

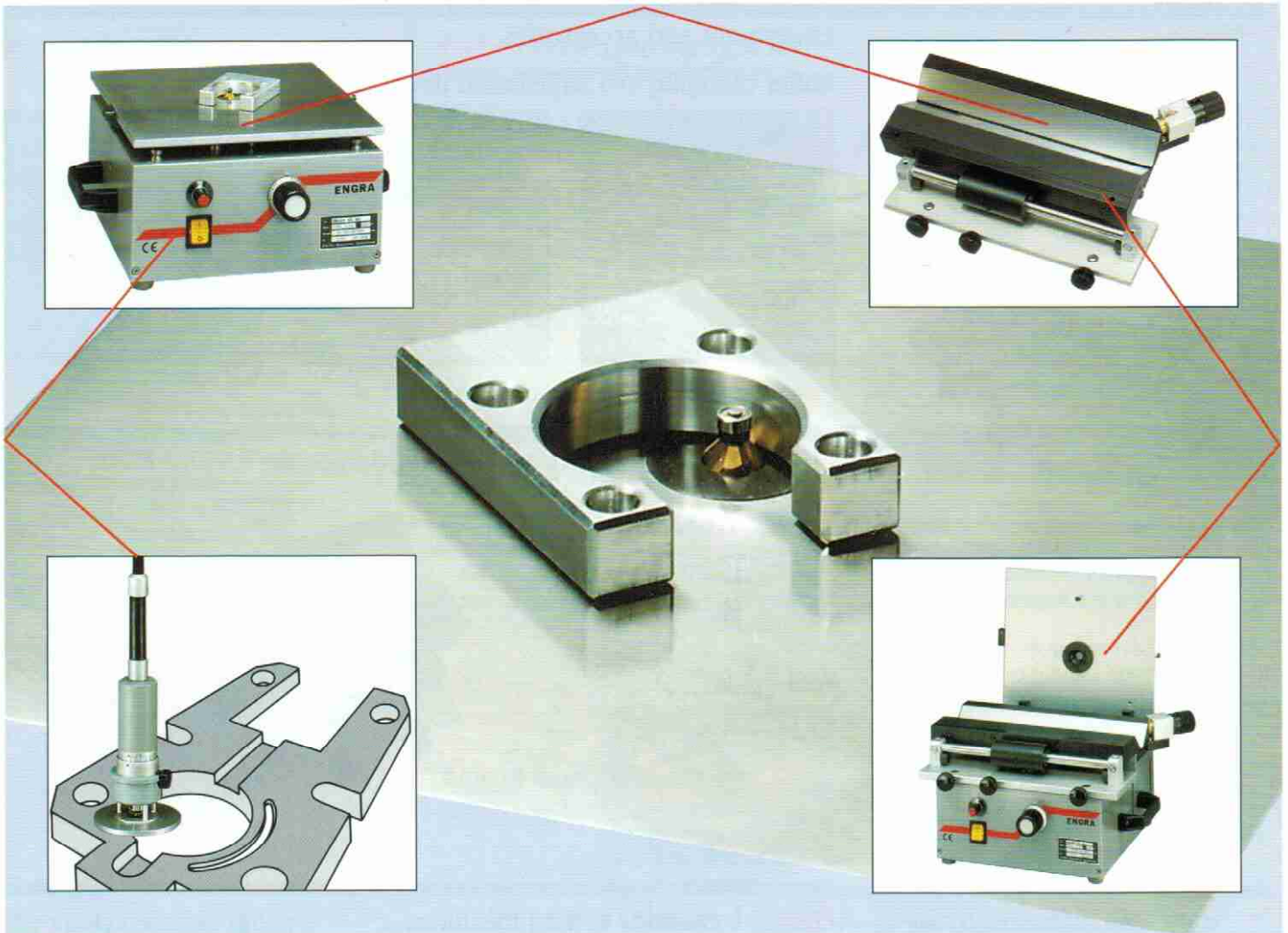
ENGRA[®]

SWISS PATENT

Deburring, chamfering

Machining time: 1 minute

Reject risk rate: practically zero



- Perfect results
- No risk of injury
- One machine for every edge
- Swiss patent

Interior and exterior contours

ENGRA chamfer milling machines are high-quality, portable machine tools. Their unique design and performance capabilities distinguish them as top-quality products.

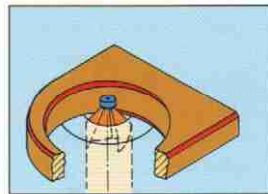
Technical characteristics:

- Can be installed on site without fixing
- Patented drive mechanism with induction motor and frequency converter
- Separate tool spindle, speed up to 40 000 rpm⁻¹
- 2 sizes

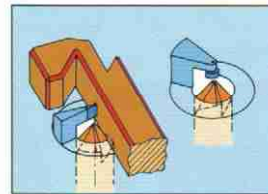
The milling tool is adjusted to suit the guide elements with the help of an integrated adjusting device and fixed precisely at 7 height positions. The consecutive miller cutting edges can thus be optimally exploited.

The height of the chamfer is not estimated, but rather set exactly on the scale knob.

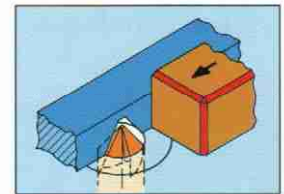
Tool guide



Guide ball bearing mount



Guide finger - reaches into acute interior corners



Guide rule

Type of workpieces:

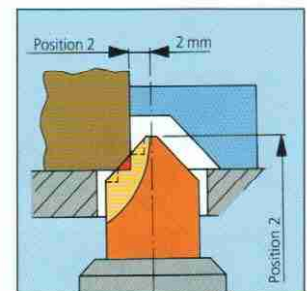
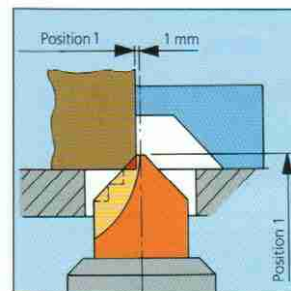
- Milled parts: all shaped parts
- Turned parts: discs, bushes
- Flat parts: sheet metal sec-

Workpiece material:

Steel, castings, aluminium, non-ferrous metal, acrylic glass, plastics, wood, laminated plastics, etc.

Equipment and accessories

Miller changing and adjustment device



Straight exterior edges

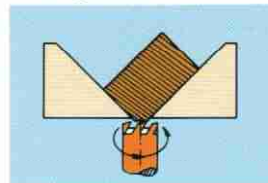
ENGRA machines with a V-block carriage and are designed for extremely efficient and precise machining of straight exterior edges on both tiny and large workpieces.

The workpiece is manoeuvred along the tool by the carriage without causing scratches.

ENGRA ES V-block carriage - an addition to the ENGRA T

The ENGRA ES auxiliary carriage increases the application range of the ENGRA T considerably. The machining time is halved and the quality of the edge is simultaneously enhanced.

Tool guide



ES 300

The ENGRA L is an extremely compact and robust chamfer milling machine for straight exterior edges. It is used where precise but highly productive chamfering is required.

Technical characteristics:

- Portable, self-supporting machine
- Carriage characteristics as for ENGRA ES
- Working stroke in both directions
- Drive mechanism as for ENGRA T
- 3 sizes

ENGRA L chamfer milling machines



L 470 E

ENGRA T universal contour milling machines



TE 40



TE 540

Chip suction system



All ENGRA T and L machines can be equipped with a suction connection and attached to any vacuum cleaner.

ENGRA FLEX hand machine for large and heavy workpieces

ENGRA FLEX is an auxiliary device designed for the ENGRA T.

The tools and guide elements are the same for both machines. The light, quiet spindle ensures sensitive machining.

It is driven via a special flexible shaft.

The shaft is connected to an ENGRA T or a M-FLEX motor.



TE 40 + ES 300

Technical characteristics:

- Ball-bearing mounted guides
- Support and running surfaces made of hardened steel
- Own adjusting and feed system
- 3 sizes

Installation

The ENGRA ES V-block carriage installation is really easy. The machine table is folded upwards and the carriage is secured to the machine with 2 to 3 hand screws.

Type of workpieces:

Plates, strips, blocks, sheet material

All older machines previously supplied can be retrofitted with the ENGRA ES.

Why «only» a small miller?

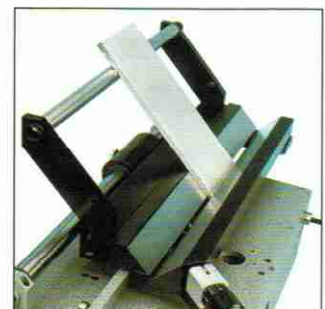
The milled chamfers are only a few millimetres wide.

A miller is far better suited for this task than a cutting head. It cuts smoothly and does not suffer from «knocking».

- Reverse and synchronised milling
- No return stroke, shorter machining time, reduced costs
- Clean chamfers, even on smallest workpieces

V-block extension limit stop

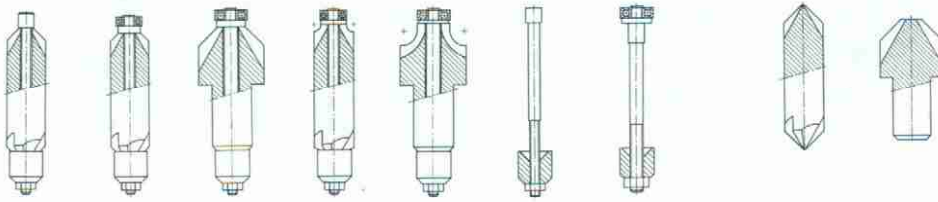
A V-block extension is fitted mainly for workpieces with large surfaces, and a lateral limit stop for strip-shaped workpieces.



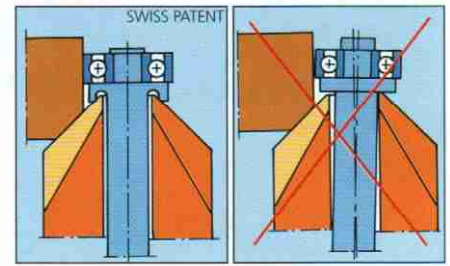
ENGRA T contour milling machines

ENGRA milling tools have a considerably longer useful life than other products because they have a patented pilot pin.

- It sits on the cutting edge without any play
- It protects the sensitive milling tip against breakage
- It centres itself to the spindle rotation axis and runs quietly



ENGRA hard metal millers are better designed

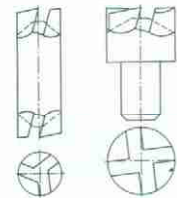


Machine	Type ENGRA	T Mini	TS 20*	TS 30	TE 40	TE 540
Contin. adjust. spindle speed (rpm)		23000	19000	12000 – 30000	10000 – 40000	10000 – 40000
Induction motor		230 V / 150 W	230 V / 180 W	230 V / 220 W	230 V / 250 W	230 V / 250 W
Working surface (mm)		180 x 250		250 x 250		300 x 500
Housing W x D x H (mm)		170 x 250 x 110		250 x 250 x 110		450 x 250 x 110
Chamfer height (mm x 45°)		0 – 2 mm		0 – 2 mm		0 – 2 mm
Radius (mm)		0,5 – 3		0,5 – 3		0,5 – 3
Tool diameter (mm)		∅ 6 + ∅ 8		∅ 6 + ∅ 8		∅ 6 + ∅ 8
Adjusting device for tool					•	•
Machine «0» point					•	•
Chamfer height can be read on scale					•	•
Position limit stop for rule					•	•
Weight (kg)		7,5	10,5	11	12	16

ENGRA ES V-block carriage - an addition to the ENGRA T

V-block carriage	Type	ES Mini*	ES 300	ES 450	ES 750*
Suitable for	ENGRA	T Mini	TS/TE 40	TE 540	TE 540
V-block length (mm)		270	300	450	750
Travel way (mm)		150	160	290	590
Chamfer height (mm x 45°)		0 – 2	0 – 3	0 – 3 (5)*	0 – 3
Max. workpiece weight (kg)		2	5	10	10
Weight (kg)		3	4	7	13

Tools for ENGRA ES and ENGRA L



ENGRA optimal hard metal tools (∅ 6, ∅ 8 and ∅ 10 mm) and commercially available end milling cutters are used with the ENGRA ES and ENGRA L.

Various ∅ 30 mm grinding wheels can be supplied for hard materials.

ENGRA L chamfer milling machines

Machine	Type ENGRA	L Mini	L 300 E	L 470 E	L 770 E
V-block length (mm)		270	300	450	750
Travel way (mm)		150	160	290	590
Chamfer height (mm x 45°)		0 – 2	0 – 3 (5)	0 – 3 (5)	0 – 3 (5)
Min. workpiece thickness (mm)		1,5	1,5 (0,6)	2 (0,8)	2
Max. workpiece weight (kg)		5	20	30	20
Tool diameter (mm)		∅ 6+∅ 8	∅ 6+∅ 8	∅ 6+∅ 8	∅ 6+∅ 8
Contin. adjust. spindle speed (rpm)		21000	9000–38000	6000–23000	6000–23000
Induction motor		230V / 150W	230V / 220W	230V / 250W	230V / 250W
Weight (kg)		8	13	18	24

*ENGRA L special purpose machines

- For wet grinding glass, ceramics, hard metal, etc.
- For parts with a thickness of 0.6 mm or more
- For 30° / 60° chamfers
- With a large carriage stroke of up to 1100 mm.

* available on request
subject to change