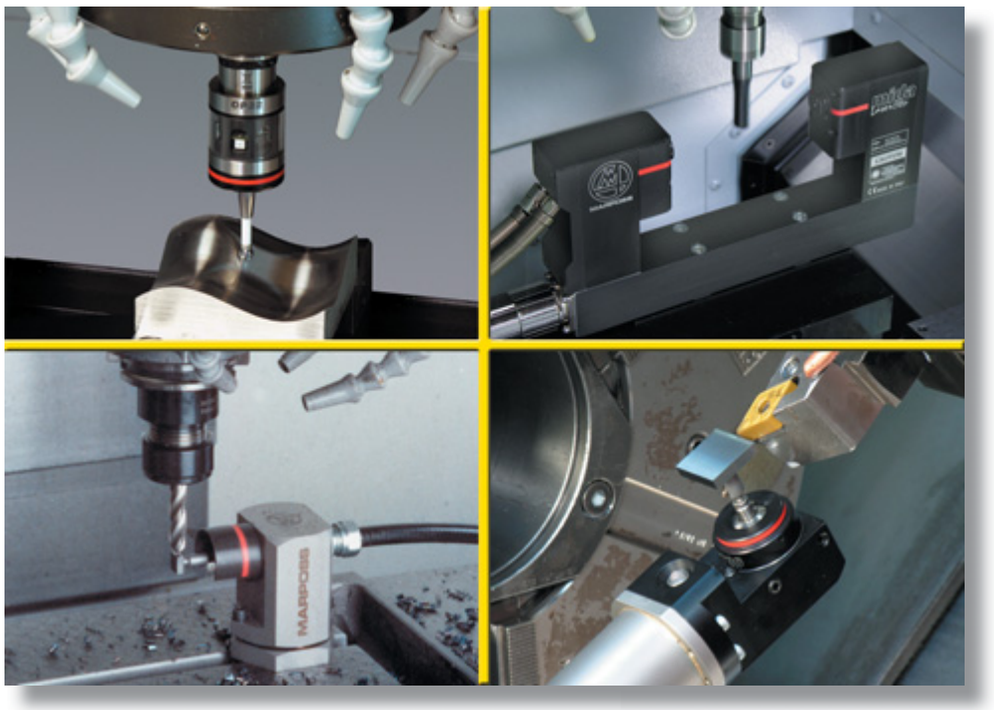
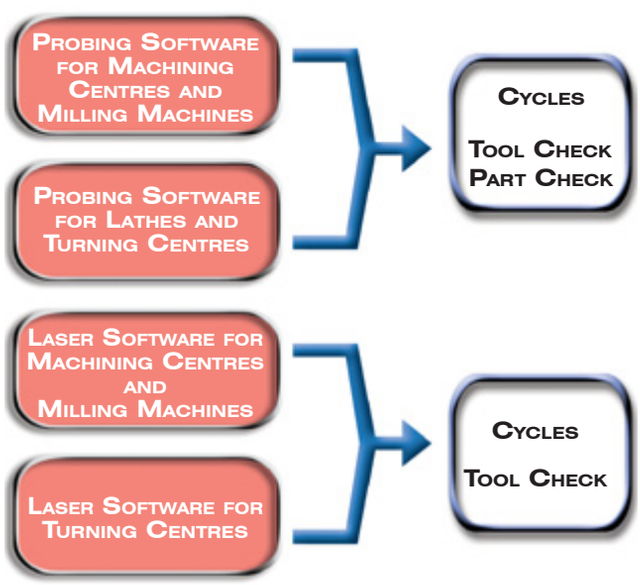
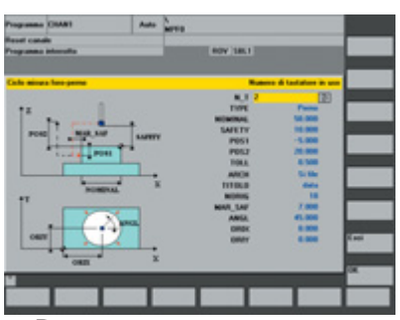
Mida software



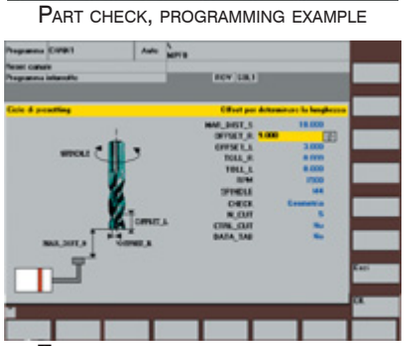
MEASUREMENT CYCLES FOR MACHINE TOOLS

Measurements and quality/process control on machine tools is becoming increasingly important to modern manufacturing companies. With this in mind, Marposs has developed new software packages for its contact and contactless probing systems. Mida software provides an easy way to effectively utilize your Mida part inspection probes, tool setting probes and laser systems, in a wide range of applications to boost your production quality and efficiency.
Measurement cycles are available for the following applications:





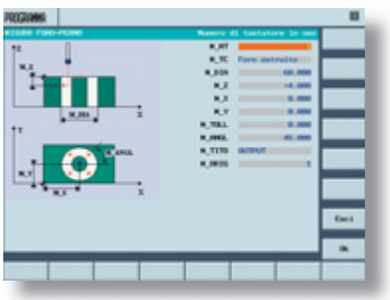
Part check, programming example



Tool check, programming example

PROBING SOFTWARE

The development of in-machine measurement involves increasingly accurate gauging of part position, dimensions and form of the finished piece, as well as the settings and checks carried out on tools used in the process.
The response to these requirements is a new range of software packages aimed at the machine tool market, for use in conjunction with our probes, on machining centres, milling machines, lathes and turning centres.
The part check cycles include a series of macros such as bore, boss, surface, corner, shoulder, pocket and stock measurements.
The tool check cycles enable the user to inspect the tool length, radius and axial integrity.



Part check, programming example

Tool check, programming example

Software for machining centres and milling machines

In order to satisfy the requirements of all machining centre and milling machine users, the part check probing software packages are available at three different levels:

- routine *Inspection Basic* designed to carry out basic alignment and measurement operations on simple geometrical elements
- routine *Inspection Premium* that includes flexible angular and vector cycles
- routine *Inspection Ultimate* designed to simplify complex measurements that would otherwise involve laborious calculations, such as orientating the probe in accordance with the three working planes

The below table lists features available at each level.

PART CHECK CYCLES

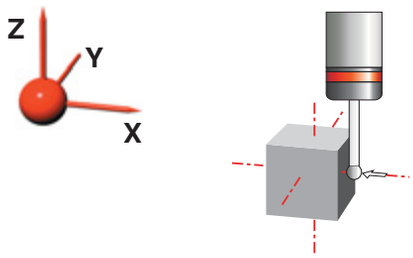
		LEVELS		
Ref.	***Measurement and calibration cycles***	***Inspection Basic***	***Inspection Premium***	***Inspection Ultimate***
	Protected probe positioning	■	■	■
1	Calibration cycle	■	■	■
2	Bore and boss measurements	■	■	■
3	Web and pocket measurements	■	■	■
4	Single surface measurement	■	■	■
5	Angle measurement on X/Y planes	■	■	■
6	Angle measurement on X/Z and Y/Z planes	–	■	■
7	Angled bore and boss measurements	–	■	■
8	Angled web and pocket measurements	–	■	■
9	Angled single surface measurement	–	■	■
10	Corner positioning	–	■	■
11	Corner position with co-ordinates rotation angle	–	–	■
12	2 bores/bosses measurement	–	–	■
13	3/4 bores/bosses measurement	–	–	■
14	Stock measurement	–	–	■
15	Aligning the probe for multiple-axis*	–	–	■
	Cycle call-up example	–	–	■

(*) = available only for Fanuc types CNCs or similar

INSPECTION BASIC

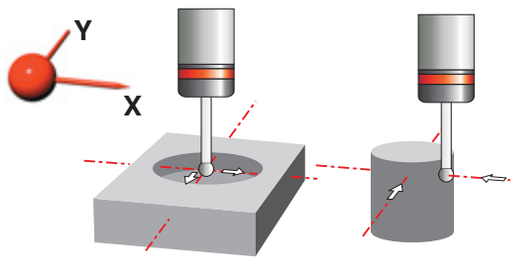
Protected probe positioning
This cycle positions the probe, rendering it sensitive to collisions with unforeseen obstacles.

Probe calibration cycle (1)
This cycle calibrates the probe with respect to a sample, determining the offset values with respect to the axes in use.



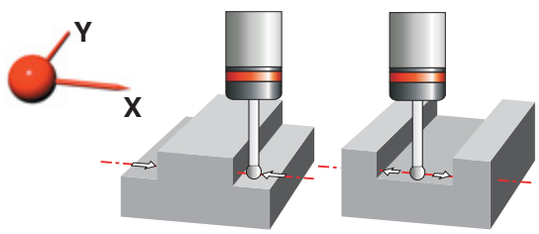
1

Bore and boss measurements (2)
This cycle is used to measure a bore, boss or internal diameter with an obstructed centre, with 5 or 6 touches and measurement axes parallel to the machine axes, in order to determine the X and Y centreline positions, and the diameter. The part origin may be set in X and Y in the centre of the measured diameter.
Alarm messages may be generated if the position or the dimensions are out of tolerance.



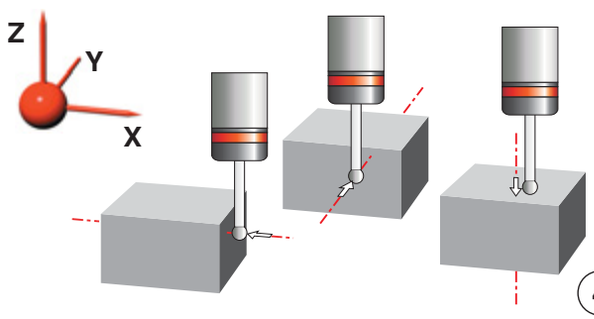
2

Web and pocket measurements (3)
This cycle is used to measure a web or a pocket, in order to determine the X and Y centre-line positions and the part size.
The tool compensation offset may be adjusted to correct the error with respect to the nominal size.
Alarm messages may be generated if the position or the dimensions are out of tolerance.



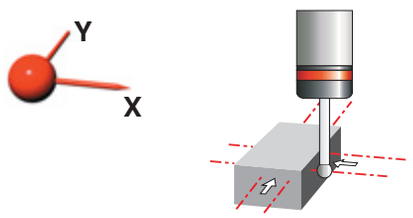
3

Single surface measurement (4)
These cycles are used to check the presence and the position of a part on the X, Y or Z axis. The tool compensation offset may be adjusted to correct the error with respect to the nominal size. The part origins may be on the X, Y or Z axis.
Alarm messages may be generated if the position or the dimensions are out of tolerance.



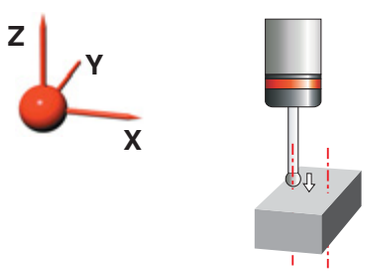
4

Angle measurement on X-Y plane (5)
This cycle is used to determine the tilt angle of the part surfaces on the X-Y axis using measurement axes parallel to the machine axes. It can be used to control the rotation of rotating axes.



5

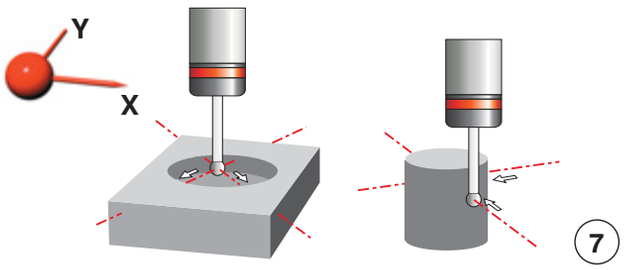
Angle measurement on X-Z and Y-Z planes (6)
This cycle is used to determine the tilt angle of the part surfaces on the X-Z and Y-Z axes using measurement axes parallel to the machine axes. It can be used to control the rotation of rotating axes.



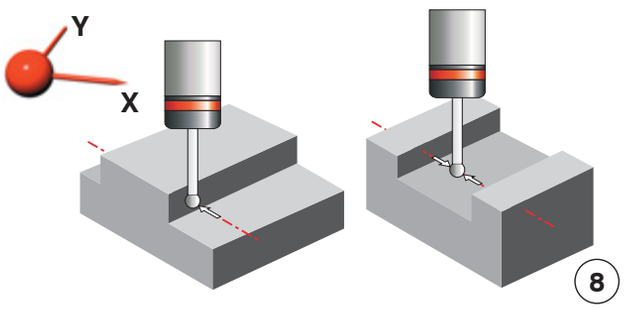
6

INSPECTION BASIC + PREMIUM

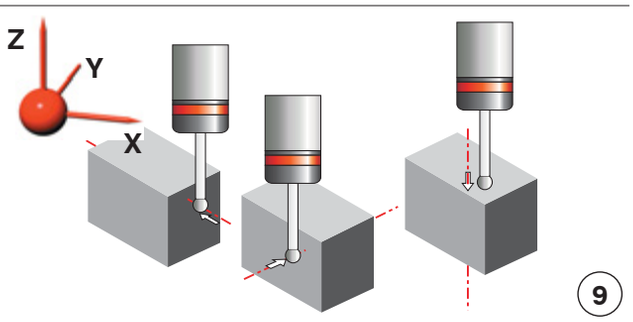
Angled bore and boss measurements (7)
The same as cycle #2, but with the measurement axes at an angle with respect to the machine axes.



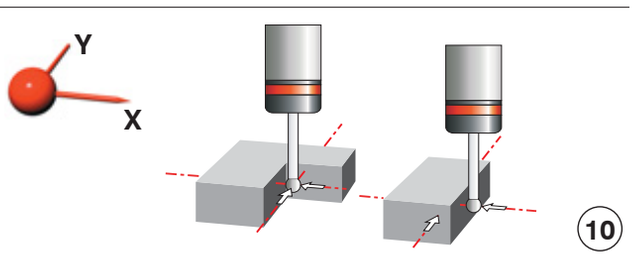
Angled web and pocket measurements (8)
The same as cycle #3, but with the measurement axes at an angle with respect to the machine axes.



Angled single surface measurement (9)
The same as cycle #4, but with the measurement axes at an angle with respect to the machine axes.

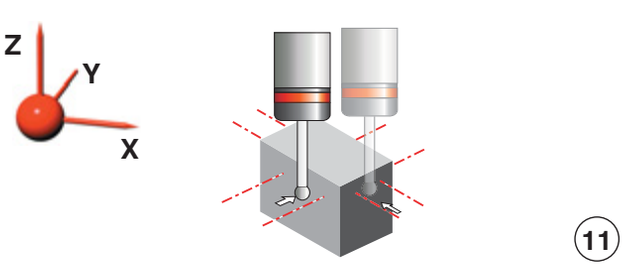


Corner positioning (10)
This cycle is used to determine the position of an internal or external corner. A part origin may be set in X and Y with reference to the position of the corner.
Alarm messages may be generated if the position is out of tolerance.

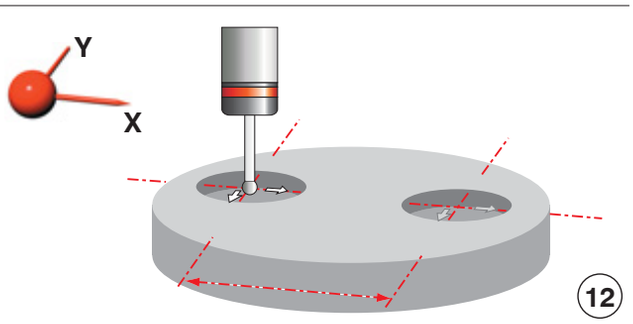


INSPECTION BASIC + PREMIUM + ULTIMATE

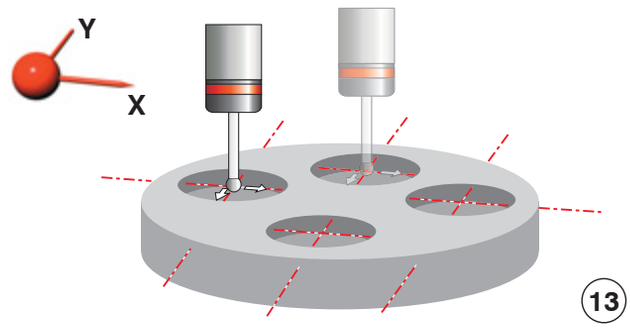
Corner position with co-ordinates rotation angle (11)
This cycle is used to determine the position of an external corner with the co-ordinates rotated with respect to the machine axes, and determines the tilt angle of the parts surfaces with respect to the X and Y axes. The part origins may be set up and/or compensated for in the working program for the part when rotated with respect to the machine axes.
Alarm messages may be generated if the position is out of tolerance.



2 bores/bosses centre distance measurement (12)
This cycle is used to measure the distance between the centre of two bores or bosses on the X-Y plane. The cycle calculates the position of the centre point between the two bores/bosses in X and Y and then sets it as the part origin, in addition, it calculates the direction of the axis that joins the two centres. It is possible to create and print a report.
Alarm messages may be generated if the position or the dimensions are out of tolerance.

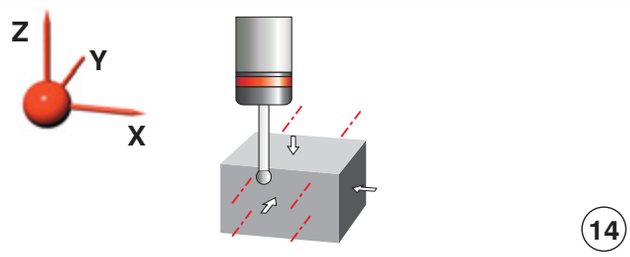


3/4 bores/bosses measurement (13)
This cycle is used to determine the centre position of 3/4 bores/bosses in X and Y, and can be used to set it as the part origin, it also calculates the radius of the circumference described by the bores/bosses. It is possible to create and print a report.
Alarm messages may be generated if the position or the dimensions are out of tolerance.



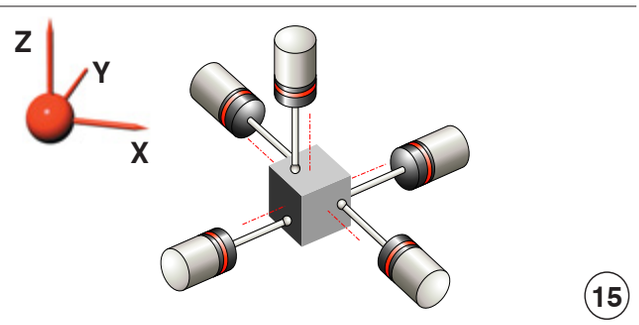
13

Stock measurement (14)
This cycle is used to calculate the maximum, minimum and average stock values on a surface along the measurement axis, and can set the minimum value as the part origin on the X-Y-Z axes. It is possible to create and print a report.
Alarm messages may be generated if the position or the dimensions are out of tolerance.



14

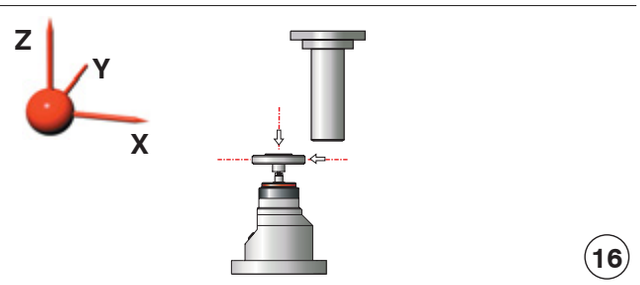
Aligning the probe for multiple-axis (15)
This cycle enables the system to measure adjacent geometrical elements (planes, bores and bosses) lying on the G17, G18 and G19 work planes with the probe aligned on these planes.



15

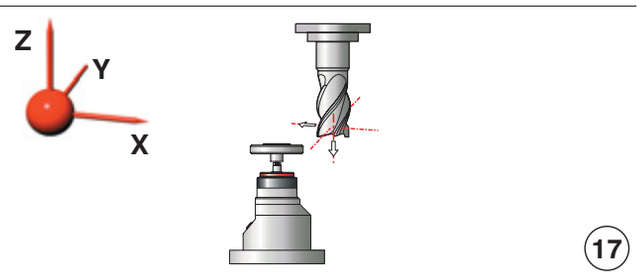
TOOL CHECK CYCLES

Probe calibration cycle (16)
This cycle calibrates the probe with respect to a sample, determining the offset values with respect to the axes in use.



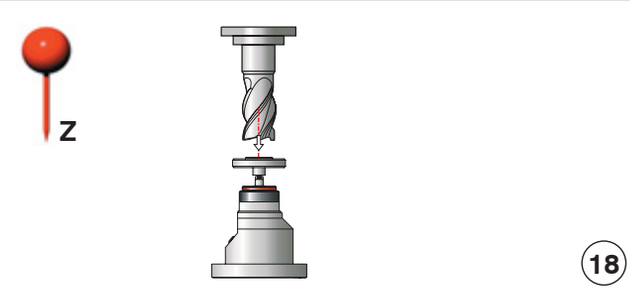
16

Tool length and radius measurement/check (17)
This cycle measures the tool axial and non-axial length and radius. It can be used to determine the dimensions of an unknown tool or check those of a previously measured one, and update the tool-table with the true value. It can carry out static measurements or on tools that are rotating.



17

Axial tool integrity check (18)
This cycle carries out a rapid tool length check along the spindle axis, even in the presence of coolant, and updates the tool table. It can carry out static measurements or on tools that are rotating.



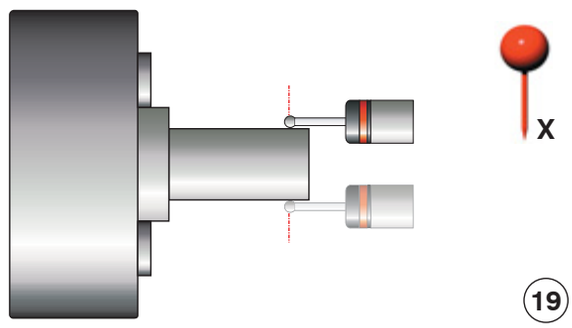
18

Lathe software

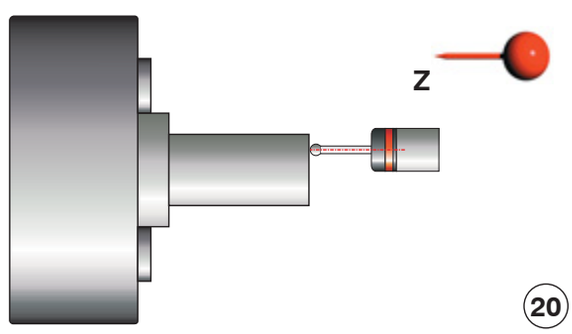
PART CHECK CYCLES

Protected positioning cycle
This cycle is used to position the probe prior to calling up the measurement cycle. The movement may be performed on the X or Z axis, or both axes simultaneously. All movements are protected. In the event of a collision an alarm is generated.

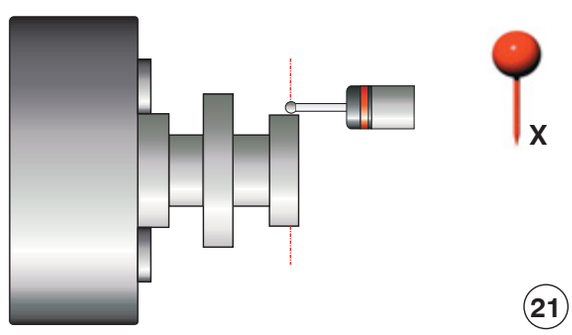
X axis calibration cycle (19)
This cycle calibrates the probe with respect to a sample along the X axis. This calibration may be either single (touching a single point on the circumference) or double (touching two diametrically opposite points). The calibration can carried out on either an internal or an external diameter.



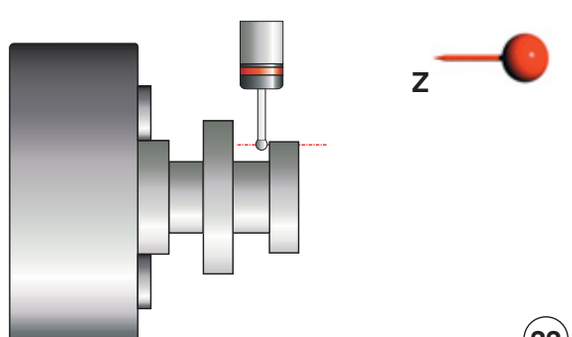
Z axis calibration cycle (20)
This cycle calibrates the probe with respect to a sample along the Z axis. This calibration may be either single or double, touching the sides of a shaft or a rib.



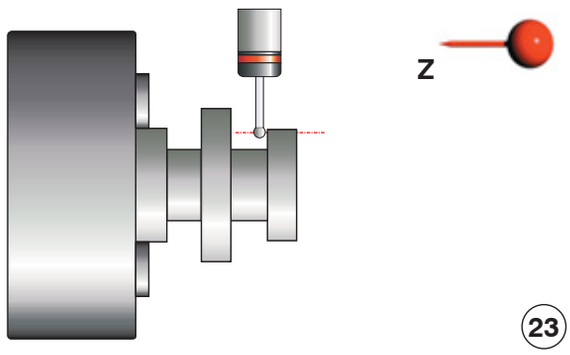
X axis single touch measurement cycle (21)
This cycle measures one side of the part along the X axis by carrying out a single touch; it can be used to offset the X dimension in the tool table. A tolerance check may be included.



Z axis single touch measurement cycle (22)
This cycle measures one side of the part along the Z axis by carrying out a single touch; it can be used to offset the Z dimension in the tool table.

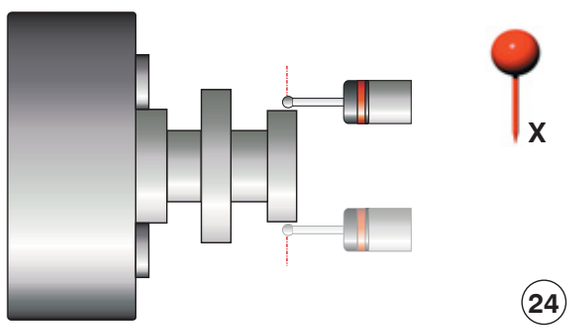


Z axis rib and groove measurement cycle (23)
This cycle measures the dimensions of ribs and grooves by carrying out two touches along the Z axis; it can be used to offset the Z dimension in the tool table.



23

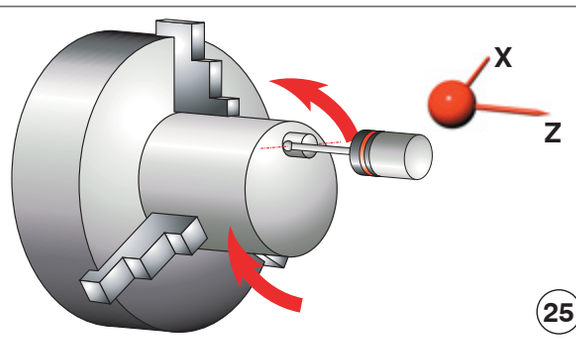
Diameter measurement cycle (24)
This cycle measures external and internal diameters by carrying out two touches on the X axis; it can be used to offset the Z dimension in the tool table.



24

Web/pocket, bore/boss measurements (25)*
This cycle measures web and pocket dimensions along the Z axis and bore and boss measurements by rotating the chuck. An indexable chuck is required.

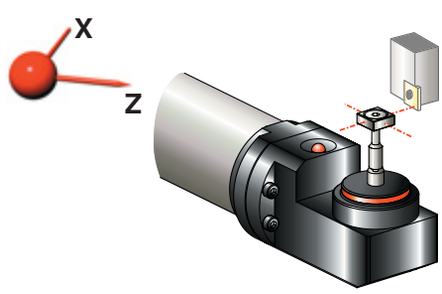
(*) = available only for Fanuc types CNCs or similar



25

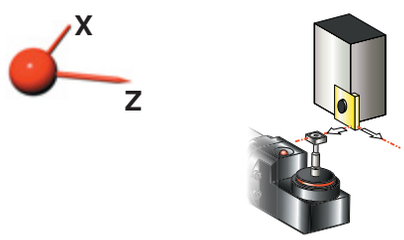
TOOL CHECK CYCLES

Probe calibration cycle (26)
This cycle is used to acquire the position of the four sides of the stylus cube, with respect to a known tool or a sample.



26

Tool measurement (27)
This cycle is used to determine the X and/or Z tool offsets.



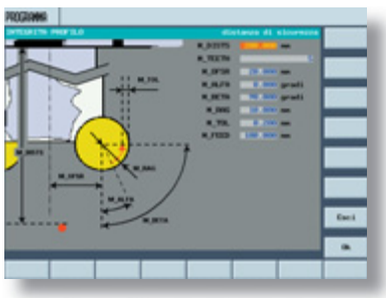
27

LASER SOFTWARE

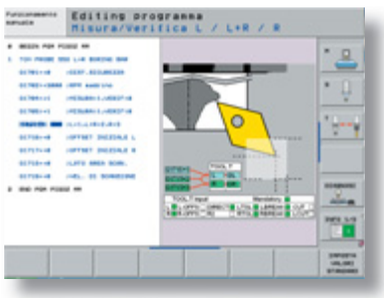
To satisfy the growing demand to “measure tools in the machine” using laser devices, Marposs has developed a complete library of tool measurement software packages for the Mida Laser systems.
Mida Laser enables the user to measure the tool whilst mounted in the machine spindle and rotating at normal working speeds.
The tool check cycles can perform the following:

- Tool identification
- Tool breakage check
- Tool length and radius measurements
- Boring bar length and radius measurements
- Automatic tool table updating
- Cutting profile integrity check
- Measuring and updating the cutting radius and identifying a worn sector
- Machine axes thermal drift compensation

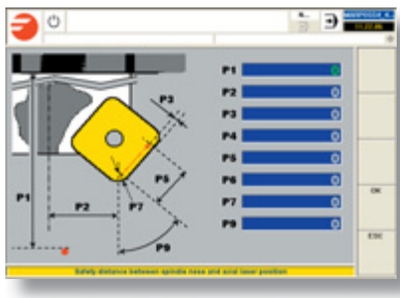
Tools can be measured several times during the machining cycle in order to check for wear at regular intervals. Tool condition is checked against tolerance values defined by the operator.
All measurements are carried out while the tool is rotating.



Siemens SW programming example



Heidenhain SW programming example

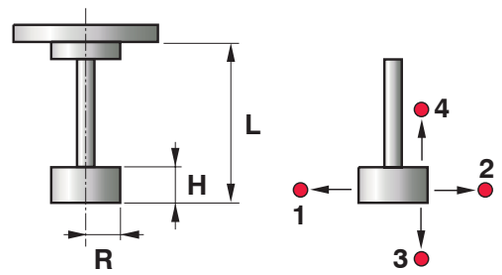


Fagor SW programming example

Common cycles for machining centres, milling machines and turning centres

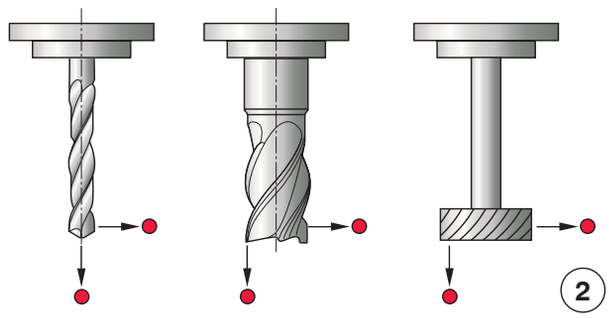
Ref.	Measurement and calibration cycles	Milling machines Machining centres	Turning centres
1	Mida Laser calibration cycle	■	■
2	Concentric and non-concentric tool length and radius measurements	■	■
3	Checking the integrity of single tool cutting edges at a point or on a straight profile	■	■
4	Checking the integrity of single tool cutting edges on a complex profile	■	■
5	Checking the tool circular sector	■	■
6	Checking the tool for axial breakage	■	■
7	Pre-setting disk mills	■	■
8	Compensation for axes thermal drift	■	■
9	Boring bar length and radius measurements	■	■
10	Drip rejection axial tool breakage check	■	■
11	Pre-setting standard turning tools	—	■
12	Pre-setting neutral turning or threading tools	—	■
13	Pre-setting turning tools for ribs and grooves	—	■

Mida Laser calibration (1)
This cycle is used to determine the exact position of the laser beam in machine co-ordinates, using a sample whose dimensions are known; the L and R values are inserted in the tool table, while the H value is inserted in the configuration program.
The calibration cycle performs the four touches required to obtain the position and the dimensions of the laser beam and writes the results to variables that will be used to measure the tools.

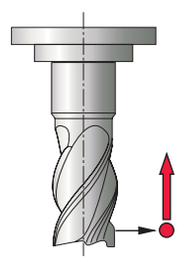


1

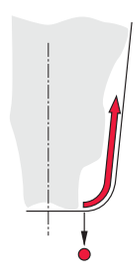
Axial and non-axial tool length and radius measurements (2)
This cycle measures the tool axial and non axial length and radius. It can be used to determine the dimensions of an unknown tool or check those of a previously measured one, and update the tool-table with the true value.


2

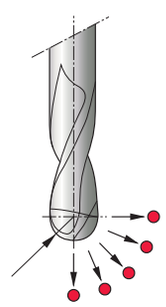
Checking the integrity of single tool cutting edges at a point or on a straight profile (3)
This cycle checks that each individual tool cutting edge is intact and undamaged either at a single point or along a straight profile while the tool is rotating.
Alarm messages may be generated if the cutting edges are out of tolerance.


3

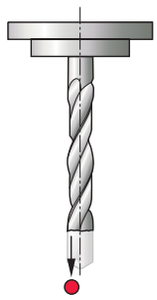
Checking the integrity of single tool cutting edges on a complex profile (4)
The same as cycle #3, but the operator may program an additional circular movement, and tilt the straight scanning profile.


4

Checking the tool circular sector (5)
This cycle checks the form of the tool in order to determine the error with respect to the theoretical form by measuring the radius of the tool cutting edges at various points.
Alarm messages may be generated if the cutting edges are out of tolerance. In addition, the cycle can also indicate the worn sector on the arc of the cutting edge circumference.

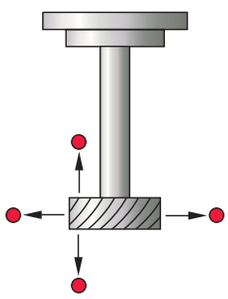

5

Checking the tool for axial breakage (6)
This cycle carries out a rapid tool length check along the spindle axis, even in the presence of coolant. Alarm messages may be generated if the length is out of tolerance.



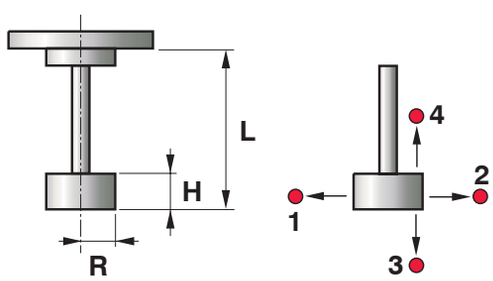
6

Pre-setting disk mills (7)
This cycle measures the length, radius and thickness of a disk mill.
Alarm messages may be generated if the measurement is out of tolerance.



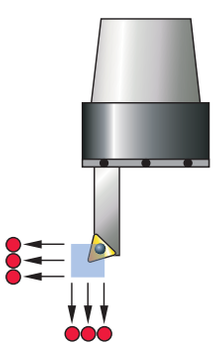
7

Axes thermal drift compensation (8)
This cycle determines the thermal drift along the machine axes, and the displacement with respect to the laser beam.



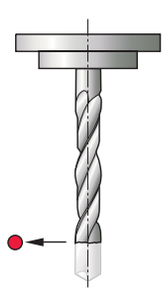
8

Boring bar measurement (9)
This cycle measures the length and radius of boring bar by scanning a pre-defined area.



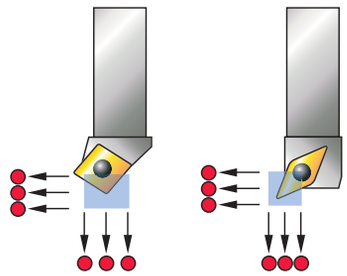
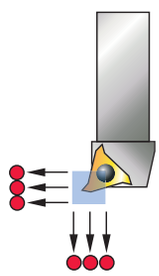
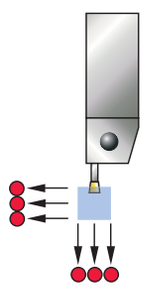
9

"Passing" axial tool breakage check (10)
This cycle carries out a rapid tool length check by passing through the laser beam, even in the presence of coolant. Alarm messages may be generated if the length is out of tolerance.



10

Dedicated turning centre cycles

Pre-setting standard turning tools (11) This cycle measures the length and radius/diameter of standard turning tools by scanning a pre-defined area.	 11
Pre-setting neutral turning or threading tools (12) This cycle measures the length and radius/diameter of neutral turning or threading tools by scanning a pre-defined area.	 12
Pre-setting turning tools for ribs and grooves (13) This cycle measures the length and radius/diameter of turning tools for ribs and grooves by scanning a pre-defined area.	 13

Mida probing software part numbers

Machine tool	Application	Numerical Control	Levels	Part N°.	Memory (kB)[2]
Machining centres and milling machines	Part check	Fanuc & similar[1]	Inspection Basic	C092*1200C	45,4
			Inspection Premium	C092*1200B	60,0
			Inspection Ultimate	C092*1200A	100,2
		Siemens 840DI-828D-840D-810D	Inspection Premium	C092*2200B	42,8
			Inspection Ultimate	C092*2200A	57,0
		Siemens 802D	Inspection Premium	C092*3200B	14,0
		Siemens 840C	Inspection Basic	C092*4200C	10,2
		Mazatrol	Inspection Ultimate	C092*7200A	100,1
		Selca 3000-4000	Inspection Basic	C092*A200A	19,6
		Okuma	Inspection Basic	C092*F200A	23,1
	Tool check	Fanuc & similar[1]		C092*1100A	19,9
		Siemens 840DI-828D-840D-810D		C092*2100A	15,0
		Siemens 802D		C092*3100A	13,6
		Mazatrol		C092*7100A	19,1
Lathes and turning centres	Part check	Fanuc & similar[1]		C092*1500A	25,8
		Siemens 840DI-828D-840D-810D		C092*2500A	18,6
		Siemens 802D		C092*3500A	19,1
		Siemens 840C		C092*4500A	6,0
		Mazatrol		C092*7500A	25,7
		Okuma		C092*F500A	8,0
	Tool check	Fanuc & similar[1]		C092*1400A	12,1
		Siemens 840DI-828D-840D-810D		C092*2400A	21,4
		Siemens 802D		C092*3400A	19,7
		Mazatrol		C092*7400A	12,1

Mida laser software part numbers

Machine tool	Application	Numerical Control	Part N°.	Memory (kB)
Machining centres and milling machines	Tool check	Fanuc & similar[1]	C092*1300A	83,2
		Siemens 840DI-828D-840D-810D	C092*2300A	107,0
		Siemens 802D	C092*3300A	101,0
		Heidenhain iTNC 530	C092*6300A	174,0
		Heidenhain iTNC 426-430	C092*5300A	148,0
		Heidenhain iTNC 620	C092*G300A	123,0
		Fagor 8070	C092*9300A	123,0
		Fagor 8050-8055	C092*8300A	28,7
		Selca 3000-4000	C092*A300A	110,0
		D.Electron Z32	C092*B300A	146,0
		ECS WIN Series	C092*C300A	12,6
		Mazatrol	C092*7300A	82,8
		Okuma	C092*F300A	101,0
Turning centres		Fanuc & similar[1]	C092*1600A	118,0
		Siemens 840DI-828D-840D-810D	C092*2600A	145,0
		Mazatrol	C092*7600A	118,0

*N.B.: * represents a letter used to indicate the operator manual language, as follows: I (Italian), G (English), F (French), E (Spanish)*
(1) = Brother, Haas, Makino, Mitsubishi, Yasnac
(2) = 1 kB of memory corresponds to approximately 2.5 metres of tape

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