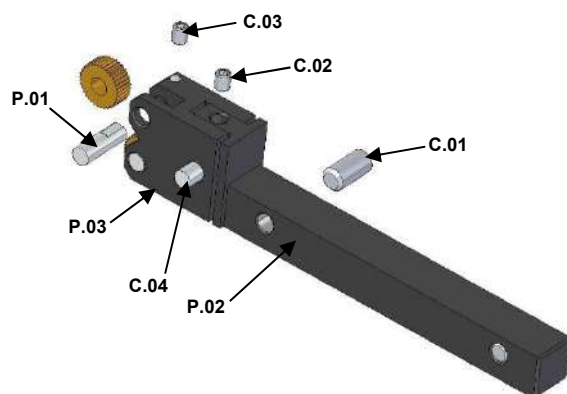




1 FEASIBLE PATTERNS

KNURLING PROFILE	KNURL		FEED (Drawing.3)	
	AXLE 1	AXLE 2	F	R
RAA	AA	AA	✓	✓
RGE 30°	BL 30°	BR 30°	✓	✓
RGE 45°	BL 45°	BR 45°	✓	✓

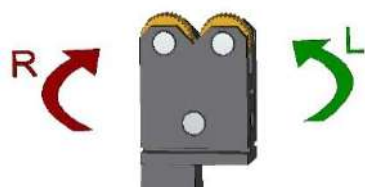
M9 form knurling tool is conceived for knurling on pieces:

- With Ø10 mm knurling wheels: diameters between 3 and 50 mm.
- With Ø15 mm knurling wheels: diameters between 5 and 100 mm.

2 RIGHT HAND OR LEFT-HAND ASSEMBLY

M9 tool is designed to work on both right hand and left-hand lathes just changing the assembly position of the head.

- Loosen the C.02 screw that blocks the head-pivoting pin C.04.
- Remove the pin C.04
- Turn over the head 180°.
- Place the pin back into the bore C.04 and firmly lock it with the screw C.02.



Drawing.2

3 KNURLING ON STEPPED WORKPIECES

When knurling stepped workpieces, it is not possible to knurl up to a shoulder. Using this tool, no knurling should be performed closer to 3,5mm from the shoulder itself.

7 RECOMMENDED SETTINGS

MATERIAL	Ø WORKPIECE (mm)	Ø KNURL (mm)	CUTTING SPEED (m/min)	RADIAL FEED (mm/rev)	TRAVERSE FEED (mm/rev)			
					PITCH (mm)			
					0.3÷0.6	0.6÷1.2	1.2÷1.6	1.6÷2.0
Steel 600 N/mm ²	<10	10	20÷50	0.05÷0.10	0.15	0.10	0.08	0.07
	10÷50	15	25÷55		0.20	0.15	0.13	0.10
Steel 900 N/mm ²	<10	10	15÷40	0.04÷0.08	0.12	0.08	0.05	0.04
	10÷50	15	20÷45		0.15	0.10	0.08	0.06
Stainless steel	<10	10	15÷40	0.04÷0.08	0.12	0.08	0.05	0.04
	10÷50	15	20÷45		0.15	0.10	0.08	0.06
Cast steel	<10	10	20÷40	0.05÷0.10	0.15	0.10	0.08	0.07
	10÷50	15	25÷45		0.20	0.15	0.13	0.10
Aluminium	<10	10	25÷45	0.05÷0.10	0.12	0.08	0.05	0.04
	10÷50	15	30÷50		0.20	0.15	0.10	0.06
Brass	<10	10	30÷50	0.05÷0.10	0.20	0.15	0.12	0.10
	10÷50	15	35÷55		0.25	0.20	0.18	0.15

Table 1

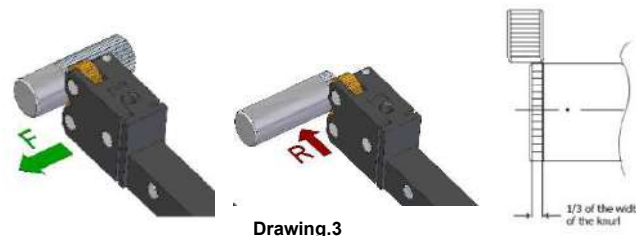
4 BEGINNING TO KNURL

While the chuck is rotating at the speed recommended, feed the tool so that 1/3 of the width of the knurl gets in contact with the workpiece.

Press the knurl against the workpiece. The value of the radial feed must be according to the conditions recommended on the table 1.

After that, you will be able to feed longitudinally.

To calculate up to what diameter we must deepen with the knurl, we must take into account the height of the tooth (in the case of standard knurls is always equal to half the step) and the increase in diameter that suffers the material.



Drawing.3

5 BEAR IN MIND BEFORE AND WHILE WORKING PROCESS

Make sure that the knurl pins are firmly fastened.

Make sure that the axis of the knurl is aligned with the axis of the workpiece.

Always work plenty of coolant, lubricant or cutting oil.

The working direction, longitudinal advance, will always be against the tool.

6 TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Double knurling	Too slow radial feed at the beginning of the knurling	Increase radial feed at the beginning of the knurling*
	The perimeter of the workpiece is not an exact multiple of the pitch	Turn a diameter so that the perimeter to be knurled is an exact multiple of the pitch*
Knurling wheels easily breakable	Knurling too deep	Reduce the depth to values according to the pitch
Knurling wheels wear out too fast	Knurling too deep	Reduce the depth to values according to the pitch
	Working conditions are not adequate	Check cutting speed and traverse feeding speeds

* Sometimes, it is not possible to increase radial feed, or it just cannot be radially fed in the workpiece is too weak.