

# MORBIDELLI TRAINING CENTER

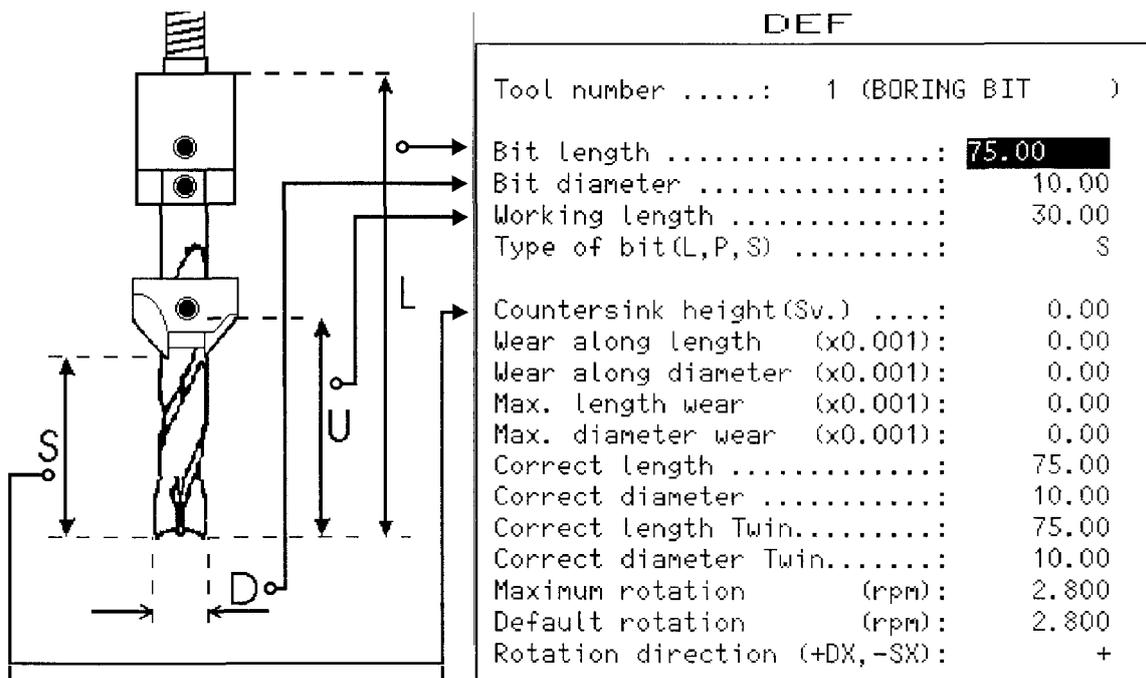
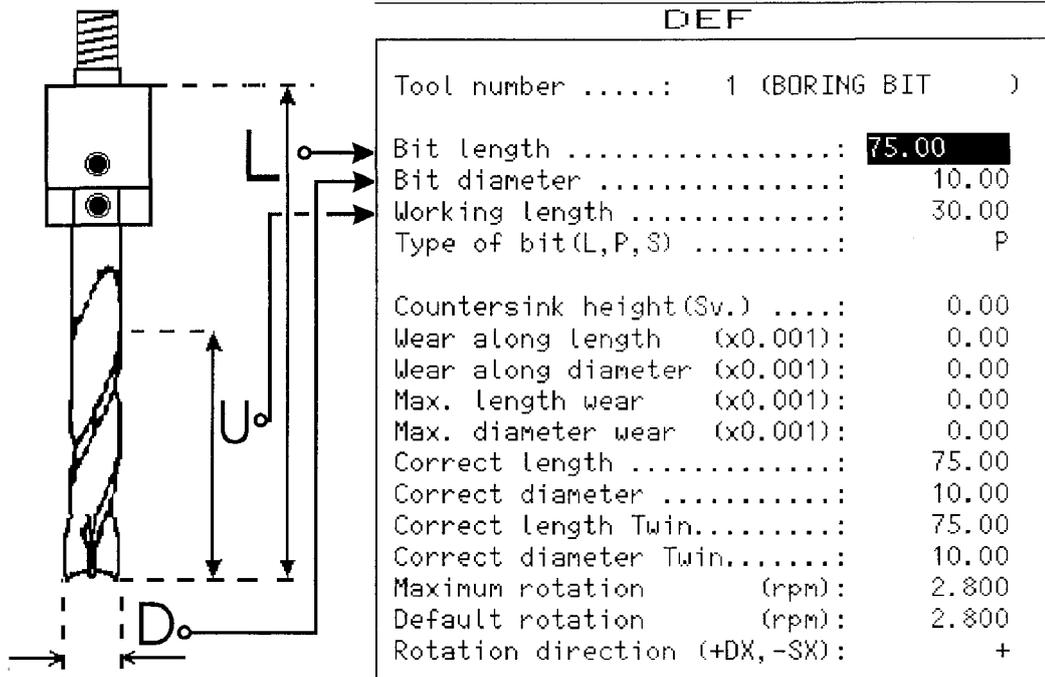
## TOOLING

We will now briefly explain the **TOOLING** data.

Tooling data is a list of parameters in table form (**DEF**); the table shows all the information about the tools fitted to the machine (spindle by spindle).

When you edit the **DEF** table the drill or cutter parameters will be measured as shown in the figures below. (figures report the release 3.xx).

**For detailed information, see the section TOOLING EDITOR.**

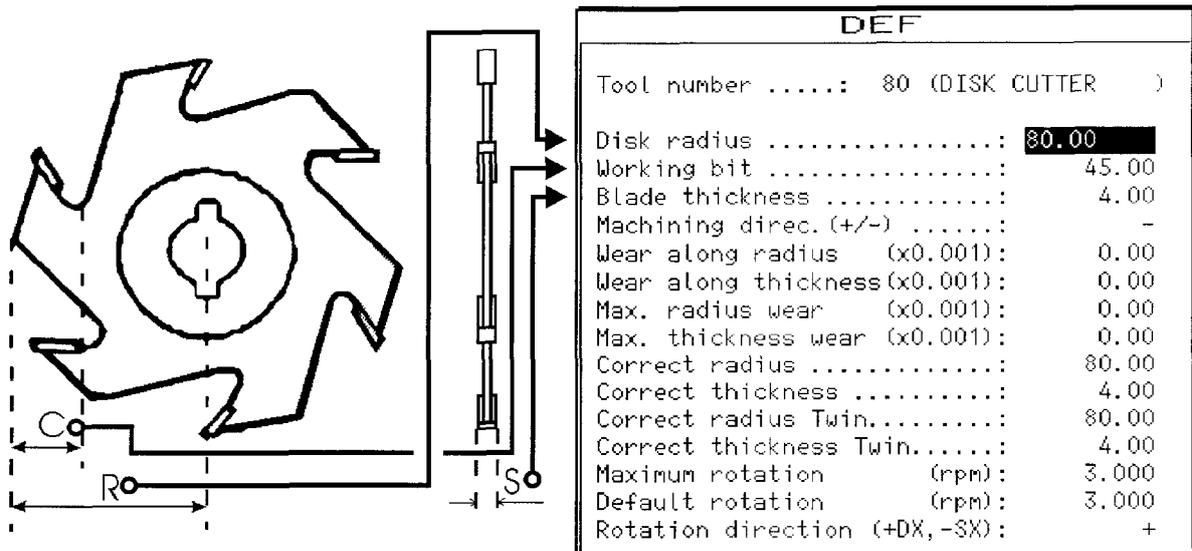


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| DEF                            |                 |
|--------------------------------|-----------------|
| Tool number .....              | 1 (BORING BIT ) |
| Bit length .....               | <b>75.00</b>    |
| Bit diameter .....             | 10.00           |
| Working length .....           | 30.00           |
| Type of bit (L,P,S) .....      | L               |
| Countersink height (Sv.) ..... | 0.00            |
| Wear along length (x0.001):    | 0.00            |
| Wear along diameter (x0.001):  | 0.00            |
| Max. length wear (x0.001):     | 0.00            |
| Max. diameter wear (x0.001):   | 0.00            |
| Correct length .....           | 75.00           |
| Correct diameter .....         | 10.00           |
| Correct length Twin.....       | 75.00           |
| Correct diameter Twin.....     | 10.00           |
| Maximum rotation (rpm):        | 2.800           |
| Default rotation (rpm):        | 2.800           |
| Rotation direction (+DX,-SX):  | +               |

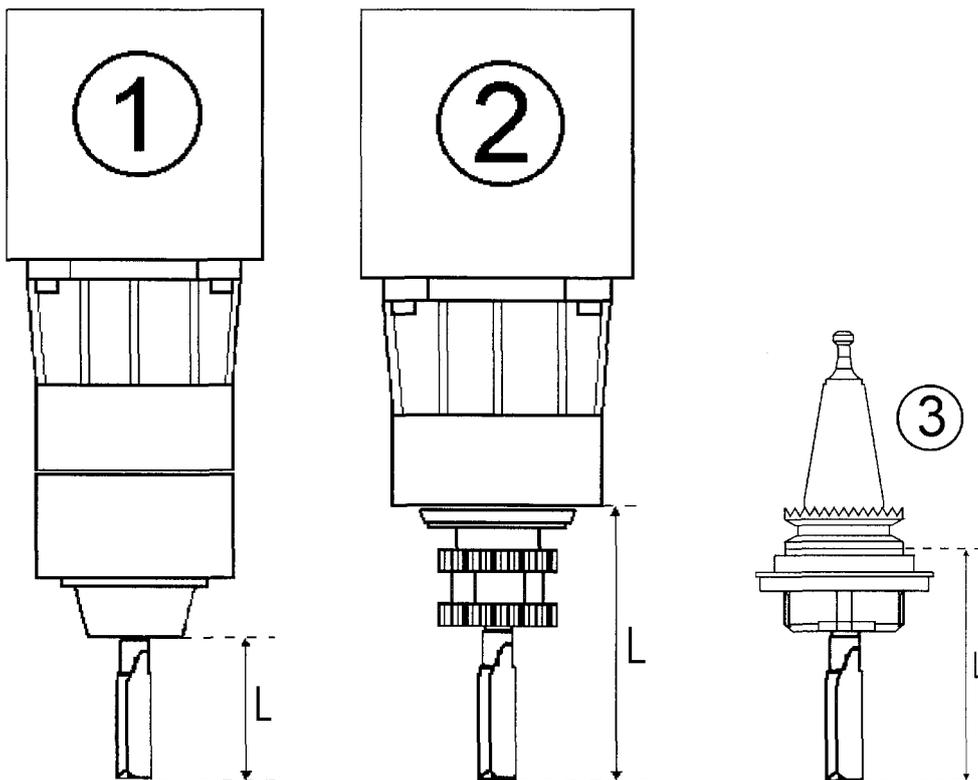
| DEF                           |                     |
|-------------------------------|---------------------|
| Tool number .....             | E 1 (FLUTED DRILL ) |
| Cutter length .....           | <b>102.00</b>       |
| Cutter diameter .....         | 10.00               |
| Working length .....          | 100.00              |
| Wear along length (x0.001):   | 0.00                |
| Wear along diameter (x0.001): | 0.00                |
| Max. length wear (x0.001):    | 0.00                |
| Max. diameter wear (x0.001):  | 0.00                |
| Correct length .....          | 102.00              |
| Correct diameter .....        | 10.00               |
| Correct length Twin.....      | 102.00              |
| Correct diameter Twin.....    | 10.00               |
| Maximum rotation (rpm):       | 16.000              |
| Default rotation (rpm):       | 10.000              |
| Rotation direction (+DX,-SX): | +                   |

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The tool lengths (L) for the various types of tool fitting used are measured as follows

- ① **LEUCO** at the end of the spindle
- ② **MORSE CONE** at the ground clamp of the motor
- ③ **ISO 30 WITH PLATE** on the ground section at the JOINT between the ALUMINIUM plate and the tapered ISO 30 fitting in steel.



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## TOOL MAGAZINE

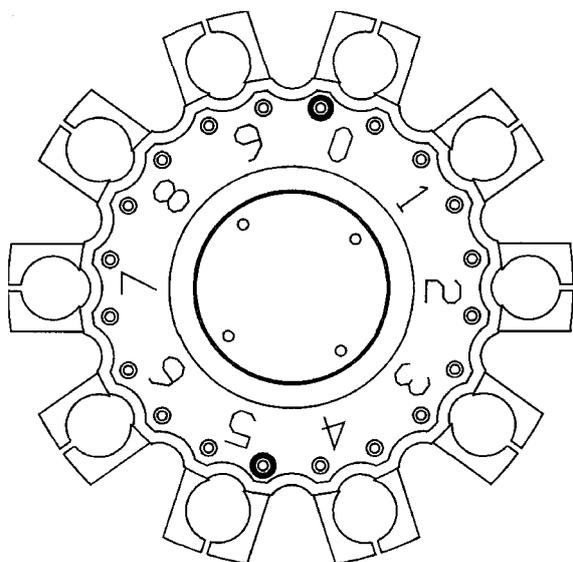
Machines with the tool change function are fitted with one of two types of tool magazine depending on machine type.

**Side-mounted magazine:** this is a tool holder pallet supplied by MORBIDELLI; magazine configuration varies with machine version.

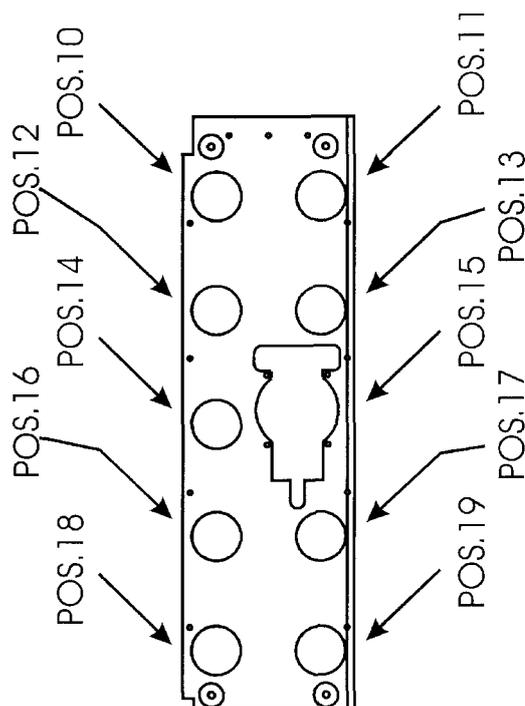
This type of magazine is for all machines with a side tool changer.

**Rotary magazine :** this is a wheel type magazine with 10 tool holders.

This type of magazine is fitted to AUTHOR 510 and RAPID series machines .



**Rotary magazine.**



**Example Pallet N° 1.**

As you can see from the two figures, the magazine has ten tool locations.

When we call up a tool in a program, the tool will be retrieved by the electro-spindle (this applies also to the case of rapid tool changers) and will be assigned a number greater than 100.

The tool positions must be defined according to the type of magazine used given that it is also possible to fit the tools manually (rapid tool change).

For the side-mounted magazine it is possible to configure a number of tool support pallets

The maximum number of pallets that can be configured is 7 (from pallet 1 to pallet 7).

"Pallet 0" is a "ghost" pallet used for configuring manual tools

The control unit will use this tool numbering when calling up (retrieving) tools:

**For example:** The tool numbered T110 will be retrieved from position no. 0 (units) of pallet no. 1 (tens) by electro-spindle no. 1 (hundreds). If the machine were fitted with a second electro-spindle it would therefore be possible to retrieve the same tool with the second electro-spindle using the number T210 (providing of course that the tool was not already loaded on another electro-spindle).

If you want to call up a tool manually in the program, write T 101.

This is a method for assigning a tool to a magazine. In effect the association tool/magazine is made directly on the tooling table (**DEF**) in the **MAGAZINE LOCATION**

On the rotary magazine there are 10 tool locations; all the other locations are for manual configuring. In this case also, the magazine locations will be read from the tool configuration table (**DEF**)

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## TOOLING EDITOR

In the next section we edit and enter the tool data **DEF** tooling table

Editor

From the MAIN MENU, press the **EDITOR** function key.

Dati  
Attrezzi

Working from the **EDITOR** menu, press the **TOOL DATA** function key; a window will open on screen displaying the name **DEF**.

Edit

Press the **EDIT** function key to access and then edit the tool configuration.

| DEF                           |                 |
|-------------------------------|-----------------|
| Tool number .....             | 1 (BORING BIT ) |
| Bit length .....              | 75.00           |
| Bit diameter .....            | 10.00           |
| Working length .....          | 30.00           |
| Type of bit(L,P,S) .....      | P               |
| Countersink height(Sv.) ..... | 0.00            |
| Wear along length (x0.001):   | 0.00            |
| Wear along diameter (x0.001): | 0.00            |
| Max. length wear (x0.001):    | 0.00            |
| Max. diameter wear (x0.001):  | 0.00            |
| Correct length .....          | 75.00           |
| Correct diameter .....        | 10.00           |
| Correct length Twin.....      | 75.00           |
| Correct diameter Twin.....    | 10.00           |
| Maximum rotation (rpm):       | 2.800           |
| Default rotation (rpm):       | 2.800           |
| Rotation direction (+DX,-SX): | +               |

The monitor will now display a table resembling that shown in the figure. This table shows all the parameters for tool no. 1.

Enter the **length, diameter, working length** and **type** of the tool, **P, L, S**.

Select  
Tool

Press the **SELECT TOOL** function key; the cursor will appear in the **TOOL NUMBER** field. To select a tool from the fixed tooling, type in a number from 1 to 96. **To select a tool from the electro-spindle, type in the letter E followed by a number.** e.g. **E1** (selects tool no. 1 from the electro-spindle tool table).

| DEF                                       |                     |
|---|---------------------|
| Tool number .....                         | E 1 (FLUTED DRILL ) |
| Magazine position .....                   | 0: 1                |
| Type of tool (M,F,D,T,S, ):               | F                   |
| Machining face .....                      | 1                   |
| D Offset .....                            | 50.00               |
| Angle $\alpha$ ( $\beta$ for 'D' type) .. | 45.00               |
| Opposite tool .....                       | E 1                 |
| Opposite tool .....                       | E 1                 |
| X Offset .....                            | 0.00                |
| Y Offset .....                            | 0.00                |
| Z Offset .....                            | 80.00               |
| R Offset .....                            | 0.00                |
| Max. tool-holder dimension ..             | 102.00              |

Tools fitted to the electro-spindle can have various shapes and must therefore be configured manually.

The tool data table is divided into two pages; use the **PAGE DOWN** and **PAGE UP** keys to select the page you require. If a tool has not been configured, the page with the characteristics (length, diameter, etc.) for that tool will display the tool number only. If you now press **PAGE DOWN** the screen will now display the table as shown here. Enter the **MAGAZINE LOCATION**; the **TOOL TYPE**, (type **M** = for spindle , **F** = for router cutter , **D** = for disc cutter , **T** = for sensing probe , **S** = for special units); the **WORK FACE** (1=upper , 2=right , 3=left , 4=front ,5= back ,22= with Vector e 32=with vector and release 3.xx); the **COUNTER TOOL** where a special head is fitted for symmetrical drilling on working areas A and D ; any **OFFSET** required for calibrating special heads; the **TOTAL SIZE**, to prevent collisions during traversing (for special heads only).

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| DEF                           |                     |
|-------------------------------|---------------------|
| Tool number .....             | E 1 (FLUTED DRILL ) |
| Cutter length .....           | 102.00              |
| Cutter diameter .....         | 10.00               |
| Working length .....          | 100.00              |
| Wear along length (x0.001):   | 0.00                |
| Wear along diameter (x0.001): | 0.00                |
| Max. length wear (x0.001):    | 0.00                |
| Max. diameter wear (x0.001):  | 0.00                |
| Correct length .....          | 102.00              |
| Correct diameter .....        | 10.00               |
| Correct length Twin.....      | 102.00              |
| Correct diameter Twin.....    | 10.00               |
| Maximum rotation (rpm):       | 16.000              |
| Default rotation (rpm):       | 10.000              |
| Rotation direction (+DX,-SX): | +                   |

When you have finished entering the tool characteristics, press **PAGE UP**. A table will appear showing all the characteristics of the tool selected.

Now enter the following data: **ROUTER CUTTER LENGTH , ROUTER CUTTER DIAMETER, WORKING LENGTH** (use the drawings in the section on Tooling as a guide).

Next, enter the data for tool wear. Tool wear mainly concerns the sanding tools whose diameter and length wear rapidly. Tool wear can be set as working hours or tool length.

The control unit will modify the **LENGTH** and **DIAMETER** values of the tool according to the values entered in the **WEAR** field (N.B. these values are divided by a thousand).

The **CORRECT LENGTH** and **CORRECT DIAMETER** are the original length and diameter of the tool and will be reset each time the tool is changed.

The **MAXIMUM ROTATION** is expressed in thousands of rpm; enter the maximum working rpm for the tool. If you select a greater rpm in the program, the control unit will ignore this setting and use the rpm set in the **MAXIMUM RPM** field

**DIRECTION ROTATION.** For right rotation, enter the + sign. For left rotation, enter the - sign.

**ROTATION STANDARD** express in thousand of turns. When the control is omitted C.N. the rotation with the value mailed in this field in the S field

Save  
on Unit

After you have completed any modifications, and before you exit, save the tool configuration to the current disk drive by pressing the **SAVE TO DISK** function key. When you have saved your data, you can exit from the program by pressing the key at the left end of the function keys (coloured grey and smaller than the function keys).



### NB:

If you forget to save the tooling and then try to exit, the control unit will warn you that you are about to lose all the modifications you have made. Press **A = Annul** to cancel the exit command and save the program or press **C = Confirm** to confirm the exit command and lose the modifications you have made up to that point.

second edition

TRAINING MANUAL (ENGLISH)