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SERVICE INSTRUCTIONS:

HABEGGER KNURLING HEAD, TYPE MOJ

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1 GENERAL REMARKS

1.1 Type of knurling

These knurling heads are used for straight or crossed knurling (30° or 45°) in the midst of a workpiece or behind a turned shoulder. No radial pressure will be exerted on the workpiece during the knurling operation.

1.2 Function

The MOJ head engages onto the workpiece in open position, closing is performed by an action on the lever. We use therefore a slide of the machine. This cutting-in motion on the lever should not exceed **1 second**.

1.3 Knurled diameter

The knurled diameter is in direct relation with the position of the lever of the MOJ head, i.e. of the slide.

1.4 Main advantages

- Does not fear any obstacle on the machined workpieces
- No radial effort exerted on the workpiece
- Reduced assembly space
- Possibility to knurl diameters smaller than 1 mm
- No flange nor support before the knurls: Knurling is effected up to the shoulders on workpieces

2 KNURLING CONDITIONS

2.1 Diameter before knurling

Knurling is obtained by material deforming. Therefore, the diameter before knurling increases by 25 to 35 % of the pitch value, according to the machined material. These values are in direct relation with the material resistance.

Indicative values are:

Tough materials	:	25 %
Smooth materials	:	35 %

Example: stainless steel

Ø before knurling : 3.875 mm
pitch : 0.5 mm

Result: 25 % of 0.5 = 0.125

Ø before knurling + 0.125 = Ø after knurling

3.875 + 0.125 = Ø 4.000 mm

The user must perform tests by himself in order to determine the diameter before knurling. He may use the following formula:

d = diameter before knurling
D = diameter after knurling
P = pitch

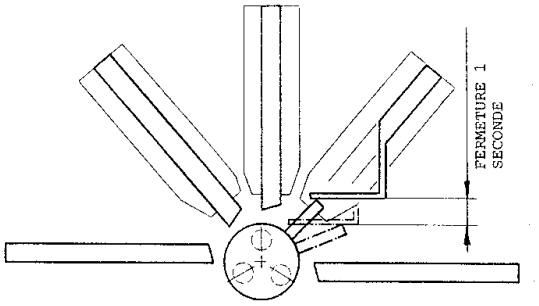
$$d = D-(P/2)$$

2.2 Peripheric speed

The peripheric speed of the workpiece must be about 20 m/min. This speed decreases when the material is very hard.

2.3 Advance on the lever

The advance on the lever should not exceed 1 second. This forces the knurls to form a unique profile. It avoids knurling in flakes.



2.4 Lubrication

We also recommend to lubricate very much. Do never stop machining during or towards the end of the knurling operation.

2.5 Maximum pitch

Pitches of more than 0.7 mm should be avoided, as the effort on the setting lever is too high.

2.6 Essential information

The following information is absolutely needed when orders or enquiries are submitted:

a) the diameter after knurling.
b) the wanted pitch. It must be determined by the user.
c) the diameter and length of the shoulder after which the knurling operation will be performed.
d) the kind of material used.

2.7 Same pitch

The three knurls must always have the same pitch. For crossed knurling, use two knurls type BL and one knurl BR.

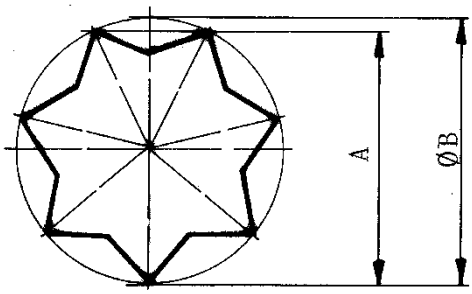
2.8 Number of teeth

The number of teeth cannot be guaranteed

3 KNURLING WITH AN ODD NUMBER OF TEETH

Note:

Measuring the outside diameter of a knurled part with an odd number of teeth must be done by other means than the micrometre (for example by ring-gauges).



Nombre de dents sur le diamètre Anzahl Zähne auf dem Durchmesser Number of teeth on the diameter	ØB x . . . = A	A x . . . = ØB
5	0.90451	1.10557
7	0.95066	1.05190
9	0.96980	1.03114
11	0.97970	1.02072
13	0.98550	1.01471
15	0.98910	1.01102
17	0.99150	1.00857
19	0.99320	1.00684
21	0.99440	1.00563
23	0.99540	1.00462
25	0.99610	1.00391
27	0.99660	1.00341
29	0.99710	1.00290
31	0.99740	1.00260
33	0.99770	1.00230
35	0.99800	1.00200
37	0.99820	1.00180

4 SPARE PARTS

We supply spare parts for the knurling head MOJ.
The following points must be stated in your order:

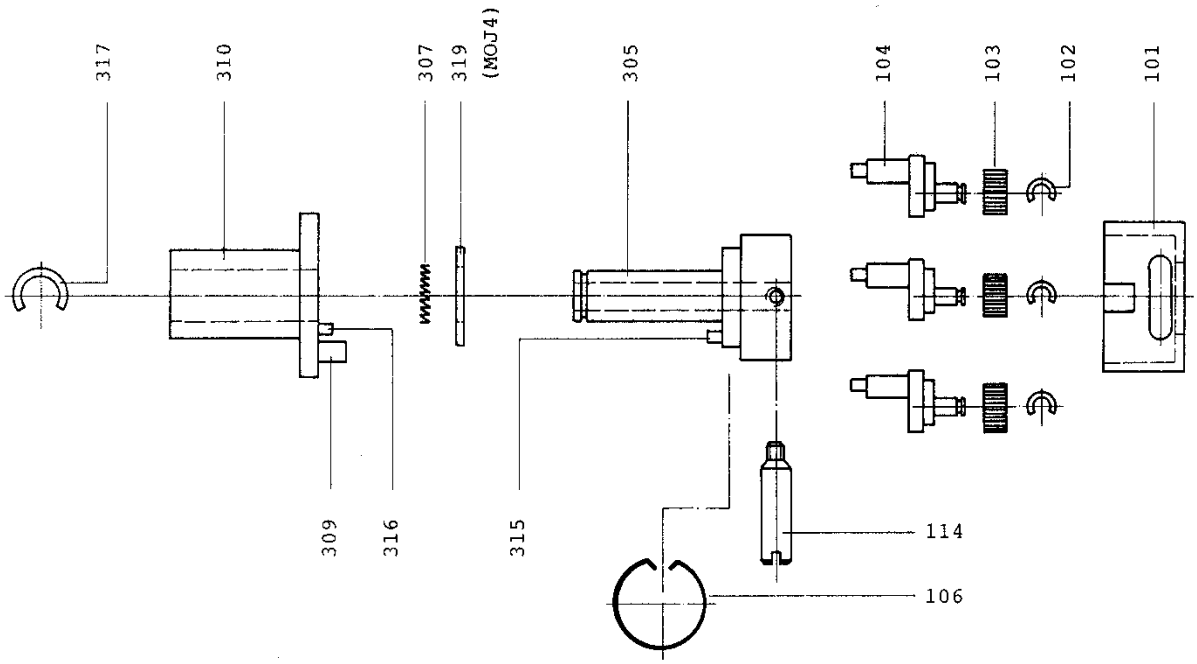
		Example:
Type of head	:	MOJ2 A head
Wanted parts as per assembly drawing	:	Knurls no 103
Number	:	1 set of 3 pces
Pitch and type of knurling operation	:	0.20 AA (straight)

5 ASSEMBLY DRAWING

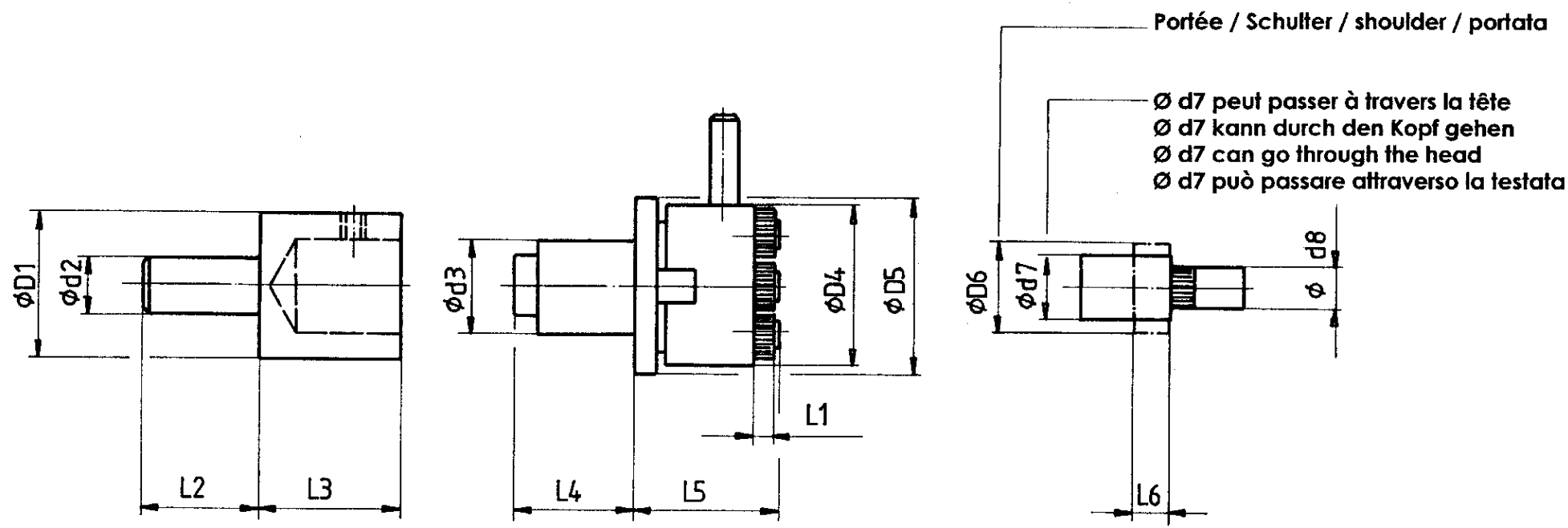
5.1 List of spare parts

101	Cam	3140 _ 000101
102	Spring lock washer	312010200 _ 0
103	Knurls	18_00_ _ _ _ _ _
104	Knurl-holder	311010400 _ 0
106	Knurl-holder spring	3140 _ 000106
114	Setting lever	3140 _ 000114
305	Body	3140 _ 000305
307	Compression spring	3140 _ 000307
309	Cam pin	3140 _ 000309
310	Sleeve	3140 _ 000310
315	Body pin	3140 _ 000315
316	Sleeve pin	3140 _ 000316
317	Stop washer	3140 _ 000317
319 (MOJ4)	Ring	3140 4 000319

5.2 Exploded view



6 TABLE OF MEASUREMENTS



Option : **Adaptateur** No 320	**Tête à moleter MOJ**	**Pièce**
Optionen : **Anpassungsteil** No 320	**Randrierkopf MOJ**	**Werkstück**
Optional : **Adaptor** No 320	**Knurling head MOJ**	**Workpiece**
Opzione : **Adattore** No 320	**Testata zigrinatrice MOJ**	**Pezzo**

Type	Pitch	Ø D1	Ø d2	L2	L3	Ø d3	Ø D4	Ø D5	L4	L5	L1	Ø D6	maxi	L6	Ø d7	Ø d8	Knurling straight	Knurling crossed
MOJ1	0.130	- - -	- - -	- - -	- - -	6	15.50	17.50	11.00	17.00	1.15	1.70		3.50	1.40	0,80 - 1,80	X	
MOJ1	0.267	- - -	- - -	- - -	- - -	6	15.50	17.50	11.00	17.00	1.15	1.50		3.50	1.40	0,90 - 1,70	X	
MOJ2 A	0.200	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.00	2.90		4.00	2.90	1,10 - 3,00	X	
MOJ2 A	0.250	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.00	2.90		4.00	2.90	1,10 - 3,00	X	
MOJ2 B	0.200	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,25 - 2,90	X	X
MOJ2 B	0.300	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,35 - 2,90	X	X
MOJ2 B	0.350	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,35 - 2,90	X	
MOJ2 B	0.400	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,40 - 2,90	X	X
MOJ2 B	0.500	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,55 - 2,90	X	X
MOJ2 B	0.600	20	5 / 6 / 8	50	17	10	20.50	24.00	14.00	22.00	2.50	2.90		4.00	2.90	1,65 - 2,90	X	X
MOJ3	0.200	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,35 - 4,90	X	X
MOJ3	0.300	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,45 - 4,90	X	X
MOJ3	0.400	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,55 - 4,90	X	X
MOJ3	0.500	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,65 - 4,90	X	X
MOJ3	0.600	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,75 - 4,90	X	X
MOJ3	0.700	26	8	37	16	14	30.00	31.00	14.50	28.50	4.00	d8 + 1,30	4.70	5.50	4.60	2,85 - 4,90	X	X
MOJ4 A	0.200	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	5,65 - 8,00	X	X
MOJ4 A	0.300	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	5,75 - 8,00	X	X
MOJ4 A	0.400	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	5,85 - 8,00	X	X
MOJ4 A	0.500	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	5,95 - 8,00	X	X
MOJ4 A	0.600	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	6,05 - 8,00	X	X
MOJ4 A	0.700	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	d8 + 1,30	7.90		7.90	6,10 - 8,00	X	X
MOJ4 B	0.200	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	3,70 - 6,10	X	X
MOJ4 B	0.300	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	3,80 - 6,10	X	X
MOJ4 B	0.400	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	3,90 - 6,10	X	X
MOJ4 B	0.500	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	4,00 - 6,10	X	X
MOJ4 B	0.600	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	4,10 - 6,10	X	X
MOJ4 B	0.700	26	8 / 10	40	22	16	38.00	38.00	18.50	32.00	4.00	5.90			5.90	4,20 - 6,10	X	X

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