

Groove Tolerances

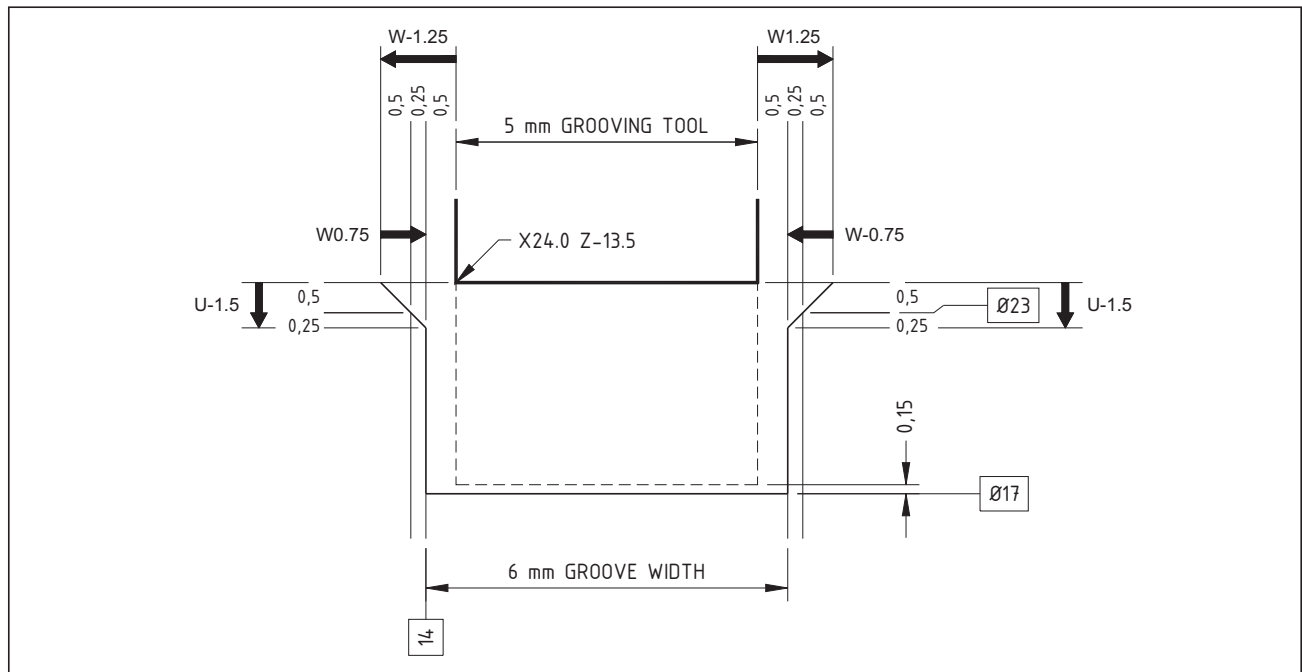
When it comes to grooves and dimensioning tolerances, there are always two considerations in programming:

- ❑ The groove **WIDTH**
- ❑ The groove **LOCATION**

It is always important to distinguish between the following drawing requirements:

- ❑ The groove position is very important, the groove width is less important
- ❑ The groove width is very important, the groove position is less important
- ❑ The groove position **and** its width are equally important

The two projects - 36-04a and 36-04b - address these major issues for precision grooving. The illustration shows the details for a 'normal' grooving program:



In any grooving, it is usually not enough to select a grooving tool width that matches the groove width and just program a plunge in and a pull out. For precision grooving, it is the best to select a smaller tool width than the groove width and plunge in the middle, once or several times, to open up the groove. Then, the same tool will finish the left chamfer and the left groove wall, moves to the right to finish the right chamfer and the right wall, and sweeps the bottom. This method has been used in the first version of the program - 36-04a:

```

(36-04A)
N1 G21 T0700
N2 G97 S1200 M03
N3 G00 Z-13.5 T0707 M08 (OFFSET APPLIED)
N4 X24.0
N5 G01 X17.3 F0.08
N6 G00 X24.0
N7 W-1.25 (LEFT CHAMFER START POINT)
N8 G01 U-1.5 W0.75 F0.05
N9 X17.3 F0.1
N10 X24.0 Z-13.5 F0.5
N11 W1.25 (RIGHT CHAMFER START POINT)
N12 U-1.5 W-0.75 F0.05
N13 X17.0 F0.08
N14 Z-14.0
N15 X24.0 Z-13.5 F0.5
N16 G00 X100.0 Z100.0 T0700 M09 (OFFSET CANCELED)
N17 M30
%
```

In the first version, tool wear offset 7 is used through the whole grooving program (displayed in blue for emphasis). By changing the *X-setting* of the offset, the *diameter* of the groove will be affected. By changing the *Z-setting* of the same offset, the groove *horizontal* position will be affected. There is no provision in the program to control the groove width *independently*. That can only be achieved with an *additional* offset.

Adding an offset, for example, offset 17, seems easy enough. The key to success is to activate and deactivate the offset in the proper block and to set correct values at the control unit. Keep in mind the purpose of each offset:

One offset controls the groove position (offset 7 in the example)
Another offset controls the groove width (offset 17 in the example)

In the second version, the wear offset 17 has to be added during the motion to the start of the *right* chamfer, and must be changed back to offset 7 during the motion to the left wall of the groove (bottom sweep). Study the changes in the modified program - additional two offsets are underlined:

```

(36-04B)
N1 G21 T0700
N2 G97 S1200 M03
N3 G00 Z-13.5 T0707 M08 (ORIGINAL OFFSET APPLIED)
N4 X24.0
N5 G01 X17.3 F0.08
N6 G00 X24.0
N7 W-1.25 (LEFT CHAMFER START POINT)
N8 G01 U-1.5 W0.75 F0.05
N9 X17.3 F0.1
N10 X24.0 Z-13.5 F0.5
N11 W1.25 T0717 (RIGHT CHAMFER START POINT - OFFSET CHANGED)
N12 U-1.5 W-0.75 F0.05
N13 X17.0 F0.08
N14 Z-14.0 T0707 (FULL WIDTH BOTTOM SWEEP - OFFSET RESTORED)
N15 X24.0 Z-13.5 F0.5
N16 G00 X100.0 Z100.0 T0700 M09 (OFFSET CANCELED)
N17 M30
%
```

There are five occurrences of the tool command. Be careful if the tool number is changed - all five entries must be changed as well!