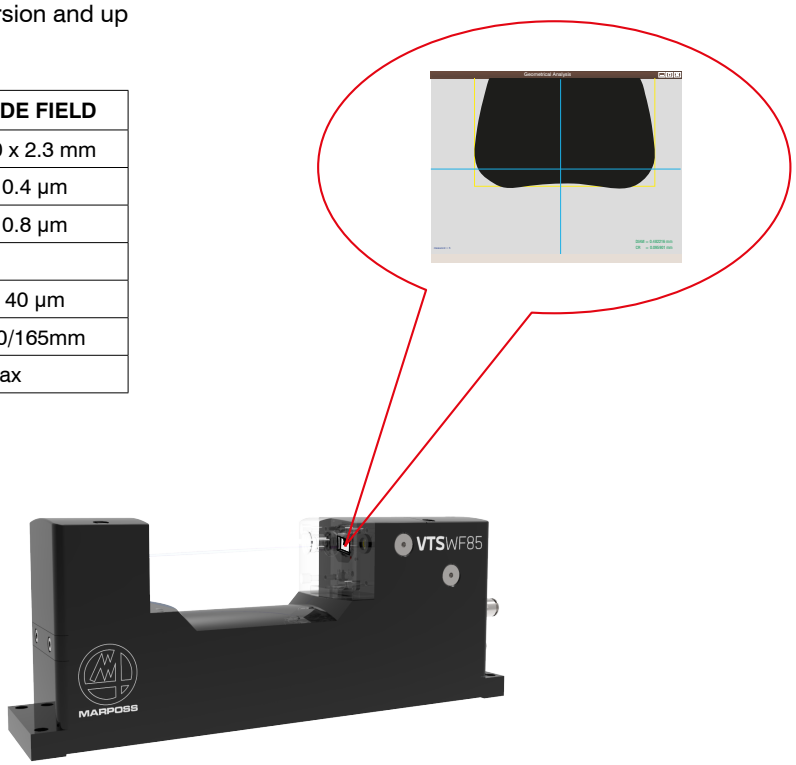
- Milling machines of various dimensions
- High precision lathes and turning centres
- Multi tasking machines
- Die & mould production
- High precision metal part production
- Tool production
- Multi-cutting edge tools
- Inspection of the profile of grinding wheels
- Measurement and inspection of small pieces

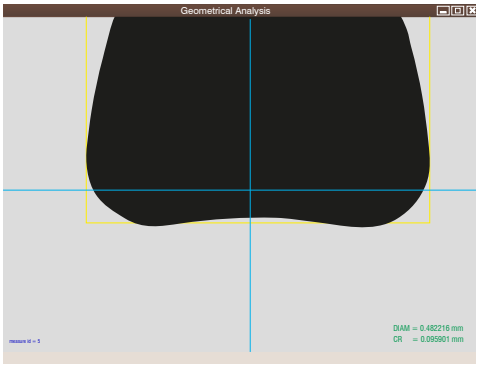


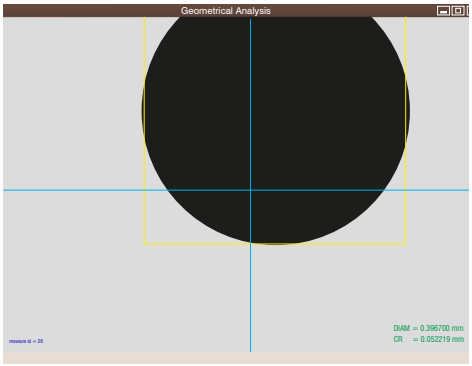
Metrological performance

The VTS is fitted with a CCD camera able to frame the tool completely up to 0.6 mm with the Small Field version and up to 2.9 mm with the Wide Field version.

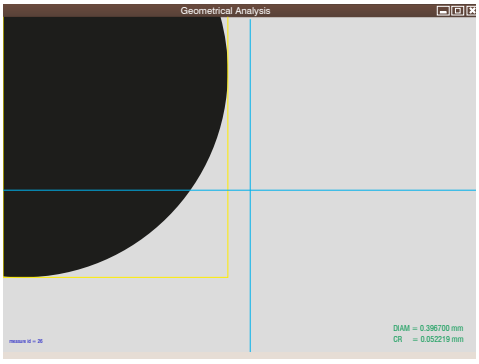
	SMALL FIELD	WIDE FIELD
MEASUREMENT AREA	0.7 x 0.5 mm	3.0 x 2.3 mm
RESOLUTION	0.1 µm	0.4 µm
REPEATABILITY	0.2 µm	0.8 µm
ACCURACY	< 1.3 µm	
MEASUREMENT RANGE $Ø_{min}$	10 µm	40 µm
MEASUREMENT RANGE $Ø_{max}$	40 mm	80/165mm
TANGENTIAL SPEED	1200 m/min max	

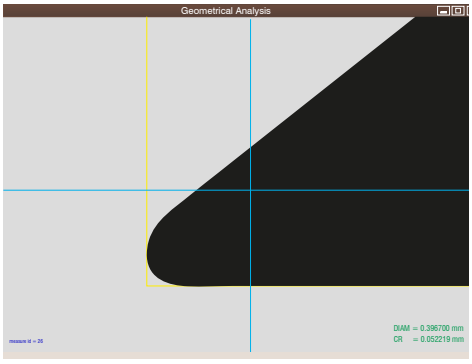






Tool Fully Framed



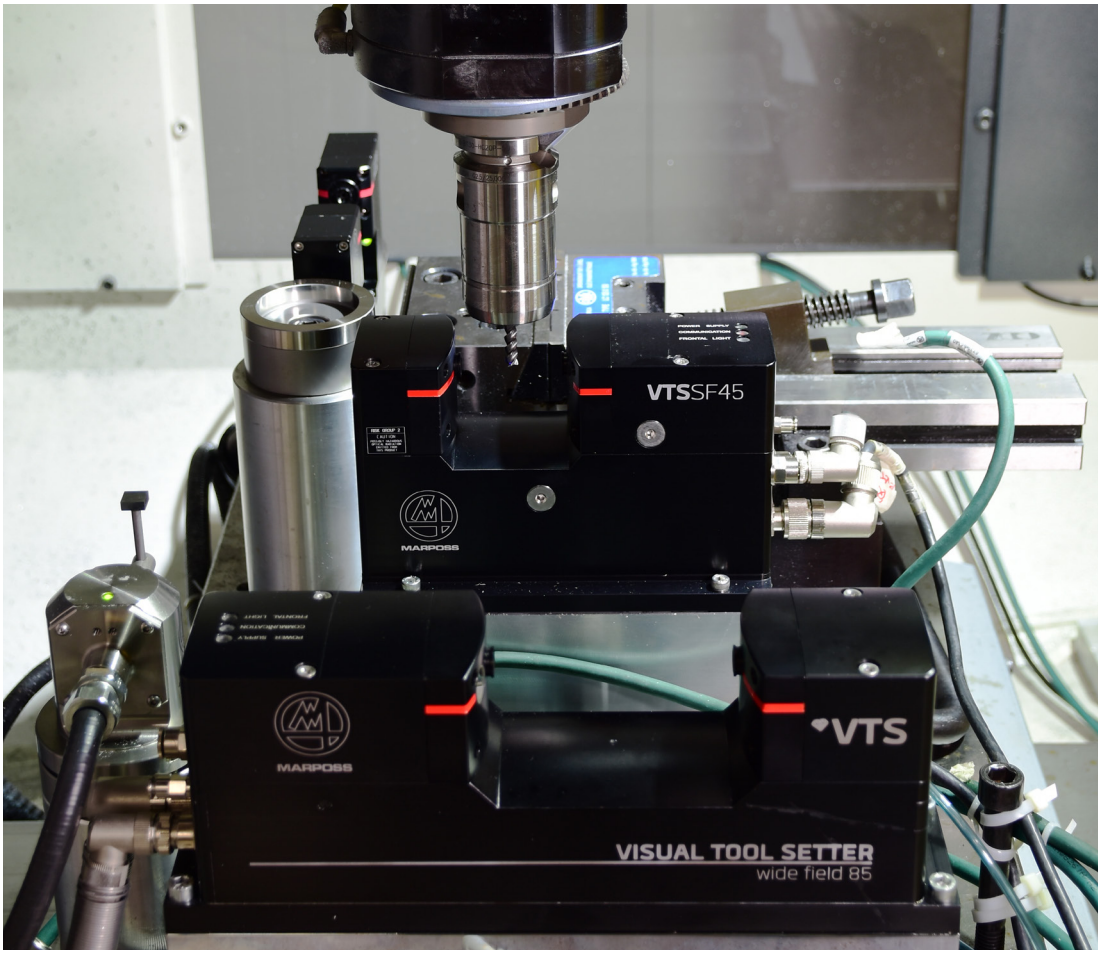


Tool not fully framed

Macro programs

- **Automatic identification** of the tool dimension to define the processing parameters also with an unknown tool
- **Calibration cycle** to automatically find the coordinates of the VTS axes and its focal position in the machine
- **Tool measuring cycle** in length, diameter, cutting radius and tool centre
- **Cycle for multi cutting edge tools** with indexed position of each cutting edge (only for indexable spindles)
- **Profile and surface integrity** of the cutting edges for orientating tools
- The automatic cycles are available for the following CNC machines:

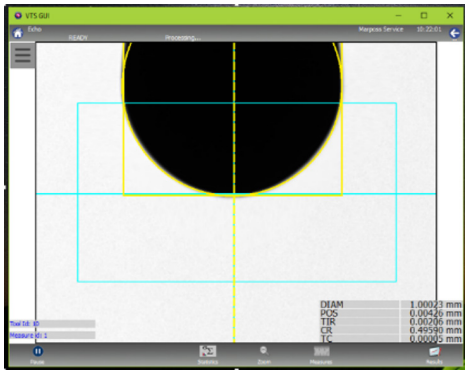
HEIDENHAIN SIEMENS OKUMA
MITSUBISHI ELECTRIC FANUC
Mazak Sodick



Geometric Analysis

VTS allows a complete scan of all significant geometric parameters in a single acquisition. The main parameters that can be acquired include:

- Tool Length
- Tool Diameter
- Tool Runout - TIR
- Tool Center - TC
- Curvature Radius - CR

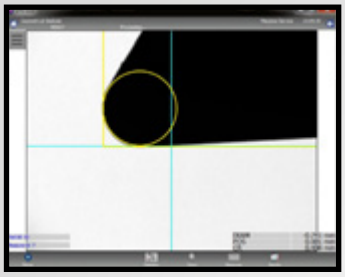


Special VTS measurements

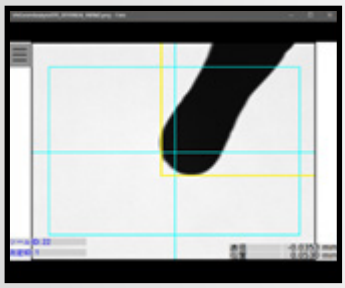
The VTS is able to inspect a vast range of tools with particular geometries, such as boring bars, turning tools, special machining tools, such as:

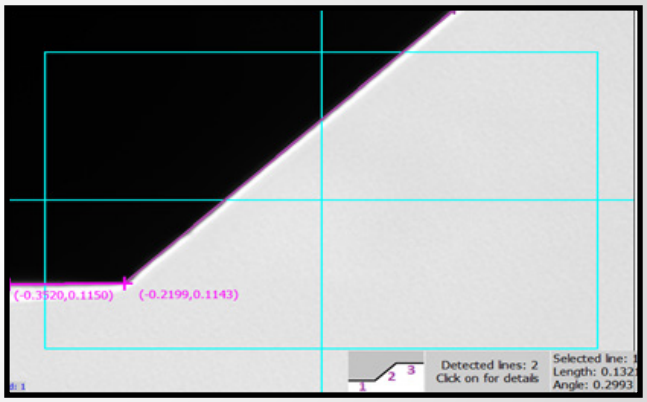
- Measurement of tilting tools
- Measurement of tools with bevelled cutting edge
- Measurement of specific inserts

1) TURNING TOOLS AND BORING BAR

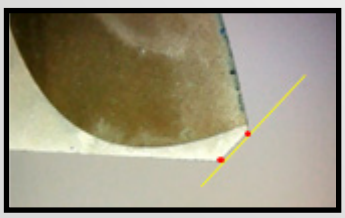


2) TILTED TOOLS (BEM)





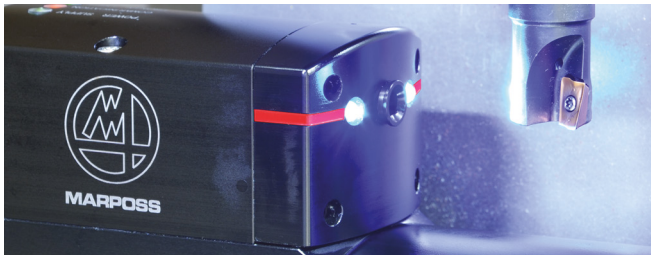
3) CHAMFERED TOOLS

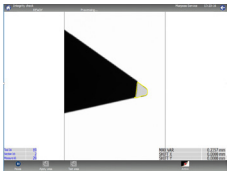


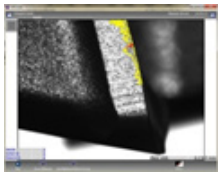
ANGLE OF THE CHAMFER

Integrity check

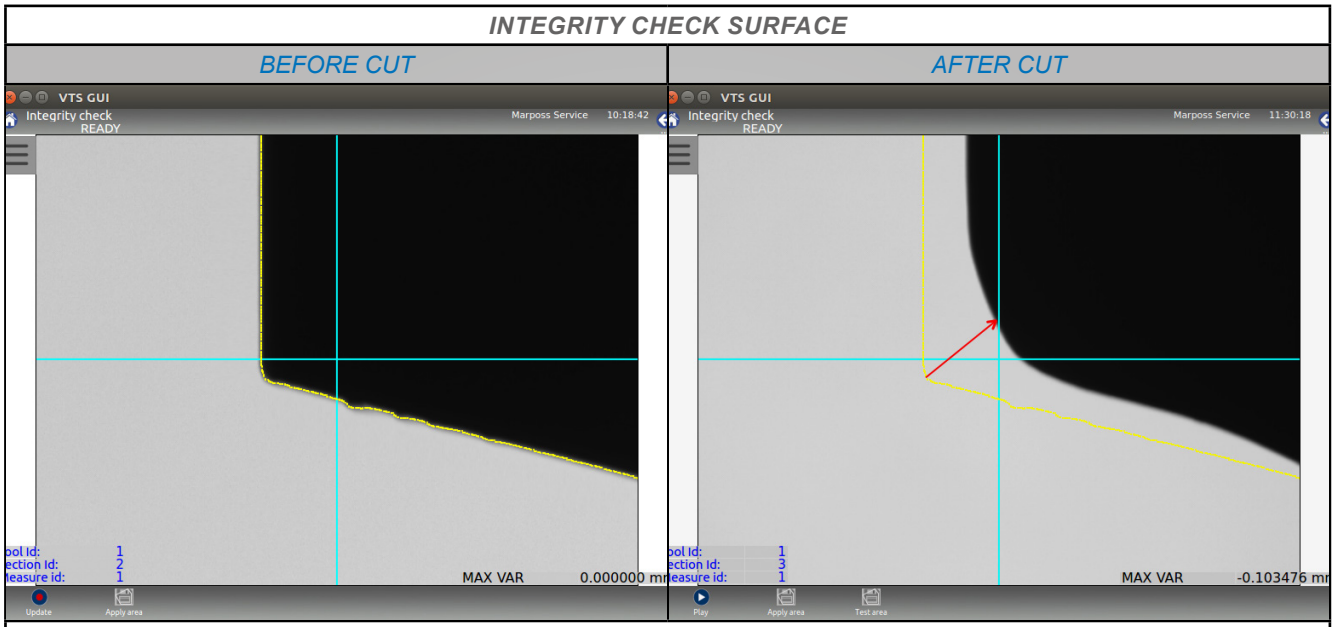
The integrity of the tool surface and profile can be examined automatically with the innovative Integrity Check function.
The surface integrity can be examined on any type of tool and can be used to identify faults and wear that would otherwise be hidden due to the shadow projection.





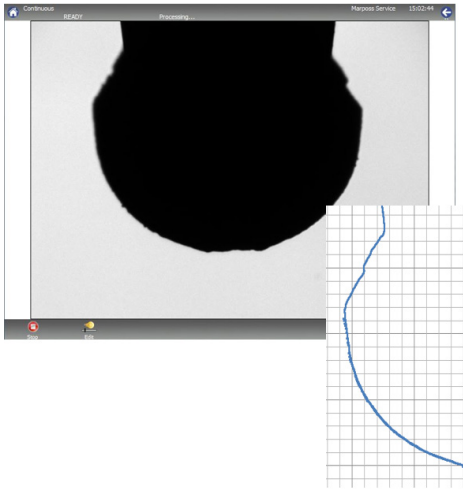


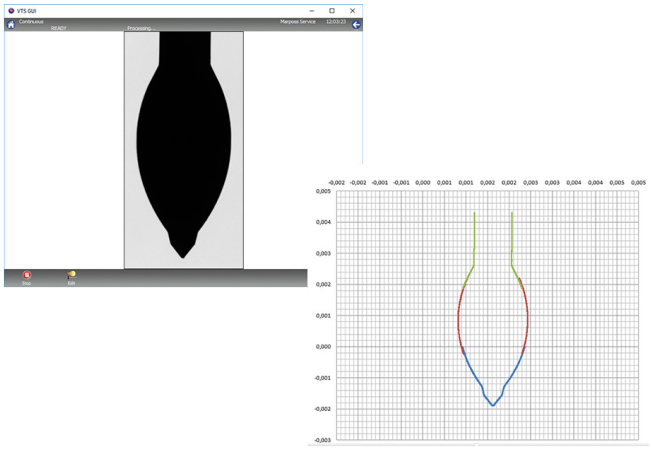
Compare the tool profile or surface before and after machining



Profile scan and reconstruction

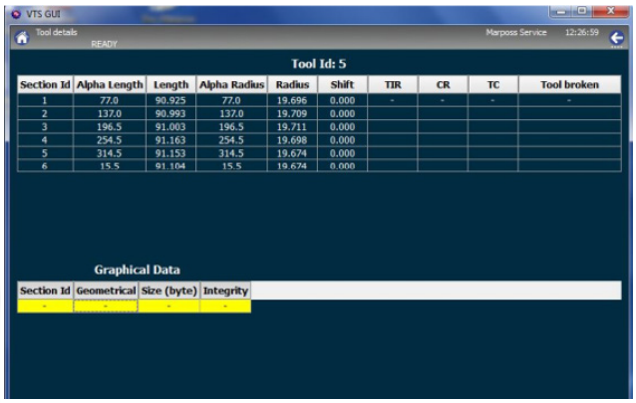
Scan and reconstruction of the profile of the tools with the multiple image acquisition through an automatic cycle.

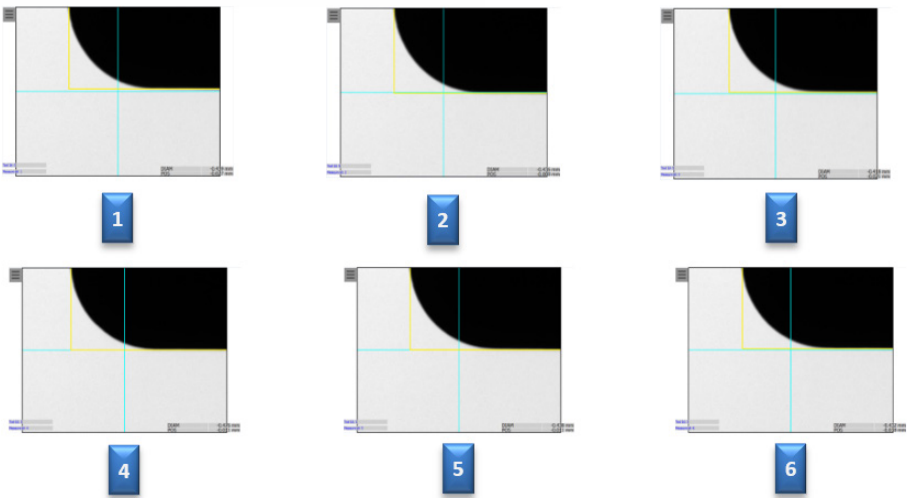




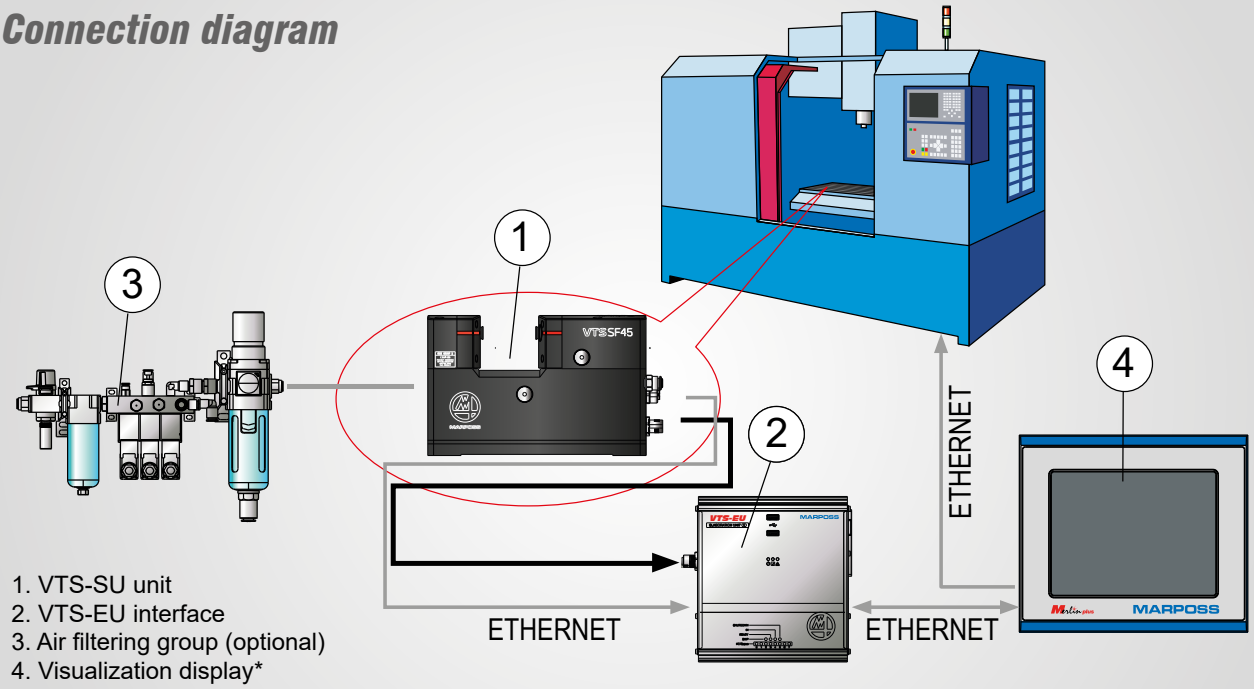
Total tool inspection

The VTS allows for a quick and accurate inspection of tools with various cutting edges. This function, as well as the dimensional measurements, also checks the wear of each single cutting edge, thanks to the tool indexing. The information is saved inside the VTS system and displayed through a summary table of the GUI.





Connection diagram



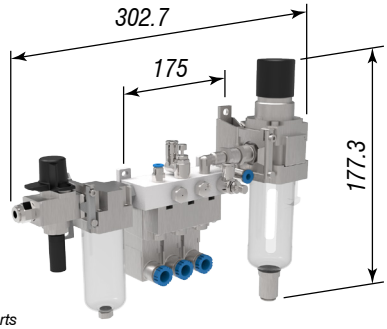
1. VTS-SU unit
2. VTS-EU interface
3. Air filtering group (optional)
4. Visualization display*

Alternatively the GUI can be installed directly on the Windows/Linux based CNC or through a RDP connection
(*) = Use of Merlin Plus is mandatory for Heidehain and Fanuc.

The VTS GUI is the graphic interface software of the system, that in ECHO mode displays the image and the result of the measurement that the machine cycle has generated. It can be installed on the CNC (Windows/Linux based), and on the PC and communicated with the VTS through an Ethernet connection. The images can be viewed on the CNC screen or on an external computer, such as Merlin Plus.

VTS accessories

Air filtering group



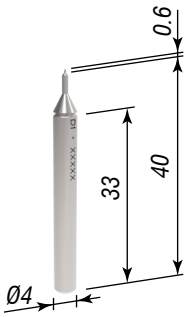
**divisible in two parts*

Air tool cleaner

Merlin Plus

**available with or without pedestal (in case of wall installation)*

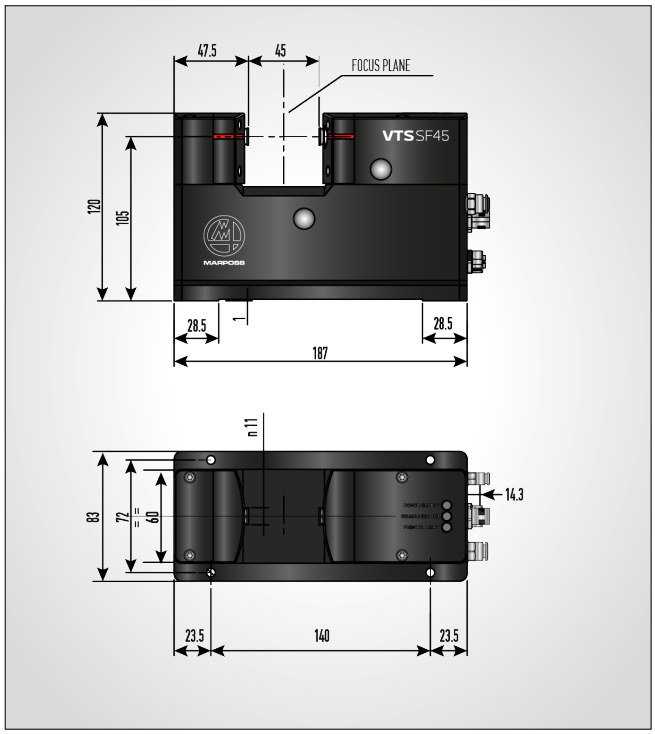
Calibration tool



**it can be ordered with tool holder shank and measurement certificate*

VTS SF-45 Compact

Machines dedicated to mold making or micro-milling machining tend to be small, so that every in-process measuring device runs into a constraint: limited space.
That is why Marposs introduces its new visual tool setter: the VTS SF-45 Compact.
The new mechanical design maintains the same repeatability and accuracy performances that remain the best on the market.
The new size, on the other hand, makes it ideal when space in the machine is an issue.
New compact VTS: same measurement performances with reduced size.

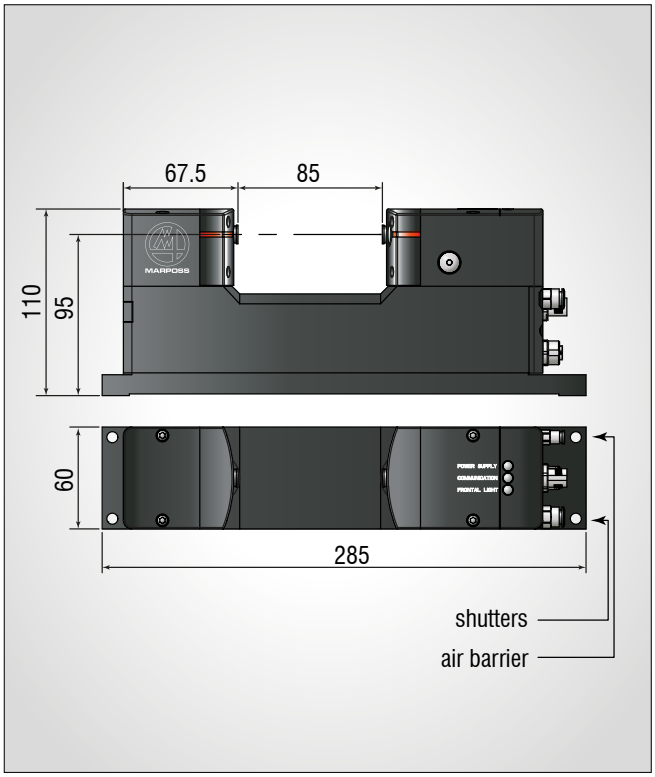


Type of actuation		Pneumatic	
DESCRIPTION OF THE DEVICE		Non-contact tool checks for CNC machines	
MEASURABLE DIAMETERS	*min*	10 µm	
	max	0.6 mm *double side*	40 mm *single side*
Resolution		0.1 µm	
Repeatability 6σ*		0.2 µm	
Weight		VTS-SU: approx. 2,58 kg	
WORKING TEMPERATURE		5 - 50° C	
RELATIVE HUMIDITY		90% max	
PROTECTION RATING *(IEC 60529)*		IP67	

(*) = The double side L and Ø values are guaranteed.
The single side L and Ø values depend on the machine.

VTS WF-85

The VTS WF 85 is the model designed specifically for applications on high precision turning centres and lathes. Thanks to the size of the framed range it can measure tools with a diameter up to 80 mm, for tools that are not completely framed and 2.9 mm for completely framed tools.



Type of actuation		Pneumatic	
DESCRIPTION OF THE DEVICE		No-contact tool checks for CNC machines	
MEASURABLE DIAMETERS	*min*	40 µm	
	max	2.9 mm *double side*	80 mm *single side*
Resolution		0.4 µm	
Repeatability 6σ*		0.8 µm	
Weight		VTS-SU: approx. 2.93 kg	
WORKING TEMPERATURE		5 - 50° C	
RELATIVE HUMIDITY		90% Max	
PROTECTION RATING *(IEC 60529)*		IP67	

(*) = The double side L and Ø values are guaranteed.
The single side L and Ø values depend on the machine.

System part numbers

Sensor & Elaboration Unit

35T0447S40	VTS-SU Small Field 45mm Compact
35T0447W20	VTS-SU Wide Field 85mm
8300090050	VTS-EU2 I.MX6Q+2GB+32GB PH 2X9 RDP

Accessories

29T0443050	Single air filter unit with 3 solenoid valves to mange shutters - tool cleaner - air barrier
29T0447009	VTS Lens cleaning kit
29T0447019	VTS shutter gaskets kit
20T0447018	Cable gland for Synchro VTS cable
20T0447019	Cable gland for Ethernet VTS cable
20T0447069	VTS gauge
Available on Request	VTS gauge slotted on shank
830MPSP006	Merlin Plus with Windows 10 for VTS
29T0449720	Air tool cleaner
10T0439794	Support for fixing blower on table
6871250050	Easy Box (to manage VTS without an ETH connection)

GUI, Bridge & Cycles

C092M1D00V	VTS Fanuc Bridge
C092M2B001	VTS Siemens OPC UA Bridge
C092M2B000	VTS Siemens OPC DA Bridge
C092M6D00V	VTS Heidhenain 530 Bridge
C092MCD00V	VTS Heidhenain 620/640 Bridge
C092MFD00V	VTS Okuma Bridge
C092MND00V	VTS Mitsubishi Bridge
C092M7D00V	VTS Mazak Bridge
C092MPD00V	VTS Sodick Bridge

Cycles

C092M1A00A	VTS Fanuc & Fanuc like (Mitsubishi) Macro
C092M2A00A	VTS Siemens Macro (OPC DA/UA)
C092M6A00A	VTS Heidhenain 530 Macro
C092MCA00A	VTS Heidhenain 620/640 Macro
C092MFA00A	VTS Okuma Macro
C092M1A01A	VTS Mazak Macro
C092MPA00A	VTS Sodick Macro

Licences

CMV9910000	Integrity Check Licence
CMV9920000	Edge File Licence
CMV9930000	Advanced Measurements Licence
CMV9940000	Chamfer Angle Licence

Cables

6739696586	RJ45-RJ45 5m ethernet extension
6739696535	RJ45-RJ45 10m ethernet extension
6739696536	RJ45-RJ45 15m ethernet extension
6739696598	VTS 5m straight connector ethernet extension
6739696538	VTS 10m straight connector ethernet extension
6739696539	VTS 15m straight connector ethernet extension
6739696557	VTS 30m straight connector ethernet extension
6739696540	VTS 10m 45° Left connector ethernet extension
6739696541	VTS 15m 45° Left connector ethernet extension
6739696717	VTS 20m 45° Left connector ethernet extension
6739696562	VTS 10m 45° Right connector ethernet extension
6739696563	VTS 15m 45° Right connector ethernet extension
6739698056	VTS 5m straight connector synchro extension
6739696542	VTS 10m straight connector synchro extension
6739696543	VTS 15m straight connector synchro extension
6739696544	VTS 10m 45° Left connector synchro extension
6739696545	VTS 15m 45° Left connector synchro extension
6739696718	VTS 20m 45° Left connector synchro extension
10T0447102	Sync & Ethernet cables metal protection 400mm
10T0439099	Metal sheath to protect air pipes / 1.5 metre cables

www.marposs.com

D6C08800G0 - Edition 01/2025 - Specifications are subject to modifications.
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VTS

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