TO CALIBRATE THE RENISHAW
PROBE FOR USE IN MAZATROL

MOUNT A PIECE OF MATERIAL IN THE
MACHINE, AND TAKE A LIGHT CUT WITH
A TOOL THAT WAS MEASURED ON THE
T. L. M. (TOOL LENGTH MEASUREMENT)
POST. AS YOU ARE MAKING THIS
LIGHT CUT, WRITE DOWN THE
MACHINE POSITION FOR THE
Z AXIS. (MACHINE POSITION IS SHOWN
ON THE COMMAND PAGE.)

NOW, GO "HOME" AND CALL FOR THE
PROBE WITH A TOOL CHANGE,

IN HANDLE MODE, TOUCH THE PROBE
TO THE MACHINED AREA FROM THE
FIRST STEP ABOVE. MOVE THE LAST
FEW THOUSANDTHS OF AN INCH IN Z
ONE TEN THOUSANDTH AT A TIME, IN
HANDLE X1 (0.0001") MODE. WHEN
THE PROBE TOUCHS AND "BEEPS",
WRITE DOWN THE Z AXIS
MACHINE POSITION.

NOW SEND THE MACHINE HOME

FIGURE OUT THE DIFFERENCE IN LENGTH BETWEEN THE PROBE AND THE TOOL USED TO CUT THE REFERENCE SURFACE

MACHINE POSITION WHILE CUTTING: -25.99

MACHINE POSITION WHEN PROBE TOUCHED: -21.81

DIFFERENCE IN LENGTH BETWEEN THEM: 4.18

GO TO TOOL DATA, AND LOOK FOR THE LENGTH OF THE CUTTING TOOL IF THE PROBE IS LONGER THAN THIS TOOL*, ADD THE DIFFERENCE FROM THE STEP ABOVE TO THE CUTTING TOOL'S LENGTH TO FIND THE LENGTH OF THE PROBE.

LENGTH OF CUTTING TOOL: 4.951

DIFFERENCE FROM ABOVE: 4.1837

LENGTH OF PROBE ——> 9.1347

ENTER THIS NUMBER IN THE TOOL DATA FOR THE "LENGTH FROM GAUGE LINE" QUESTION FOR THE PROBE.

* (IF THE PROBE IS SHORTER, SUBTRACT, BUT THIS IS VERY RARE)

PROBE CALIBRATION CONTINUED.....

NOW, MOUNT A RING GAUGE OF KNOWN
SIZE ON THE MACHINE SO THAT
THE HOLE FACES THE SPINDLE.
(ON A VERTICAL MACHINE, CLAMP
THE RING TO THE TABLE. ON A
HORIZONTAL MACHINE, YOU'LL HAVE
TO MOUNT THE RING ON AN ANGLE
PLATE OR "TOMBSTONE".

MOUNT A _VERY_ ACCURATE DIAL
INDICATOR IN THE SPINDLE, AND
LOCATE THE CENTER OF THE
RING GAUGE. WHEN THE INDICATOR
READS ZERO ALL AROUND, WRITE
DOWN THE X & Y MACHINE POSITION
FROM THE COMMAND PAGE.
SEND THE MACHINE HOME AND LOCK
UP YOUR INDICATOR BEFORE SOME
BODY BREAKS IT.

NOW WE HAVE TO WRITE A
PROGRAM TO CALIBRATE THE
PROBE IN X & Y.

THE COMMON UNIT (FIRST UNIT)
OF THE PROGRAM CAN BE AS
SHOWN BELOW:

UNO 0

MATERIAL (ANYTHING)	INITIAL z	ATC	MULTIMODE
	2	0	OFF

UNO 1

	ADD.	X	Y	θ	Z	4
WPC-0		x	y	0	z	0

THE WPC UNIT SHOULD HAVE THE
X & Y COORDINATES FOR THE CENTER
OF THE RING GAUGE ENTERED. TEACH
THE TOP OF THE RING GAUGE AS
THE Z VALUE, THE SAME AS FOR
ANY PROGRAM. NOW WE PROGRAM
THE MMS CALIBRATE UNIT.

UNO 2

MMS	TOOL T. SENS.	NOM DIA 0.2	U. SKIP 0	$

SNO	PTN	X	Y	Z	4	R	D/L	K
1	CAL	0	0	-.3	0	*	*	.2

*FOR D/L, ENTER THE VALUE OFF
THE RING GAUGE FOR ITS DIAMETER.
THEN, END THE PROGRAM.

UNO 3

END	CONTI	NUMBER
	0	0

NOW, RUN THE PROGRAM. IT
WILL AUTOMATICALLY CALIBRATE
THE PROBE. YOU CAN RUN THE
PROGRAM IN SINGLE BLOCK AND
WITH THE RAPID FEEDRATE
REDUCED IF YOU WANT.

YOU ONLY HAVE TO CALIBRATE
THE PROBE WHEN IT IS NEW,
OR AFTER YOU DROP IT, ADJUST IT,
OR CHANGE THE STYLUS. IF
YOU PUT THE PROBE ON A DIFFERENT
MACHINE, YOU HAVE TO RE-CALIBRATE
IT. IF YOU PUT A DIFFERENT
PROBE ON A MACHINE YOU HAVE
TO RECALIBRATE IT.

Mazak

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TELEFAX

Total 3 pages. 1

DATE: _____

HARTFORD SERVICE

TO: _____

FROM: MIKE SHINDO

## 4-11-3 Measurement of length of feeler tool

Feeler = Touch Probe

It is necessary to measure the length of the feeler tool in order to enter the data into the LENGTH item on the TOOL DATA display.

This section describes the tool length measurement in manual mode using the TEACH function on the TOOL DATA display.

(Start)

This is Z (Length of touch probe) measurement.

1 ☞ Mount the feeler on the spindle.

2 ☞ In manual mode, move the axes in order to bring the feeler stylus from a point above the reference block or from a workpiece of which the height is determined.

3 ☞ In HANDWHEEL mode, slowly move the Z axis until the contact light goes on (SENSOR TOUCH LED) on the control panel.
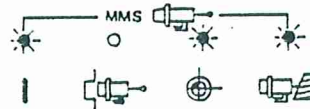
4 ☞ Call up the TOOL DATA display.
  • The screen displays the following menu.

DRUM NO.	TEACH	T-DATA MOVE	INCR.	TOOL ASSIGN		TOOL SEARCH	PREVIOUS PAGE	NEXT PAGE

5 ☞ Press the │TEACH│ menu key.
  • The cursor appears under the feeler LENGTH item (tool length).

6 ☞ Enter the height of the reference block or of the workpiece by means of numerical keys.
  • The NC equipment calculates the length of the feeler and the value thus obtained is automatically entered in the LENGTH item.
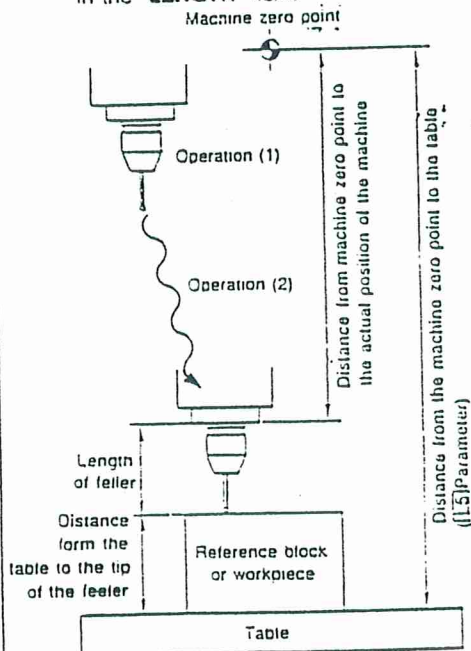
Since the NC equipment memorizes the actual position of the machine, the length of the tool is automatically calculated if the height of the reference block or of the workpiece is specified (Distance from the table to the feeler probe).

Calibration procedure

for M 32

(End)

4-11-4 Feeler calibration measurement

The calibration measurement function serves to automatically record the parameters as measurement correction values. true values of the stylus. including the main measurement errors such as the alignment deviation of the axes. the stylus and the tool tail (on X.Y). the functional clearance. the inertia feed of the machine itself. etc.
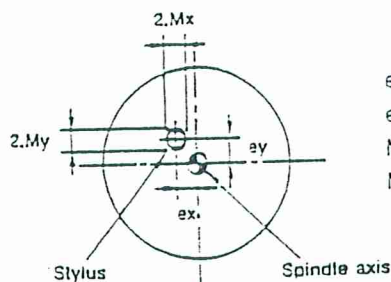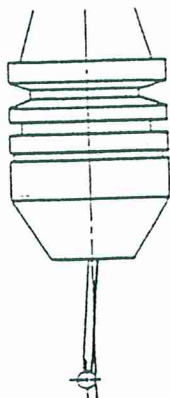
ex: Alignment deviation correction value on X axis
ey: Alignment deviation correction value on Y axis
Mx: Stylus correction value on X axis
My: Stylus correction value on Y axis

Start

1 ☞ Prepare a reference block having a reference hole (ø 2 to ø 4 inchs)

2 ☞ Measure the inside diameter of the reference hole.
 • It must be correctly measured to within 0.0002 by means of a dial type comparator for measuring cylindricity.
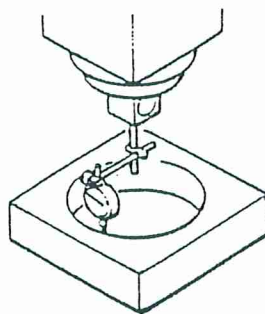
3 ☞ Move the spindle to the coordinates of the center of the reference hole. (Perform the alignment operating.
 The pivoting of the lever type tester shall be less than 4 μ).
 Note:
 The precision of all measurements depends on the precision of this alignment.

4 ☞ Prepare the calibration measurement program.
 • The same as for the general measurement program. press the |CAL| menu key, then prepare the program.

5 ☞ Enter the coordinates of the center of the spindle in the X and Y columns of the WPC unit by using the
 WPC SEARCH and TEACH menu keys on the COORDINATES MEASUREMENT of the PROGRAM
 display.

6 ☞ Mount the feeler on the spindle.

7 ☞ In manual mode. move the axes in order to place the stylus of the feeler in contact with top of the workpiece having the machined reference hole.
 • Move the Z axis slowly until the contact light (SENSOR TOUCH LED) lights.
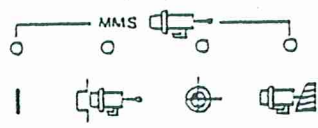
8 ☞ Enter the Z coordinate of the spindle in the Z column of the WPC unit using the **WPC SEARCH** and **TEACH** menu keys on the COORDINATES MEASUREMENT display.

9 ☞ Press the MEMORY key and start the calibration measurement program, which causes the measurement → ATC (return to magazine) of the feeler.

10 ☞ Thus. each one of the correction data is automatically entered in the parameters (L1 to L4).

(End)

Example of calibration measurement program

UNO	MAT	INITIAL-Z	ATC MODE	MULTI-MODE	MULTI-FLAG	PITCH-X	PITCH-Y		
0	CST IRN	50.	0	OFF					
UNO	UNIT	X	Y	θ	Z	4			
1	WPC-0	①	①	0	②	0			
UNO	UNIT	TOOL	NOM-ø	NO.	U.SKIP				
2	MMS	T.SENS	5	.	0				
SNO	PTN	X	Y	Z	4	R	D/L	K	
1	CAL	③	③	④	0	◆	⑤	⑥	
UNO	UNIT	CONTI.	NUMBER						
3 .	END	0	0						

MUST BE CAL to CAL

①	X, Y	Specifies the X and Y coordinates of the workpiece zero point (Basic coordinates) in the machine coordinate system. • Value of the coordinates of the center of the reference hole entered by operation 4 .
②	Z	Specifies the Z coordinate of the workpiece zero point (Basic coordinates) in the machine coordinates system. • Value of the coordinates of the top of the reference hole. entered by operation 7 .
③	X, Y	Specifies the coordinates of the center of the hole from the workpiece zero point (Basic coordinates). • In this example. 0 because the workpiece zero point = the center of the reference hole.
④	Z	Specifies the depth to which the stylus is inserted in the reference hole in order to make the measurement. Usually $Z - 0.2$
⑤	D/L	Specifies the measurement value of the inside diameter of the reference hole. • Value of inside diameter of the reference hole. measured by operation 2 .
⑥	K	Feed distance at skip speed (K = 2 to 5)

Notes

1: These correction values are essential data for ensuring the correction of the system by the feeler. The precision of other measurements are influenced by the precision of the positioning of the machine itself and of this calibration measurement.

2: The calibration measurement is not necessary for each correction of the coordinates system. but it must obligatorily be made when the feeler is used for the first time or when the stylus is replaced by a new one.