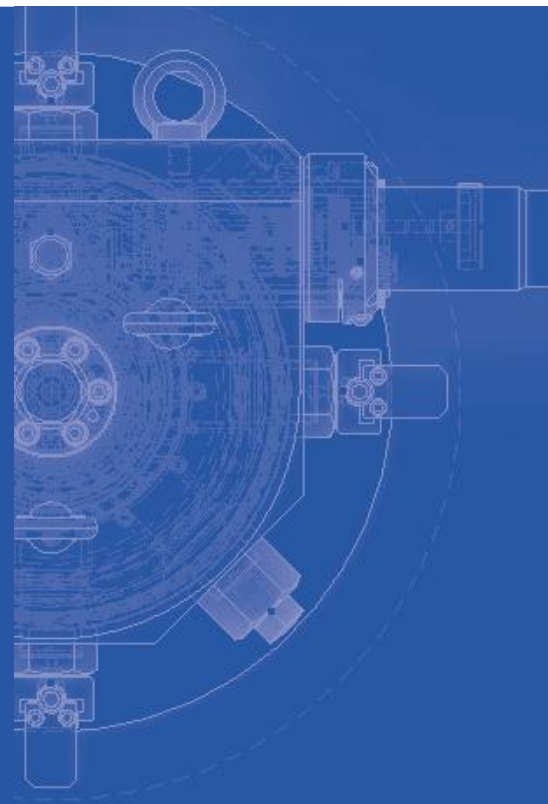
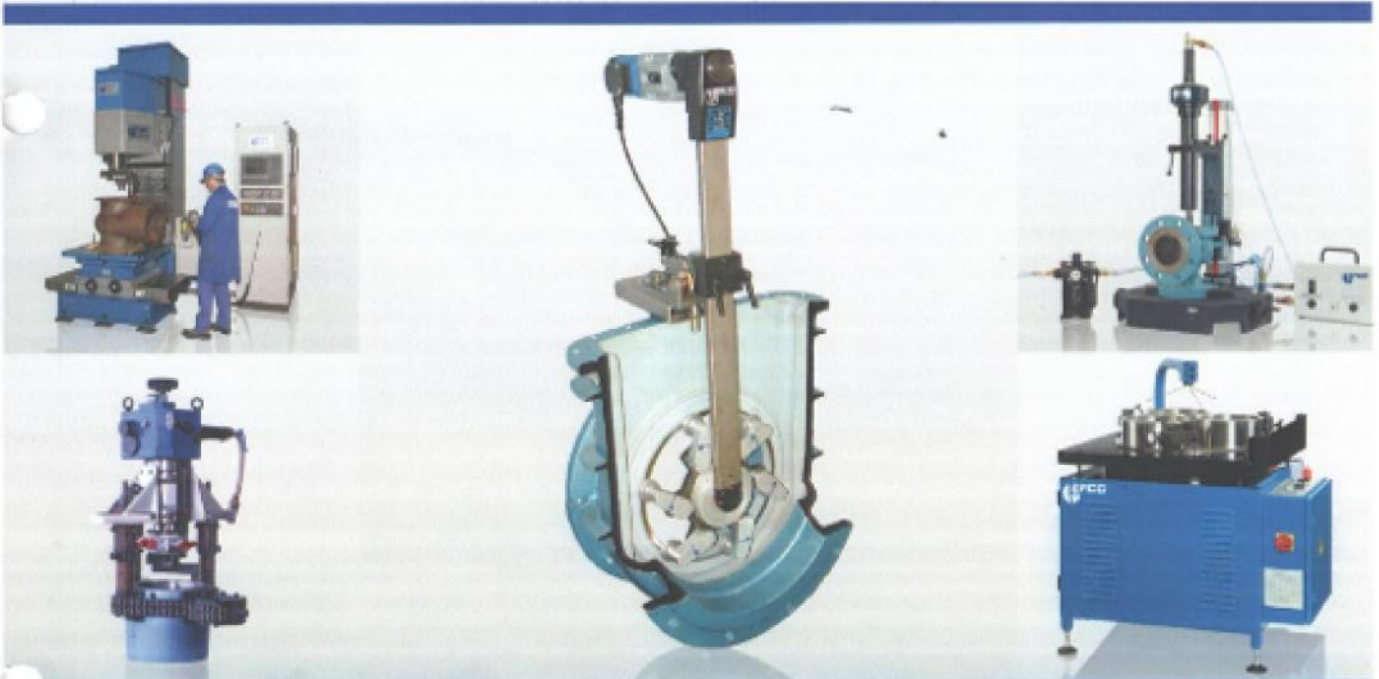


# VALVE MACHINING TECHNOLOGY





# VALVE REPAIR EQUIPMENT



CE

# Certificate

Standard **ISO 9001:2008**

Certificate Registr. No. 01 100 6435

TÜV Rheinland Cert GmbH certifies:

Certificate Holder:



**EFCO Maschinenbau GmbH**  
Otto-Brenner-Straße 5-7  
D - 52353 Düren

Scope:

Development, Design and Manufacturing of repair and production machines as well as test installations for the stationary and mobile use for the repair and test of industrial valves

An audit was performed, Report No. 6435. Proof has been furnished that the requirements according to ISO 9001:2008 are fulfilled.

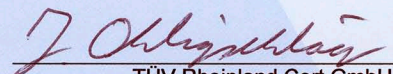
The due date for all future audits is 16-04 (dd.mm).

Validity:

The certificate is valid from 2011-04-17 until 2014-04-16.

First certification 1996

2011-04-15

  
TÜV Rheinland Cert GmbH  
Am Grauen Stein · 51105 Köln



DGA-ZM-58-95-00

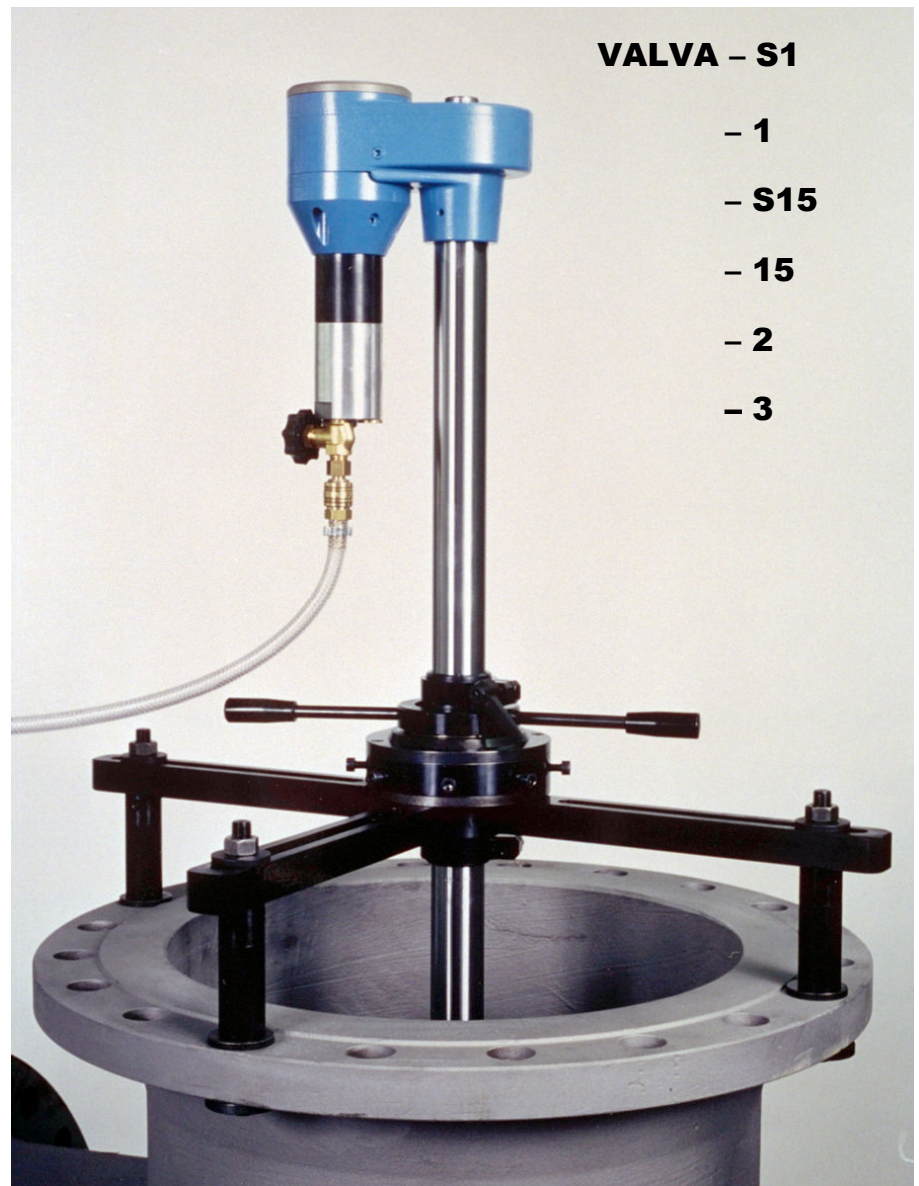
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# VALVA series

**Portable machines for grinding and lapping of sealing faces in valves, valve disks, flanges etc.**

**DN 8 – 1600 mm  
(3/8"-64")**



**VALVA machines prove their strength everywhere where fast valve repair and economy are required.**

## Employing tomorrow's technology to machine today's valves

### EFCO – VALVA: An impressive Concept

- Wide-ranging use in conventional power stations, nuclear power stations, refurbishment companies, refineries, chemical plants, shipyards, sugar mills, paper mills, on ships, by valve manufacturers and many others.
- Long life due to the use of:
  - High-quality materials
  - Powerful drives
  - Wear-resistant tools
  - Stable light-weight design
- Good price/performance ratio
- High profitability
- Simple handling due to low weight
- Free-hand operation of the “small” machines
- One-man operation
- The live-spindle of the drives has a spring mounting. This facilitates a more controlled tool pressure to the sealing face.
- Universal installation systems enable:
  - Safe installation
  - Stable mounting
  - Fast alignment
- Drives can be supplied depending on requirements.
  - Electric drive 230/110 V, 50/60Hz
  - Rechargeable battery (Valva-S1)
  - Pneumatic drive



VALVA-S1



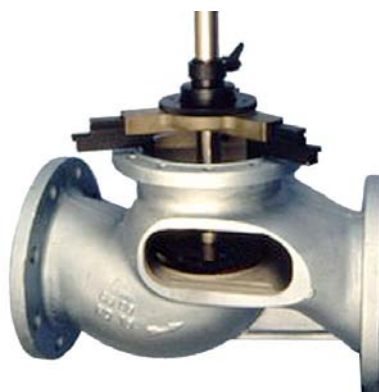
VALVA battery powered

## Specifications

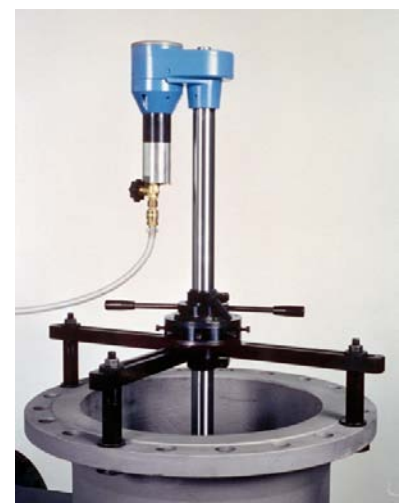
	<b>Valva</b>					
	<b>-S1*</b>	<b>-1</b>	<b>-S15</b>	<b>-15</b>	<b>-2</b>	<b>-3</b>
Nominal bore (DN - mm)	8-150 1/4"-6"	8-150 1/4"-6"	80-300 3"-12"	80-300 3"-12"	200-700 8"-28"	500-1600 20"-63"
Standard insertion depth (mm)	250 10"	250 10"	500 20"	500 20"	800 (1200) 32" (48")	1500 60"
Drive	electric 230/110 V, 50/60Hz / rechargeable battery* / pneumatic 6-7 bar					
Overall machine length (mm)	450 18"	550 22"	750 30"	750 30"	~1550 ~62"	~2600 ~104"
Grinding	●	●	●	●	●	●
Lapping		●		●	●	●
<b>Tools</b>						
Smooth grinding plates	●	●				
Smooth lapping plates		●				
Smooth grinding plates with roller guide	●	●	●			
Planetary gear				●	●	●
<b>Clamping</b>						
Machine stand		●				
Jaw chuck			●	●		
Manual	●	●	●			
3-point clamping					●	●
3-point centre clamping					●	



VALVA-1  
with machine stand



Jaw chuck



VALVA-2  
with 3-point centre clamping

## EFCO-VALVA - The Complete Solution

The VALVA machines, as do all EFCO products, provide a complete repair system.



VALVA-1 machine case



VALVA-1 accessory case



VALVA-2 with workshop trolley

Subject to technical change.

**EFCO Maschinenbau GmbH – Valve repair and testing equipment**

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Agencies in many countries

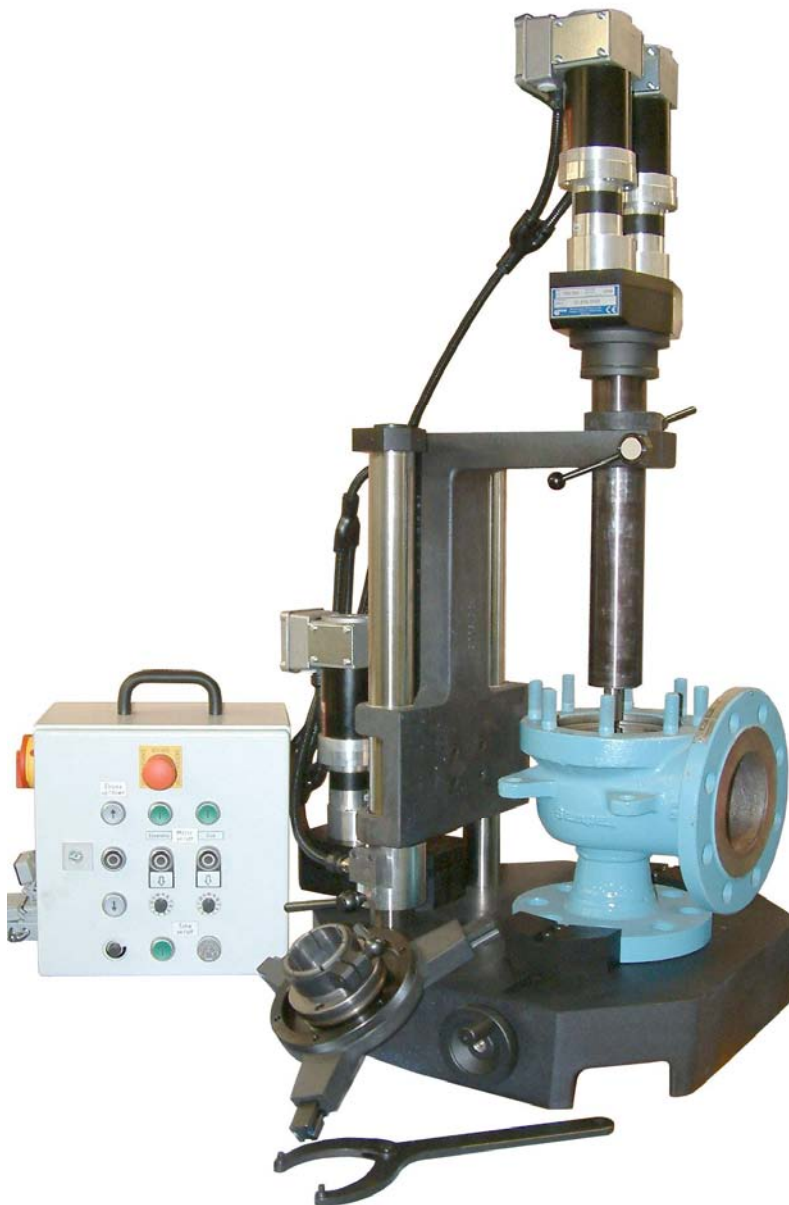
**THE PREMIUM-PRODUCTS – MADE BY EFCO – MADE IN GERMANY**

# TSV Series

## Grinding and Lapping Machines for safety valves

DN range 15-300 mm (1/2"-12")

The EFCO TSV are portable grinding and lapping machines with eccentric. They are meant for the machining of surfaces in safety valves. The TSV-300 has two separate drives. One drive operates the grinding spindle, whereas the other drive actuates an opposite motion (eccentric motion).



TSV-300 with machine column

### Advantages:

- easy handling
- set-up at valves with or without flange is possible
- even (flat) surfaces
- good self-cleaning of the grinding tools  
=> extended durability (service life) of the grinding media
- uniform dispersion of lapping paste during lapping procedure
- cross hatch



## Technical data TSV

	TSV-150	TSV-300
DN range	Ø 15 - 150 mm (1/2" – 6")	Ø 25 - 300 mm (1" – 12")
max. submerging depth	350 mm (14")	
Clamping range of jaw chuck	Ø 80 - 400 mm (3" - 16")	
Clamping range of machine column	Ø 50 - 360 mm (2" - 14")	Ø 80 - 360 mm (3" - 14")
Rotational speed of grinding spindle	~ 0 – 330 U/min	~ 0 – 170 (245*) U/min
Rotational speed of eccentric	~ 0 – 520 U/min	~ 0 – 555 (805*) U/min
Eccentricity	3 mm	
Stationary mounting	Machine column	
Portable mounting	Jaw chuck	
Drive	pneumatic 6-7 bar	230/110 V, 50/60 Hz or pneumatic 6-7 bar

\*Rotational speed of pneumatic

Due to geometry, there are normally higher speeds of the grinding discs at the outside diameter of the seat than at the internal diameter.

The result is a different material removal.  
The sealing surface inclines downwards.

The use of an eccentric neutralizes the influence of different cutting-speeds.  
An even (flat) surface is produced.

### Abrasive- and Lapping Material:

- Self-adhesive grinding media
- EFCOBOR Lapping Paste in grits 80 to 1500



TSV-150 with jaw chuck

Subject to technical change.

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# VSK

## Special tools for grinding conical valve seats DN 8-300 mm (1/4-12")

VSK tools facilitate the quick repair of conical sealing faces on all shut-off and control valves with nominal diameter 8-300 mm.

VSK tools prove their strength everywhere where fast valve repair and economy are required:

- **Wide-ranging use:**  
in conventional power stations, nuclear power stations, refurbishment companies, refineries, chemical plant, shipyards, sugar mills, paper mills, on ships, by valve manufacturers and many others.
- **Long life due to the use of:**
  - high-quality materials
  - powerful drives
  - wear-resistant tools
  - stable light-weight design
- **Use independent of:**
  - width and hardness of sealing faces to be machined
  - installation position of fitting (horizontal, vertical)
  - type of fitting
- **Due to its low weight**
  - easy handling
  - hand-held operation
  - fast setting up



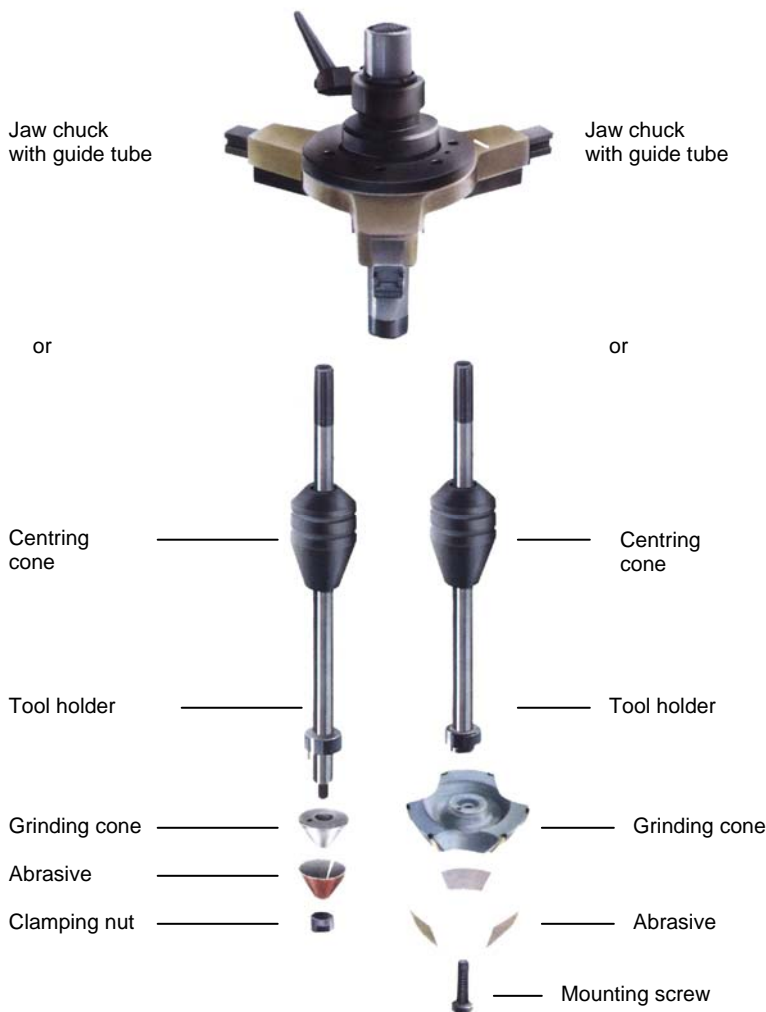
### EFCO VSK Tools An impressive Concept

- Simple handling
- Low weight
- One-man operation
- Wear-resistant tools
- Good price/performance ratio
- High profitability and efficiency
- Optimum material removal due to use of high-quality abrasives
- Simple fitting of tools
- Safe centring using centring cone or rim chuck, thus centred machining
- Hard grinding cones to which the abrasive is attached ensure precise angular geometry

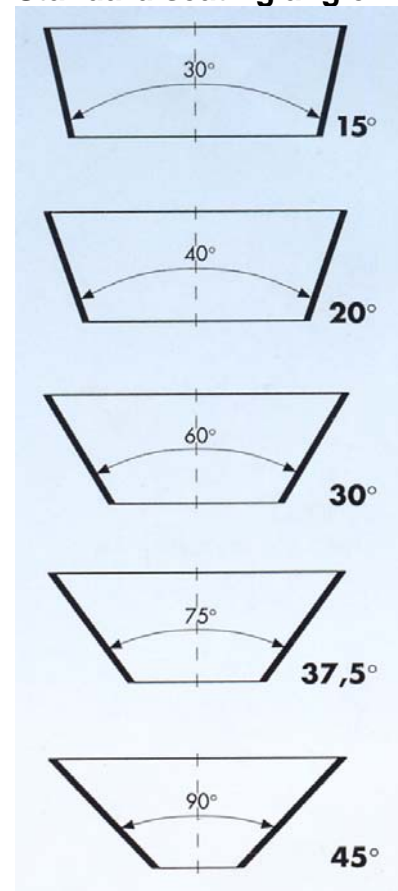


### VSK Specifications

	VSK-1	VSK-2	VSK-3	VSK-4	VSK-5
<b>DN (mm)</b>	8-50 (1/4"-2")	8-65 (1/4"-2.5")	8-100 (1/4"-4")	80-150 (3"-6")	80-300 (3"-12")
<b>Drive</b>	electric 230/110 V, 50/60Hz or pneumatic 6-7 bar				
<b>Standard seating angle</b>	30° (2x15°), 40° (2x20°), 60° (2x30°), 75 (2x37,5), 90° (2x45°) (other angles on request)				



### Standard seating angle



The EFCO VSK tools, as do all EFCO products, provide a complete repair system.

It is possible to combine various angles and sizes into a complete tool set as per your specification.



Subject to technical change.

### EFCO Maschinenbau GmbH – Valve repair and testing equipment

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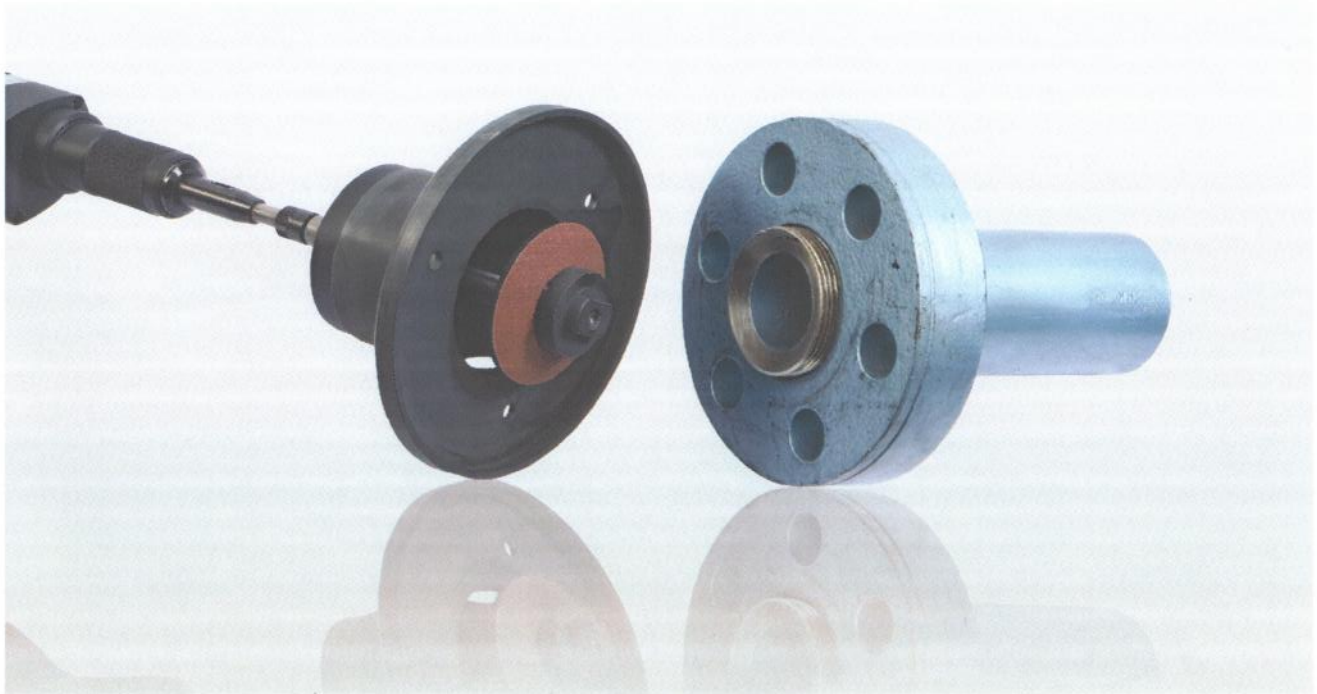
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# LS

**Tools for the machining of pipe ends with 140° metallic  
lenticular gaskets  
(to BASF and DIN 2696)**

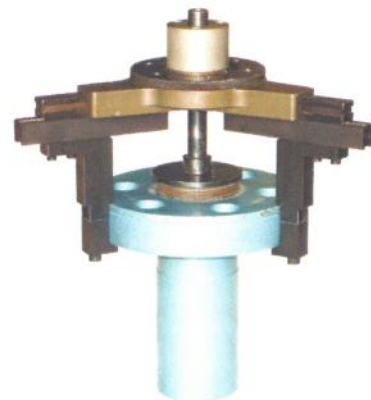
**DN 8 – 200 mm (3/8"-8")**



EFCO-LS with guide bush

Precise special guides provide for completely centred machining of the sealing face.  
Guide bushes are used for small nominal diameters.  
Even for large diameters, our special jaw chucks enable precise guiding of the grinding tool.

Our EFCO-LS tools are supplied complete with guide bush or rim chuck and an extensive assortment of various abrasive cloths in a plastic carry case.



EFCO-LS with jaw chuck

Subject to technical change.

**EFCO Maschinenbau GmbH – Valve repair and testing equipment**

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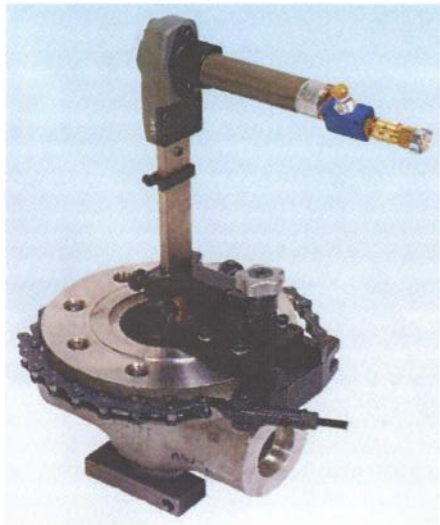


# SL Series

Portable machine for grinding and lapping of sealing faces in gate valves, gates and flanges

**DN 20 – 2000 mm**

**3/4" - 80"**



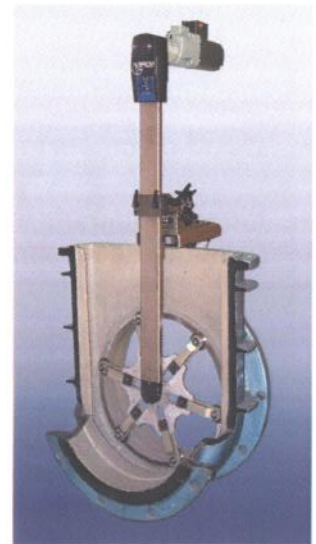
**SL - 05**

**SL - 1**

**SL - 15**

**SL - 2**

**SL - 3**



**Employing tomorrow's technology to machine today's valves**

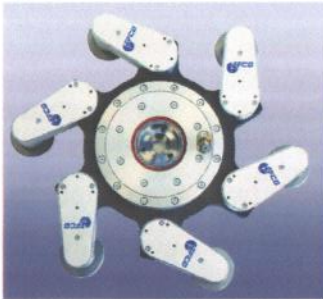
## EFCO – SL - AN IMPRESSIVE CONCEPT

- **Wide-ranging** use in conventional power stations, nuclear power stations, refurbishment companies, refineries, chemical plants, shipyards, sugar mills, paper mills, on ships, by valve manufacturers and many others.
- **Long life due to the use of:**
  - High-quality materials
  - Powerful drives
  - Wear-resistant tools
  - Stable light-weight design
- **Good price/performance ratio**
- **Flexible use** of machine by means of various tool sets and accessories
- **Use independent of:**
  - Width and hardness of sealing faces to be machined
  - Installation position of fitting (horizontal, vertical)
  - Type of fitting (with or without sealing flange, oval or round)
- **Universal installation systems enable:**
  - Safe installation
  - Simple handling
  - Fast adjustment
  - Drives can be fitted on both sides and replaced quickly
  - Any insertion depth can be set.

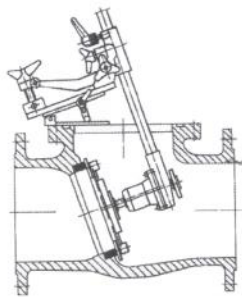


- **The rocker - precision element to:**
  - Mount the machine arm
  - Set the insertion depth
  - Easy to install
  - Fast fine adjustment at side
  - Setting of working pressure
  - Easy repeatability of optimum working pressure by fitting the digital display (optional)
  - Worldwide patent.

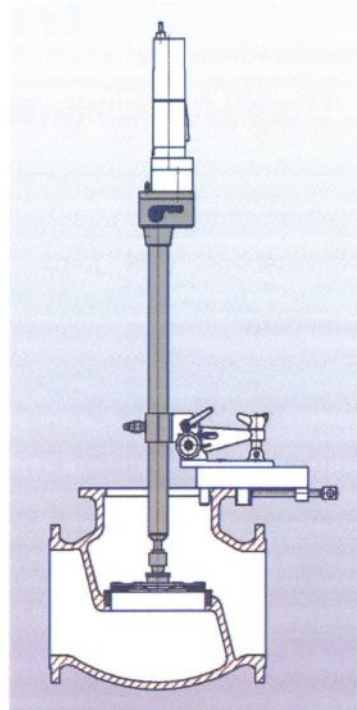
- **Swing-Check Adapter**  
Accessory for machining the sealing faces of non-return valves with large angle.
- **VB Device**  
Additional arm for grinding and lapping sealing faces in valve housings.
- **EFCO-SLA**  
Planetary gear with driven grinding spindles. Significantly increased performance - thus shorter machining times.



EFCO-SLA



Swing-Check Adapter



SL-15 with VB Device

## WELL THOUGHT-OUT MACHINING TECHNOLOGY

### Grinding (dry grinding)

- Using hardened and lapped grinding spindles and self-adhesive grinding paper or grinding film rings.
- On rotation of the planetary gear, the grinding spindles, which are guided in ball bearings, rotate around their own axis => optimum cross-hatch grinding.
- GSS - high-performance grinding disks for the removal of large-scale damage and use in hot valves.
- Optimum material removal.

### Lapping

- With grey iron lapping spindles.
- Lapping pastes in various grain sizes.



### **Optimum material removal due to:**

- High quality, self-adhesive, water-proof grinding papers and grinding films.
- Oil soluble lapping pastes based on boron carbide.

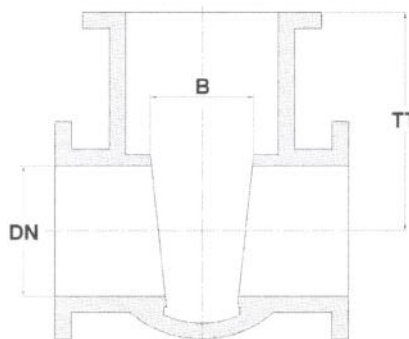
## EFCO-SL - The Complete Solution

The SL machines, as do all EFCO products, provide a complete repair system.

Specification	SL-05	SL-1	SL-15	SL-2	SL-3
Nominal bore (DN - mm)					
Standard	20-65 (3/4"-2 1/2")	32-150 (1 1/4"-6")	40-300 (1 1/2"-12")	200-700 (8"-28")	500-1600 (20"-64")
Special up to	80 (3")	200 (8")	450 (18")	900 (36")	2000 (80")
Immersion depth (mm) TT					
Standard	250 (9.8")	400 (15.7")	600 (23.6")	1000 (39.4")	1200 (47.2")
Special up to	400 (15.7")	600 (23.6")	1200 (47.2")	1600 (62.9")	2200 (86.6")
Min. spacing B	15 (0.59")	28 (1.1")	41 (1.6")	69 (2.7")	102 (4")
Drive	electric 230/110 V, 50/60Hz or pneumatic 6-7 bar				



EFCO SL-2



SL-15 machine case

Subject to technical change.

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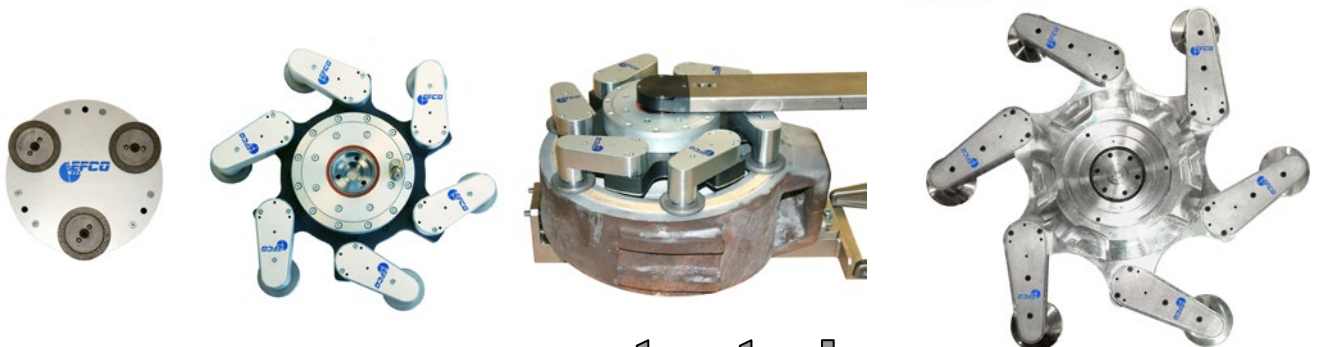
# HSL-15 / HSL-2

Portable High-Speed Gate Valve Grinder  
for the repair of sealing surfaces of gate valves and wedges

**HSL-15 DN 175-400 mm (DN 7"-16")**

**HSL-2 DN 225-600 mm (DN 9"-24")**

Huge time savings  
up to 90% !



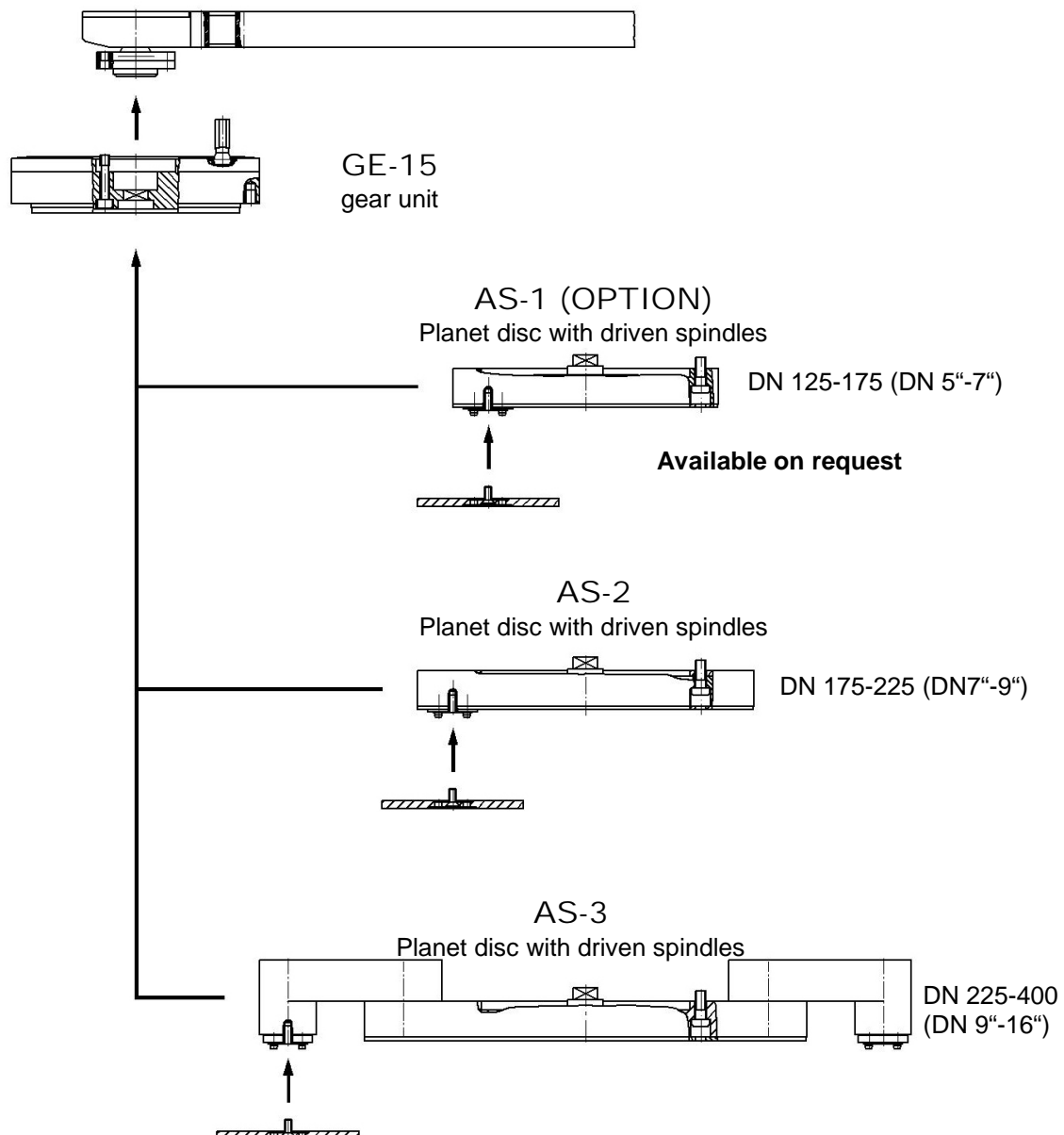
**patented**

THE PREMIUM-PRODUCTS – MADE BY EFCO – MADE IN GERMANY

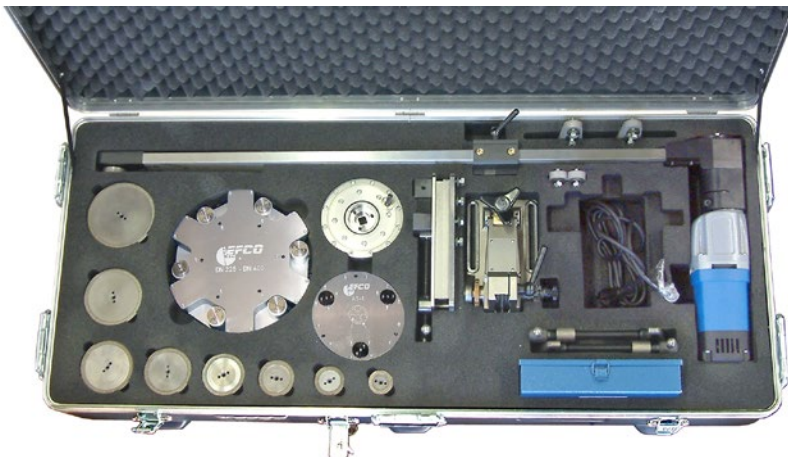
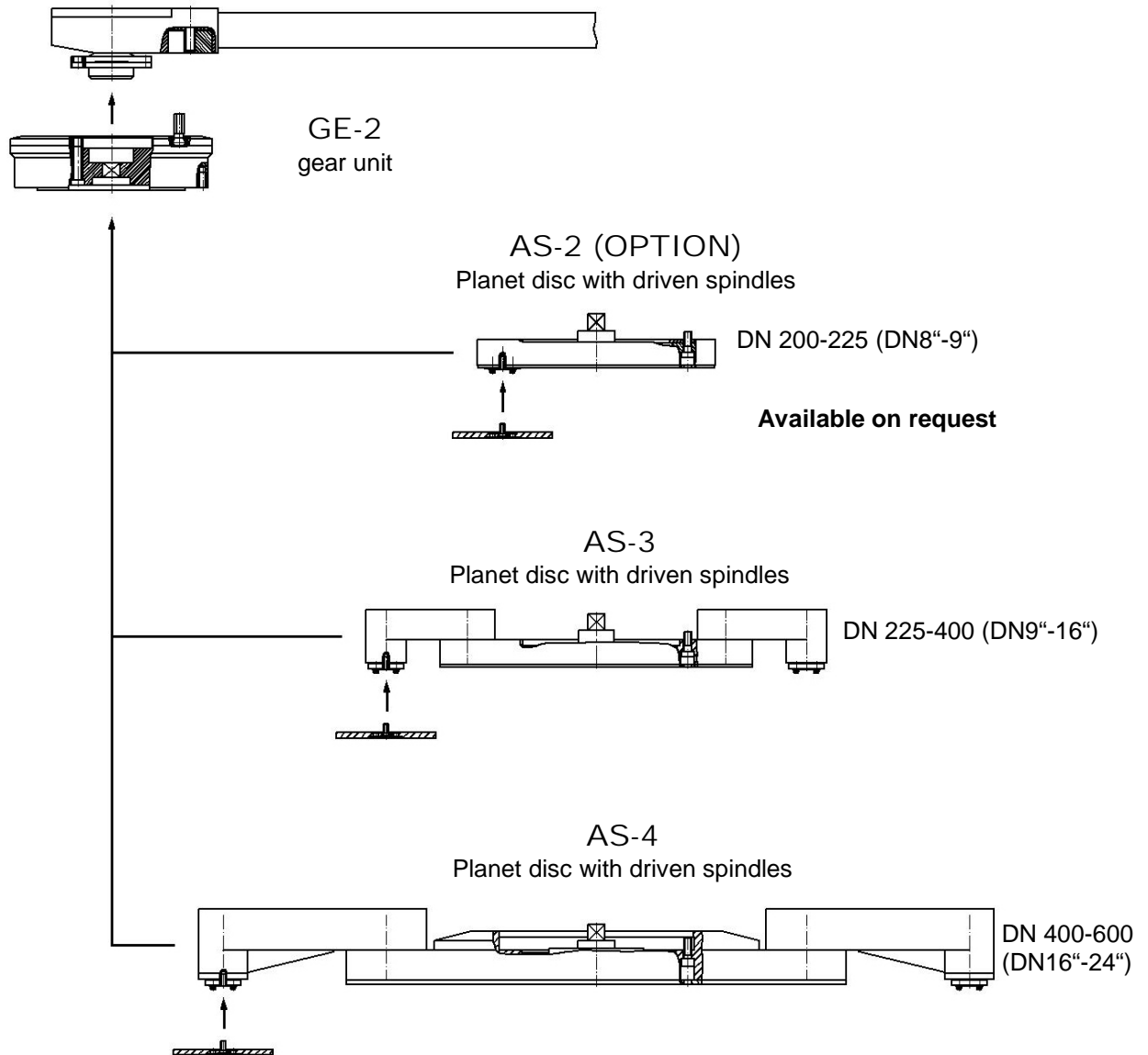
Our machines represent the latest technology in valve repair  
and set standards

- Very high speed of the **mechanically driven grinding spindles** simultaneously to slow rotation of planet disc
- High grinding speed:..... up to 21 m/s (826.8"/s)
- Very high removal rate:..... up to 2 mm/h (0.08"/h)  
(grinding „Stellite 6 / 21“ Ø 350/325 mm (13.8"/11.8"))
- Grinding spindles with CBN-coating by standard
- Machining „Stellite 6 / 21 using driven CBN-grinding spindles, compared to removal rate with:
  - non-driven CBN-grinding spindles:..... ....8 – 10 times higher
  - non-driven grinding spindles with folio or paper abrasives:...40 – 50 times higher

### The modular design of the HSL-15



## The modular design of the HSL-2



The EFCO HSL-Machines, -like all other EFCO products-, are a complete repair system, designed for on-site or in-shop use.

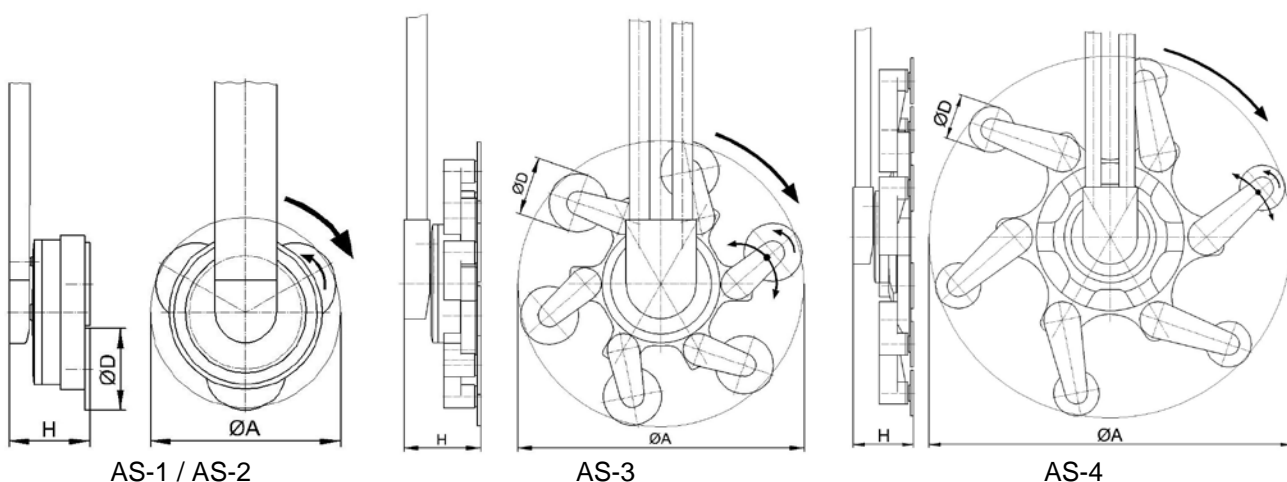
Each complete machine including all accessories is delivered in a plastic transport case.

← Example of a case

## Technical Details HSL

- Working range:**
  - HSL-15 with GE-15:**
    - AS-1 : DN 125-175 (DN 5"-7") (OPTION)
    - AS-2 : DN 175-225 (DN 7"-9")
    - AS-3 : DN 225-400 (DN 9"-16")
  - HSL- 2 with GE-2:**
    - AS-2 : DN 200-225 (DN 8"-9") (OPTION)
    - AS-3 : DN 225-400 (DN 9"-16")
    - AS-4 : DN 400-600 (DN 16"-24")
- Height H:**
  - Planet disc AS-1 + GE-15: 81,5 mm (3.2") (OPTION)
  - Planet disc AS-2 + GE-15: 77,5 mm (3.05")
  - Planet disc AS-3 + GE-15: 77,5 mm (3.05")
  - Planet disc AS-2 + GE-2 : 105 mm (4.13") (OPTION)
  - Planet disc AS-3 + GE-2 : 105 mm (4.13")
  - Planet disc AS-4 + GE-2 : 110 mm (4.3")

Outer grinding diameter A (mm) when using grinding spindle of diameter D (mm)														
	Ø40 (Ø1.57")		Ø50 (Ø1.97")		Ø60 (Ø2.36")		Ø80 (Ø3.15")		Ø90 (Ø3.54")		Ø100 (Ø3.94")		Ø120 (Ø4.72")	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
<b>AS-1</b>	-	153 (6")	-	163 (6.4")	-	173 (6.8")	-	193 (7.6")	-	203 (7.9")	-	-	-	-
<b>AS-2</b>	-	194 (7.6")	-	204 (7.9")	-	214 (8.4")	-	234 (9.2")	-	244 (9.6")	-	254 (10")	-	274 (10.8")
<b>AS-3</b>	250 (9.8")	376 (14.8")	252 (9.9")	386 (15.2")	262 (10.3")	396 (15.6")	282 (11.1")	416 (16.4")	292 (11.5")	426 (16.8")	302 (11.9")	436 (17.2")	322 (12.7")	456 (17.9")
<b>AS-4</b>	405 (15.9")	637 (25.1")	415 (16.3")	647 (25.5")	425 (16.7")	657 (25.9")	445 (17.5")	677 (26.7")	455 (17.9")	687 (27")	465 (18.3")	697 (27.4")	485 (19.1")	717 (28.2")



Subject to technical change.

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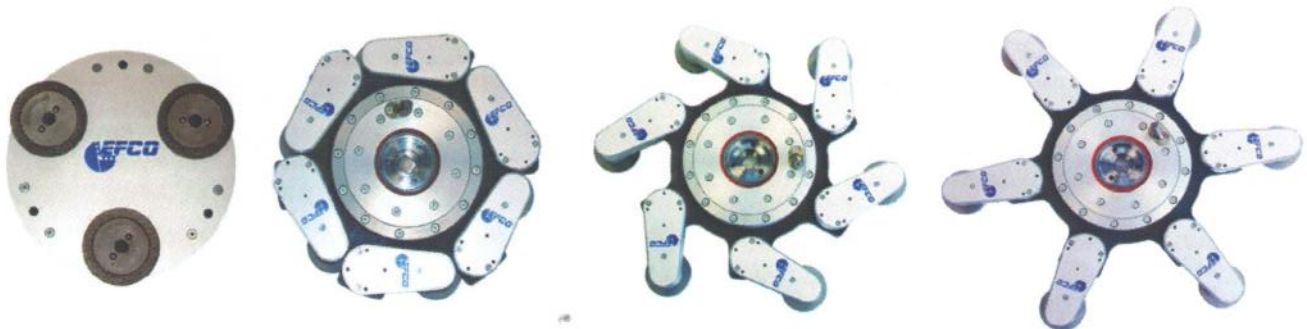
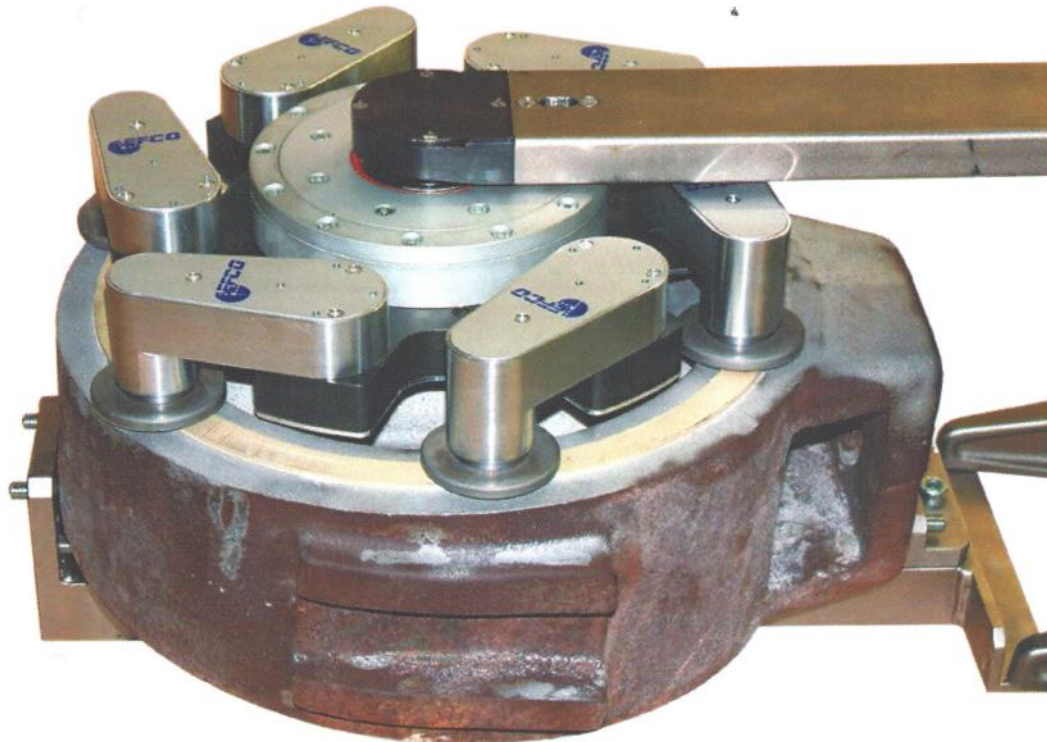
# SLA

**Planet-discs with mechanically driven grinding  
spindles as accessories to the  
EFCO- Gate Valve Grinding Machines SL-15 / SL-2**

SLA-15 DN 175-400 mm (DN 7"-16")

SLA-2 DN 225-600 mm (DN 9"-24")

**Huge time savings up to  
90% !**



**patented**

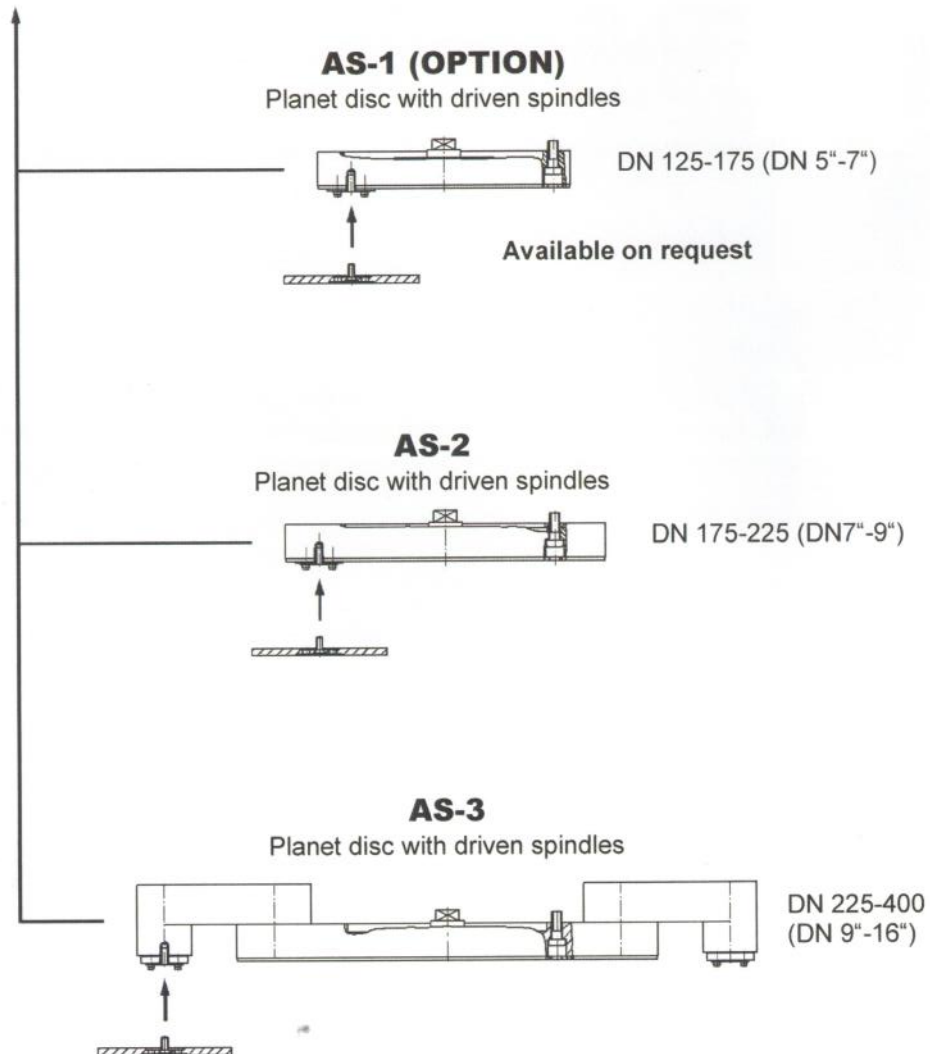
## Our machines represent the latest technology in valve repair and set standards

- Very high speed of the mechanically driven grinding spindles simultaneously to slow rotation of planet disc
- High grinding speed:..... up to 21 m/s
- Very high removal rate:..... up to 2 mm/h (grinding „Stellit 6 / 21“ Ø 350/325 mm)
- Grinding spindles with CBN-coating by standard
- Machining „Stellite 6 / 21“ using driven CBN-grinding spindles, compared to removal rate with:
  - non-driven CBN-grinding spindles:..... 8 – 10 times higher
  - non-driven grinding spindles with folio or paper abrasives:....40 – 50 times higher

### The modular design of the SLA-15



**GE-15**  
gear unit



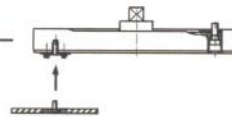
## The modular design of the SLA-2



**GE-2**  
gear unit

### **AS-2 (OPTION)**

Planet disc with driven spindles

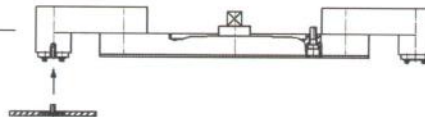


DN 200-225 (DN8"-9")

Available on request

### **AS-3**

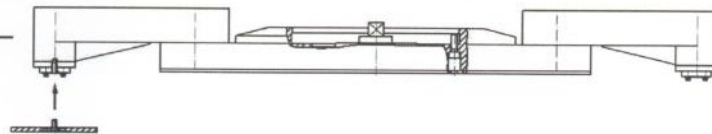
Planet disc with driven spindles



DN 225-400 (DN9"-16")

### **AS-4**

Planet disc with driven spindles



DN 400-600  
(DN16"-24")



The EFCO SLA-Tools, -like all other EFCO products-, are a complete repair system, designed for on-site or in-shop use.

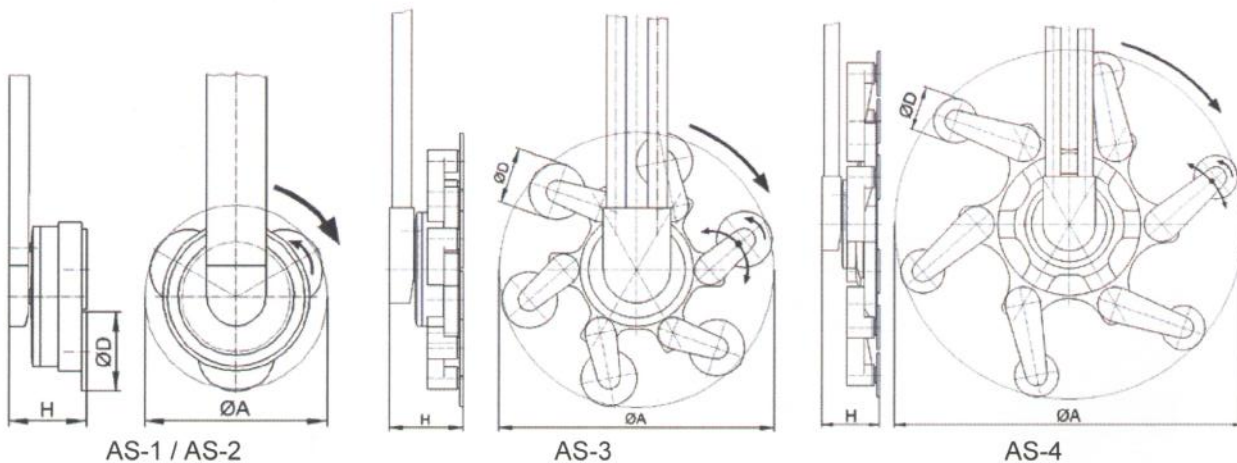
The complete discs with driven grinding spindles including all accessories are delivered in a plastic transport case.

← Example of a case

## Technical Details SLA

- Working range:
  - SLA-15** (for SL-15 as from 01/2006):  
 AS-1 : DN 125-175 (DN 5"-7") (OPTION)  
 AS-2 : DN 175-225 (DN 7"-9")  
 AS-3 : DN 225-400 (DN 9"-16")
  - SLA-2** (for SL-2 as from 01/2005):  
 AS-2 : DN 200-225 (DN 8"-9") (OPTION)  
 AS-3 : DN 225-400 (DN 9"-16")  
 AS-4 : DN 400-600 (DN 16"-24")
  
- Height H:  
 with a  
 EFCO SL-machine
  - Planet disc AS-1 + GE-15: 81,5 mm (3.2") (OPTION)
  - Planet disc AS-2 + GE-15: 77,5 mm (3.05")
  - Planet disc AS-3 + GE-15: 77,5 mm (3.05")
  - Planet disc AS-2 + GE-2 : 105 mm (4.13") (OPTION)
  - Planet disc AS-3 + GE-2 : 105 mm (4.13")
  - Planet disc AS-4 + GE-2 : 110 mm (4.3")

Outer grinding diameter A (mm) when using grinding spindle of diameter D (mm)														
	Ø40 (Ø1.57")		Ø50 (Ø1.97")		Ø60 (Ø2.36")		Ø80 (Ø3.15")		Ø90 (Ø3.54")		Ø100 (Ø3.94")		Ø120 (Ø4.72")	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
<b>AS-1</b>	-	153 (6")	-	163 (6.4")	-	173 (6.8")	-	193 (7.6")	-	203 (7.9")	-	-	-	-
<b>AS-2</b>	-	194 (7.6")	-	204 (7.9")	-	214 (8.4")	-	234 (9.2")	-	244 (9.6")	-	254 (10")	-	274 (10.8")
<b>AS-3</b>	250 (9.8")	376 (14.8")	252 (9.9")	386 (15.2")	262 (10.3")	396 (15.6")	282 (11.1")	416 (16.4")	292 (11.5")	426 (16.8")	302 (11.9")	436 (17.2")	322 (12.7")	456 (17.9")
<b>AS-4</b>	405 (15.9")	637 (25.1")	415 (16.3")	647 (25.5")	425 (16.7")	657 (25.9")	445 (17.5")	677 (26.7")	455 (17.9")	687 (27")	465 (18.3")	697 (27.4")	485 (19.1")	717 (28.2")



Subject to technical change.

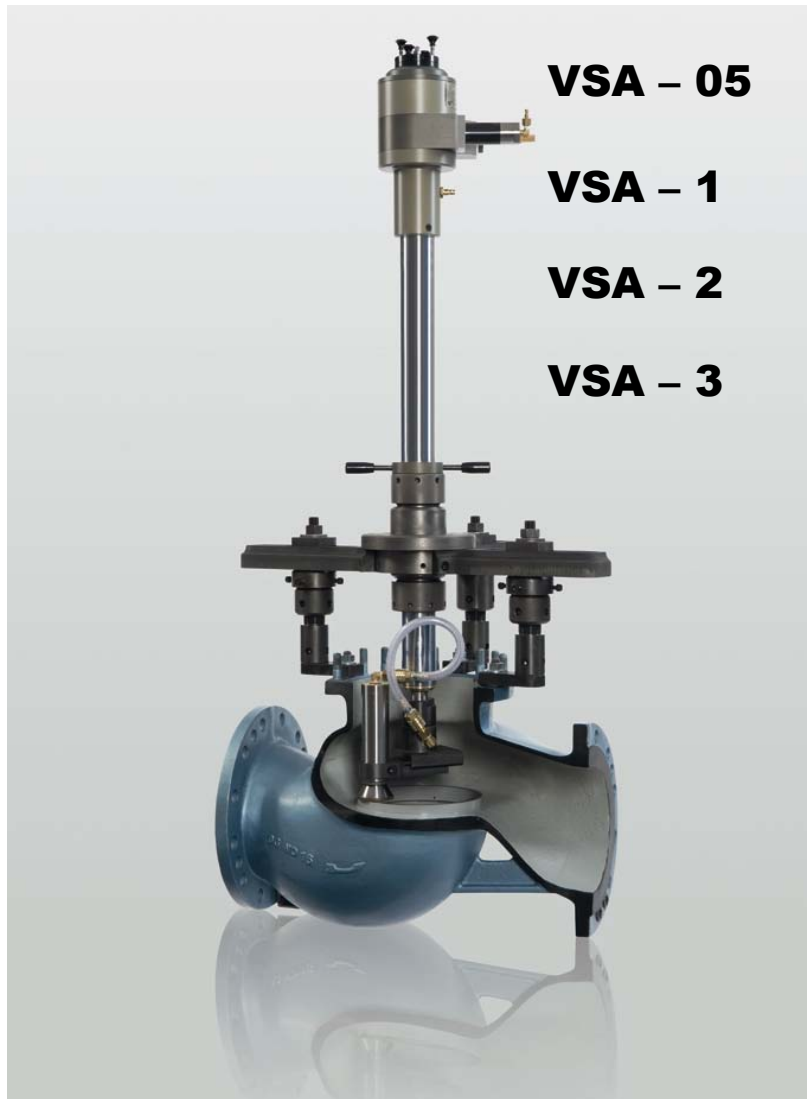
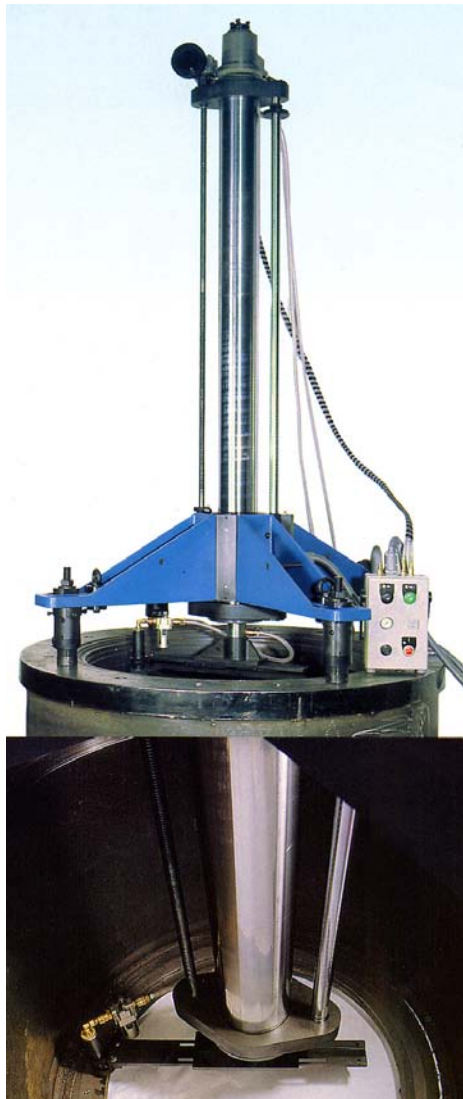
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 Otto-Brenner-Straße 5 – 7 • D - 52353 Düren • Phone: +49-(0)2421-989-0 • Fax: +49-(0)2421-86260  
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# VSA series

**High-speed grinding machines for machining flat and conical seats in valves and on flanges.**

**DN 20 – 1500 mm  
(3/4" – 60")**



**Quality, reliability and innovative technology**

## Employing tomorrow's technology to machine today's valves

### EFCO-VSA

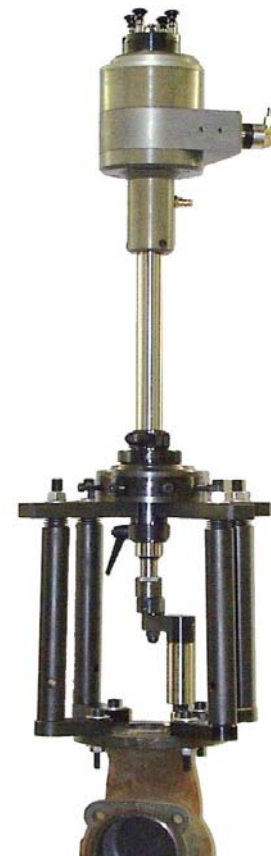
...the new generation of precision grinding machines for machining sealing faces, conical faces and bores in valves, cylinders, pump housings, flanges and many more.

The VSA machines are suitable for use on site and in the workshop, in nuclear and conventional power stations, for valve service, for chemical and petrochemical plants, for shipyards etc.

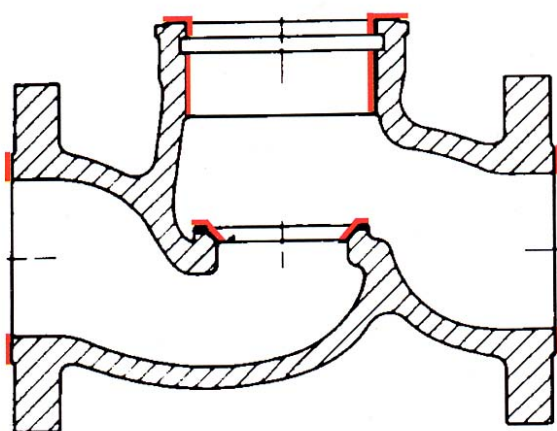
The controls for rotation and axial feed are easily accessible. Control of the machine is safe in any mounting position. Axial feed is via max. four buttons. The axial path is determined via limit switches in conjunction with the bore grinding device.

VSA machines are mounted on a flange as standard. The machine is adapted to the appropriate pitch circle diameter using interchangeable clamping arms. Horizontal adjustment is via bolts with a fine thread, and centering via adjusting screws. As an alternative, external clamping devices are available so that the flanges, too, can be machined.

The machine can thus be mounted even if there is no flange.



VSA-05



— Machinable faces

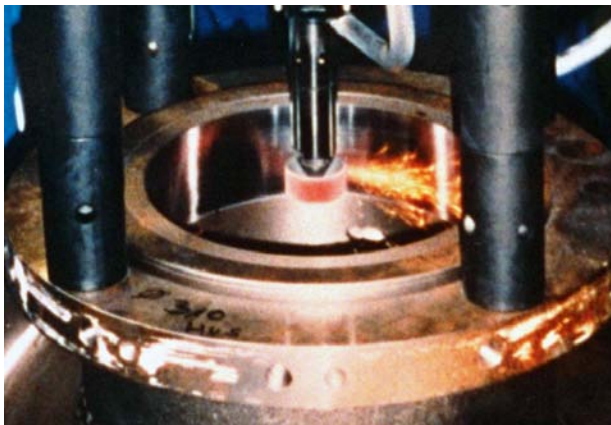
### Benefits:

- Continuous axial feed - can also be controlled manually.
- High stability.
- Can be used in any mounting position - on site or in the workshop.
- Flexible mounting systems.
- Very precise height adjustment and centering.
- Interchangeable guide tubes in various lengths can also be supplied.

## Bore grinder

This very robust accessory ensures the highest precision in any mounting position.

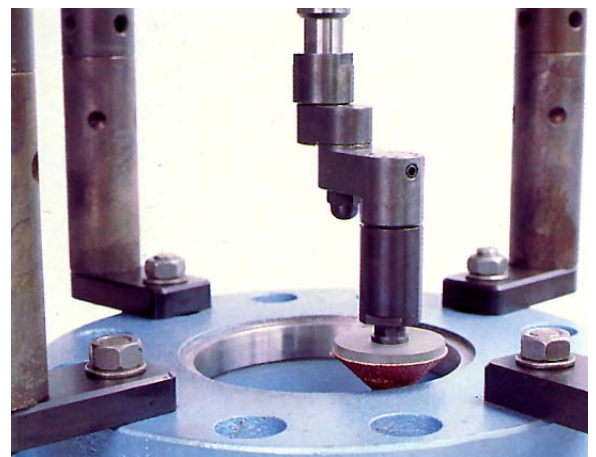
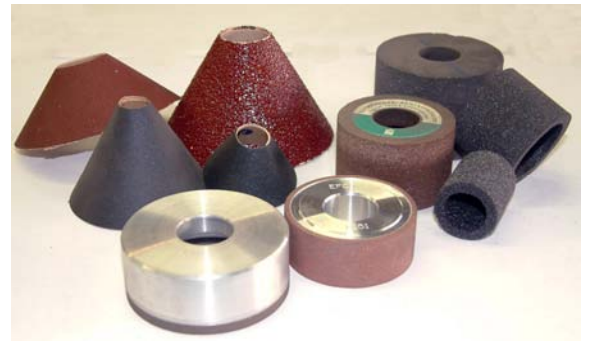
The bore grinder (special accessory) enables precise grinding of valve bores with automatic reversible stroke. It is particularly suitable for grinding cylindrical faces for radial seals (e.g. Brettschneider).



## Grinding tools

Various grinding tools are available:

- Cup wheels (silicon carbide, special fused alumina)
- Conical abrasive sleeves for the grinding of sealing faces at various angles.
- CBN abrasive wheels



## EFCO-VSA - The Complete Solution

Specification	VSA-05	VSA-1	VSA-2	VSA-3
Nominal bore (DN - mm)	20-150 (¾"-6")	50-400 (2"-16")	250-800 (10"-32")	500-1500 (20"-60")
Working range (mm)	up to 150 dia. (5.9")	up to 400 dia. (15.7")	up to 800 dia. (31.5")	up to 1500 dia. (59")
Insertion depth (mm)	250 (9.8")	650 (25.6")	1000 (39.4")	up to 1500 (59")
Clamping diameter mm	min. 200 (7.9") max. 540 (21.3")	min. 290 (11.4") max. 600 (23.6")	min. 290 (11.4") max. 1150 (45.3")	min. 500 (19.7") max. 1350 (53.2")
Drive	pneumatic 6-7 bar			

**The VSA machines, as do all EFCO products, provide a complete repair system.**

The machines are supplied with extensive accessories.  
Machine and accessories are supplied in a practical workshop trolley.



VSA in workshop trolley

Subject to technical change.

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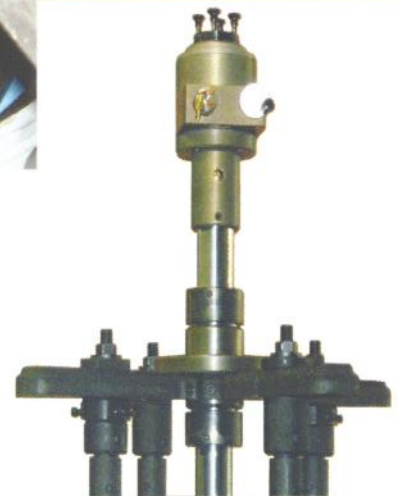
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# Manhole Grinding Device 250-800 mm (9.8"-31.5") as a supplement to our high-speed grinding machine EFCO VSA-2



- For manholes in boilers, tanks, heat exchangers, etc.
- For grinding in any position
- Easy handling
- High removal rate due to use of CBN grinding discs
- For hand holes on request



Subject to technical change.

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07/2006 - 02

# HSS-1A

## Mobile high-speed valve grinding machines

### DN 200-600mm (8-24")

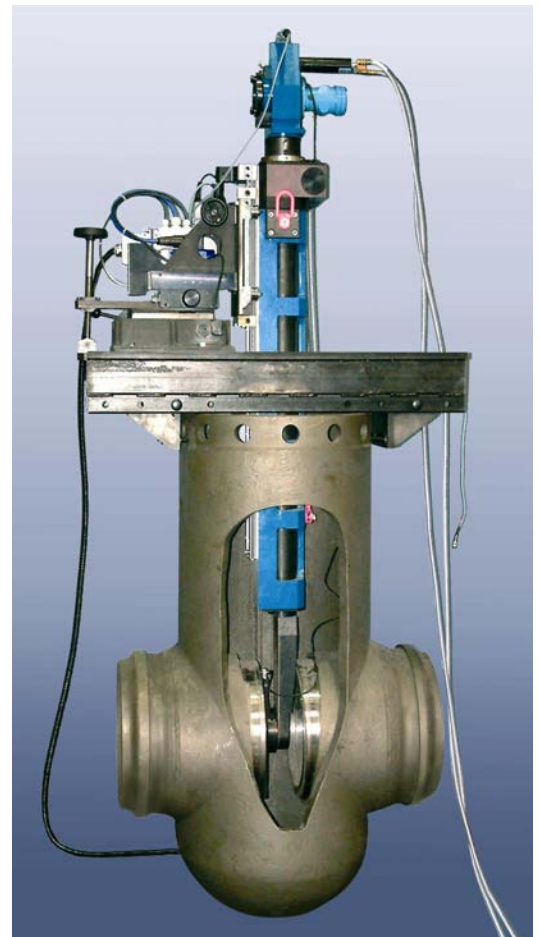
The HSS is a portable high-speed valve grinding machine for general overhaul (incl. angle correction) of the sealing faces in gate valve and non-return valve housings on site. This new generation of valve grinding machines is preferentially used where high material removal is required. This is always the case when sealing faces must be largely or completely renewed.

Depending on accessories, the HSS can be used for many tasks of valve refurbishment, including, for example:

- Grinding of conical sealing faces, mainly on non-return valve housings.
- Grinding of chamfers and radii
- Detection of sealing face geometry (angular position) with the integral measurement system.
- Defined changes to sealing face geometry.

#### Benefits of HSS machines:

- Easy installation and precise alignment.
- Adjustment of grinding arm at precise angle in the same position.
- High throughput.



Subject to technical change.

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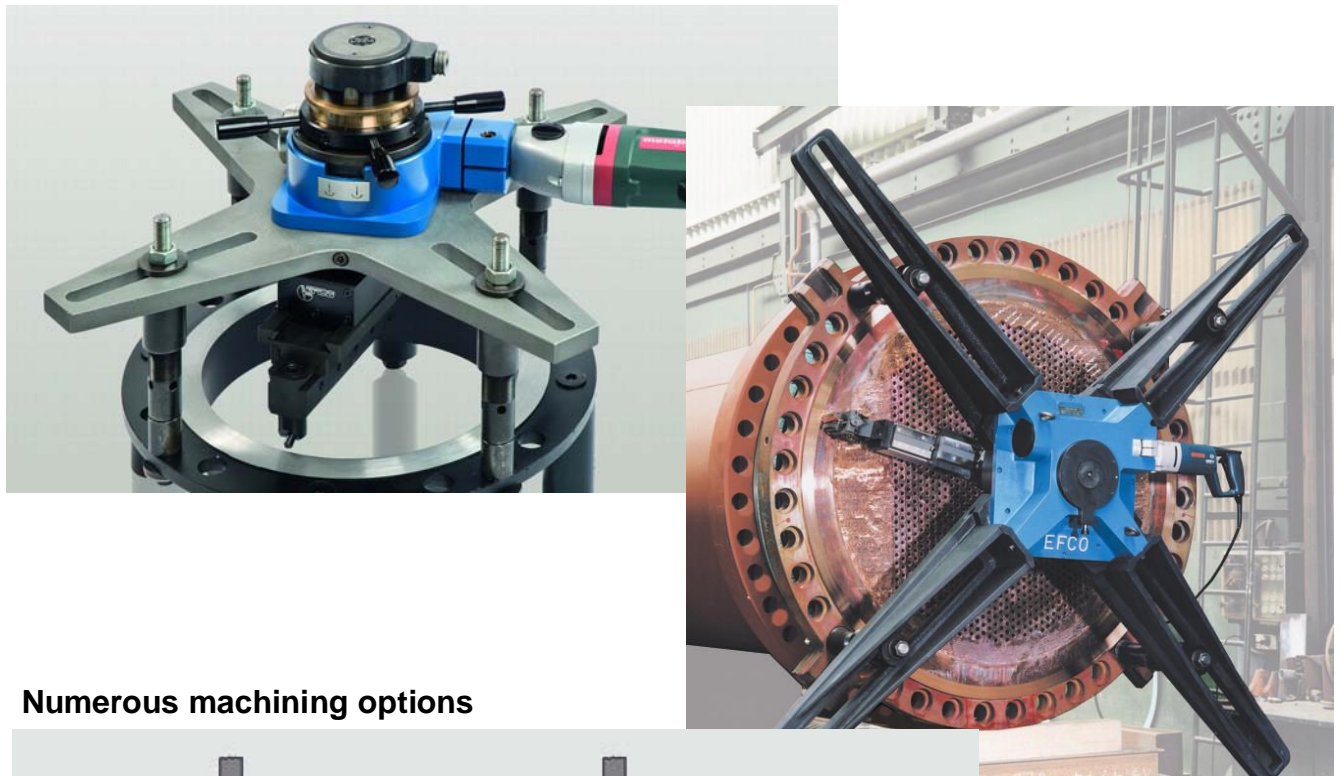
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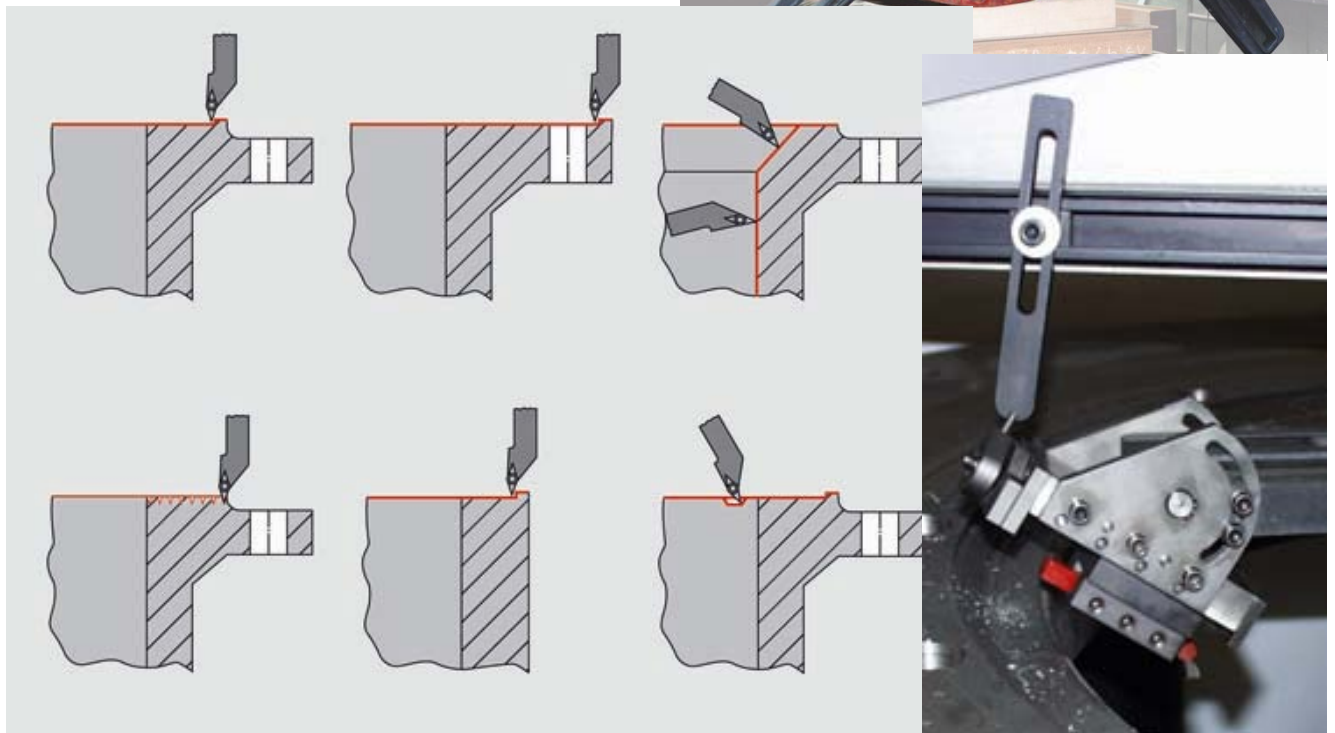


# TDF Series

## PORTABLE FLANGE TURNING MACHINE WITH EXTERNAL CLAMPING



Numerous machining options



THE PREMIUM-PRODUCTS – MADE BY EFCO – MADE IN GERMANY

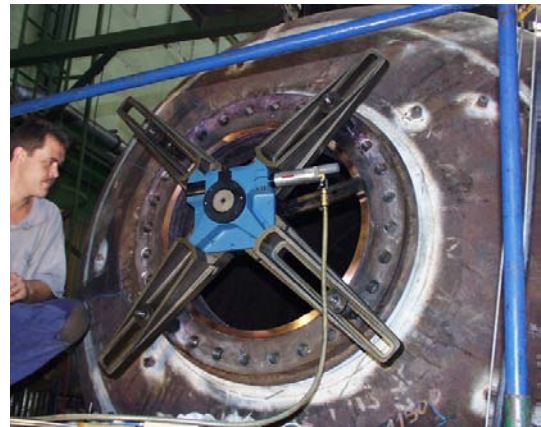
## QUALITY, RELIABILITY AND INNOVATIVE TECHNOLOGY

Due to the constantly rising pressure on the costs of industrial maintenance, the demands made on the machines and tools required also increase.

The particular low profile and low weight of the portable TDF series turning machines create new possibilities for flange machining on site.

### EFCO TDF machines are particularly suitable for:

- Machining of flanges of all types
- Valve housings
- Bottles
- Heat exchangers
- Fittings in shipbuilding
- Columns in refineries and the chemical industry
- Smooth and helically fluted flange sealing faces
- Internal cones and bores (special facing head)

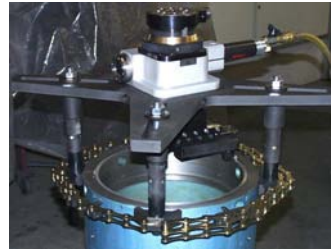


TDF-2 with compressed air drive



TDF-2 with electric drive

### Three different setup types:



#### Basic mounting on the flange bore

TDF machines can be mounted directly on the flange.

The machines can be aligned precisely with regard to the face to be machined using the integral adjustment system.

#### Chain clamping

If there is no flange, for example on Brettschneider closures, the chain tensioning system is the ideal solution.

The four clamping points required for mounting are provided by this system.

#### Mounting on tensioning blocks

Tensioning blocks are another universally adjustable clamping device for flanges with clearance holes. They form part of the scope of supply for many models of the TDF range.



## Machine descriptions

	TDF-05	TDF-1	TDF-2	TDF-3
<b>Face turning ranges</b>	<b>0-250 mm (0-9.8“)</b>	<b>0-500 mm (0-19.7“)</b>	<b>300-1200 mm (11.8“-47.2“)</b>	<b>700-2200 mm (27.5“-86.6“)</b>

The low weight and low profile make mounting easier as this is normally handled by only one person. The machines are particularly suitable for the on-site repair of sealing faces of flanges in pipelines. The simply designed clamping and adjustment system permits mounting of the machines extremely quickly precisely centred and level to the flange.

Both machines are fitted with a facing head. It has 2 automatic feeds (0.1 mm (0.004”)/rotation for finishing and 1 mm (0.04”)/rotation for turning of spiral grooves or a surface roughness Rz 160 The cutting tool feed is 20 mm (0.8”) (50 mm (2”) for the TDF-3).

Indexable inserts with appropriate inserts are part of the standard equipment.

As an option, both machines can be fitted with an angled facing head.

The facing slide of this head can be continuously adjusted from 0° (facing) to 120°.

The stroke is 60 mm (2.36”).

This means that bores, too, can be machined at the 90° setting.



TDF-1



TDF-05-A

	TDF-05A	TDF-1A	TDF-2A
<b>Face turning ranges</b>	<b>0-250 mm (0-9.8“)</b>	<b>0-400 mm (0-15.7“)</b>	<b>300-800 mm (11.8“-31.5“)</b>

These machine types have an additional manual axial feed of 30 mm (1.2”). Despite this additional function, the machine height is only 310 mm (12.2”) (380 mm (15”) for the TDF-2A).

These models, too, can be mounted and operated by only one person without effort.

Due to the additional axial feed, the TDF-A machines are particularly suitable for cutting sealing grooves of all types.

Whilst the cutting tool feed on TDF machines can be operated only with the machine stationary, the axial feed which is arranged centrally to the machine, can also be moved with the cutting steel rotating.

The 2-feed facing head (0.1 mm (0.004”)/rotation and 1 mm (0.04”)/rotation) used on TDF machines is also used here.

As an option, the machines can be fitted with the angled facing head.



Angled facing head

All machines are low-maintenance and have lifetime lubrication.

## Specifications - all dimensions in mm / inch

Type	TDF-05	TDF-05A	TDF-1	TDF-1A	TDF-2	TDF-2A	TDF-3
Machining dia.	0-250 0-9.8"	0-250 0-9.8"	0-500 0-19.7"	0-400 0-15.7"	300-1200 11.8"-47.2"	300-800 11.8"-31.5"	700-2200 27.5"-86.6"
Mounting dia.	250-400 9.8"-16"	250-400 9.8"-16"	260-600 10.2"-23.6"	260-600 10.2"-23.6"	480-1380 18.9"-54.3"	480-1380 18.9"-54.3"	750-2400 29.5"-94.5"
Machine height	230 9.1"	310 12.2"	230 9.1"	310 12.2"	300 11.8"	380 15"	450 17.7"
Radial stroke	80 3.15"	80 3.15"	80 3.15"	80 3.15"	100 3.9"	100 3.9"	150 5.9"
Radial feed, Fine (automatic)	0.1 0.004"	0.1 0.004"	0.1 0.004"	0.1 0.004"	0.1 0.004"	0.1 0.004"	0.1 0.004"
Radial feed, Coarse (automatic)	1 0.04"	1 0.04"	1 0.04"	1 0.04"	1 0.04"	1 0.04"	1 0.04"
Axial stroke (manual)	-	30 1.2"	-	30 1.2"	-	30 1.2"	-
Cutting tool feed	20 0.8"	-	20 0.8"	-	20 0.8"	-	50 2"
Axial stroke with angled head (optional)	60 2.36"	60 2.36"	60 2.36"	60 2.36"	80 3.15"	80 3.15"	80 3.15"
Shipping weight (kg)	48	61	54	67	270	300	485

All machines can be supplied with an electric as well as a compressed air drive.

## Extensive accessories

All tools required for mounting are part of the scope of supply of the TDF machines. In addition, all TDF machines are equipped with a range of cutting tools.



Subject to technical change.

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12/2008 - 03

# TDFI-2

## Portable flange facer with internal clamping

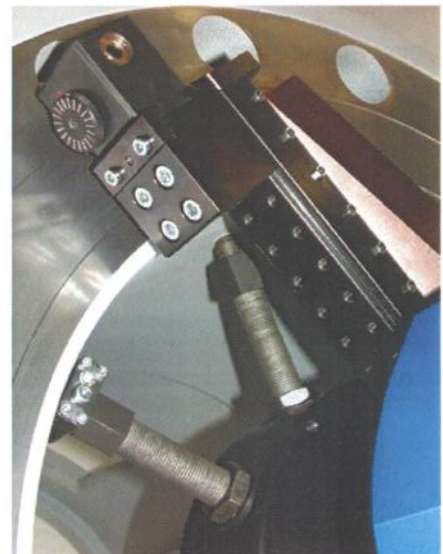
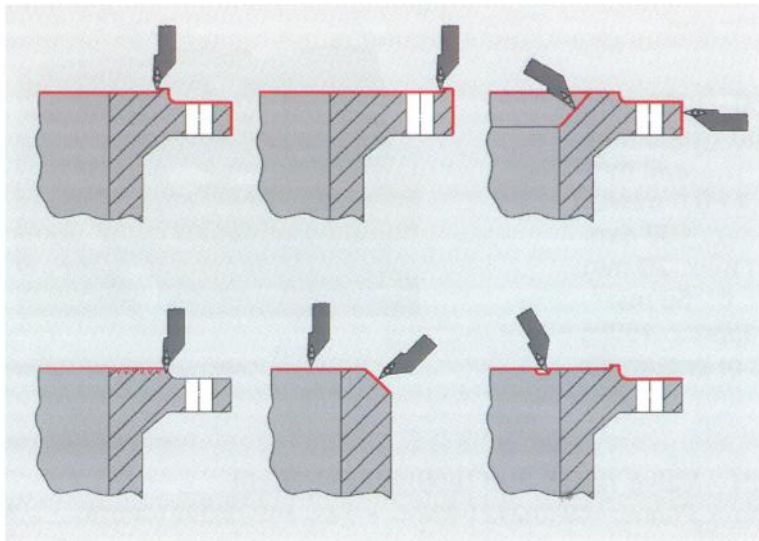
Because of the continuously increasing pressure to reduce costs in the industrial maintenance area, additional demands are being made of the machinery and tools that are required. Because of the flat design and light weight, the mobile, portable flange facer with internal clamping is suitable for making repairs on-site.

The EFCO TDFI-2 machine is particularly suitable for machining:

- Flanges of any kind
- Fitting housings
- Container flanges
- Heat exchangers
- Shipbuilding fittings
- Columns in refineries and the chemical industry
- Smooth and spirally grooved flange sealing surfaces



### Numerous machining options



## QUALITY, RELIABILITY AND INNOVATIVE TECHNOLOGY

### Machine description

The TDFI-2 consists of the clamping device, gearbox housing, drive and facing head assemblies.

As an independent assembly, the **clamping device** is first **fitted separately** in the hole of the part to be machined, and clamped

=> **Light weight – better handling.**

With the **simply designed chucking and adjusting system** the clamping device can be aligned so that is centric and level with the flange within a short time.



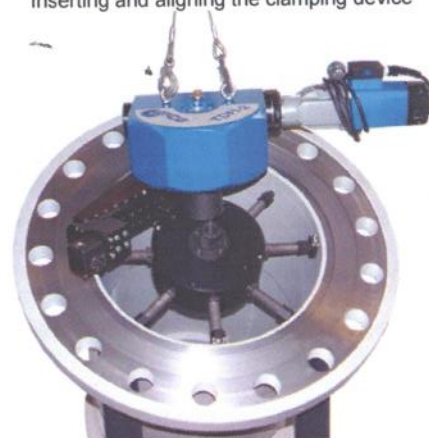
Inserting and aligning the clamping device

Subsequently the **gearbox housing incl. drive and facing head** are easy to fit to the clamping device.

Installation can normally be carried out by just one person.

The facing head has **3 automatic radial feeds** for finishing and roughing work and for cutting spiral grooves.

Power can be provided by either an electric motor or a compressed air motor.



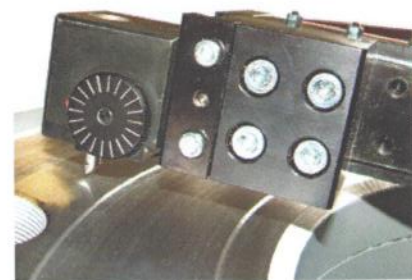
Fitting the gearbox housing

### Plenty of accessories

The scope of delivery of the machine includes all of the tools and measuring materials that are needed for installation and alignment. The machine is also equipped with a range of different turning plate holders and appropriate cutting plates.

### Technical data \*

Machining -Ø:	400 - 1200 mm
Clamping -Ø:	400 - 1000 mm
Height of machine:	330 mm
Radial feeds	0,06 / 0,1 / 0,5 mm/U
Radial stroke (facing head):	100 mm
Axial tool feed:	max. 20 mm
Spindle speed:	0 - 58 min <sup>-1</sup>
Overall weight:	approx. 150kg
Drive:	electric or pneumatic



\* other versions on request

Subject to technical change.

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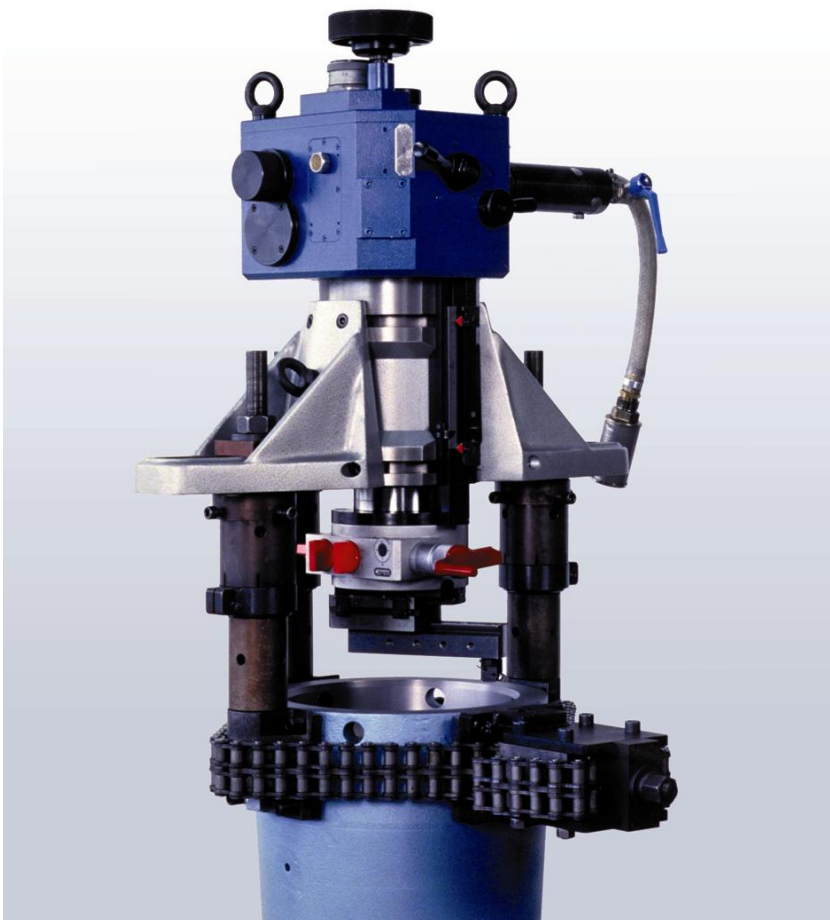
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# TD Series

Portable lathe for on-site machining of valves, flanges, pumps, turbine housings etc.



THE PREMIUM-PRODUCTS – MADE BY EFCO – MADE IN GERMANY

## A forward-looking solution for machining the valves of today

### EFCO-TD

The portable TD machine for turning drill holes and sealing surfaces in valves, cylinders, pumps, turbine housings, flanges etc. It is particularly suitable for turning cylindrical sealing surfaces in high-pressure valves (board-cutting seal) and for turning complete valve seatings. Also suitable for turning conical sealing surfaces.

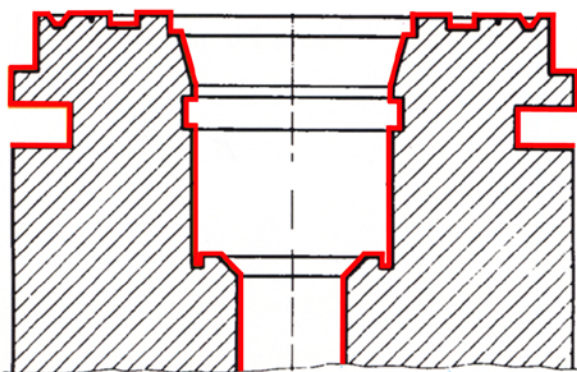
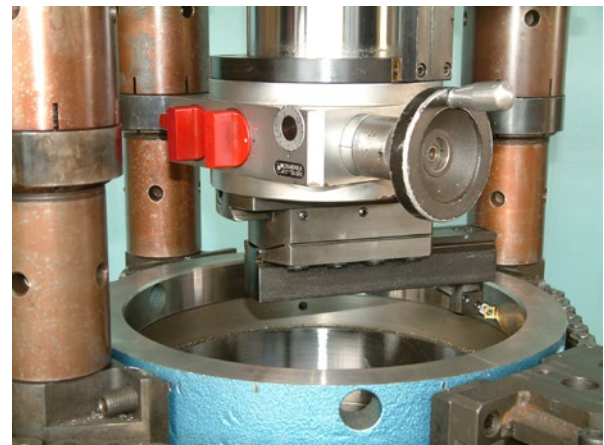
The TD machines are suitable for use on site and in the workshop, in nuclear and conventional power stations, for servicing equipment, in chemical engineering and petrochemicals, in structural steel engineering, in shipyards and oilfields.

The controls are readily accessible and, wherever the machine is installed, they enable it to be controlled simply and safely.

The axial and radial paths are limited by limit switches. These machines are supplied equipped with all the necessary accessories.

The TD machines are normally installed on a flange. The machine is adjusted to the appropriate diameter of hole by means of replaceable tensioning arms. Horizontal adjustment is carried out using bolts with fine threads, whilst setscrews are used for centering.

Alternatively, there is also a chain tensioning device which enables flanges to be turned as well. Thus the machine can even be installed in situations where there is no flange.



— Machining options

### Advantages:

- Fully-automatic radial and axial feed
- Fully-automatic fast return
- Excellent stability even when removing large amounts of swarf
- Suitable for installation in any situation – on site or in the workshop
- Variety of installation systems
- Precision height and center adjustment
- Guide tubes can also be supplied (and replaced) in a variety of different lengths

## Taper lathe

As well as machining cylindrical and flat surfaces, series TD-1 and TD-2 lathes also allow conical surfaces to be machined. This application requires a taper lathe instead of the facing head.

There are two different sizes:

**LKD 1** with a max. rotational diameter of 180 mm (7") (carriage travel = 36 mm (1.4"))

**LKD 2** with a max. rotational diameter of 400 mm (15.7") (carriage travel = 60 mm (2.4"))



Taper lathes allow any angle to be machined from 0° (= facing) to 90° (=hole drilling).

## Axial plunging tools

Time and again, the separation of welding seams when seating sections are welded in represents an insuperable problem.

By deploying **axial plunging tools** in conjunction with the TD machines, this job becomes almost child's play.

The way that the tool is assembled using a modular system gives it the greatest possible degree of flexibility. Thus, even with the basic version, seatings up to a depth of approx. 600 mm (23.6") can be plunged.

The standard range comprises three different tool heads (core bits):

Size 1:                    Ø100 – 155 mm (3.9" – 6.1")       (2 cuts)

Size 2:                    Ø150 – 210 mm (5.9" – 8.3")       (4 cuts)

Size 3:                    Ø190 – 250 mm (7.5" – 9.8")       (4 cuts)



All core bits are equipped with interchangeable cutter elements (HSSE or HM). Plunging depth is 30 mm (1.2").

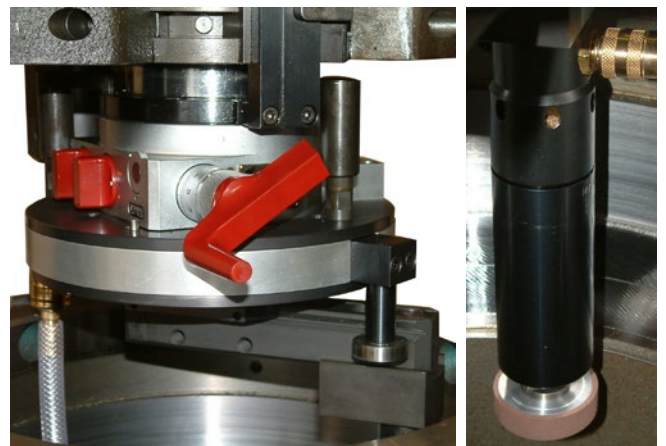
The central guide pin means that the tool can be controlled superbly well. It also offers the opportunity to punch materials through absolutely safely without the core tipping on its edge.

## Grinding device for machining drill holes and flat surfaces

The TD series of portable lathes can be used to produce dressed-quality finishes.

For most applications this is perfectly satisfactory. However, if a superior-quality finish is required, then the workpiece should be ground. For this purpose, EFCO can supply a pneumatic grinding device which can be fitted to the TD machine as a special accessory.

The machine, which is aligned with the workpiece, does not need to be dismantled in order to fit the grinding device.

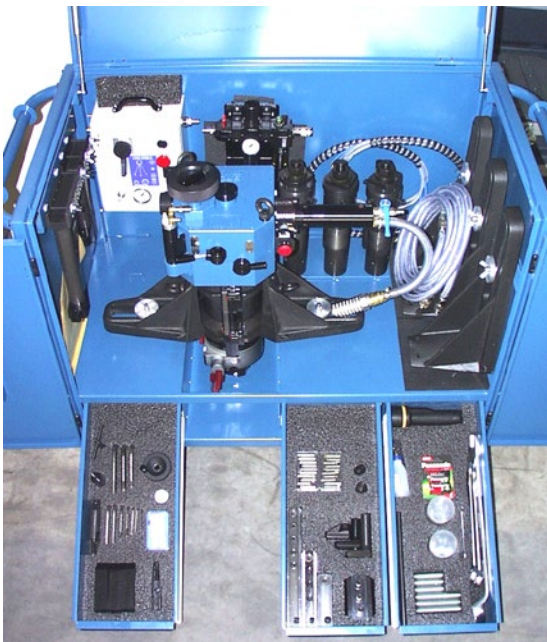


## EFCO-TD – The Universal Solution

Technical data	TD-03	TD-1	TD-2
Turning range	up to Ø 150 up to Ø 5.9"	up to Ø 400 up to Ø 15.7"	up to Ø 600 up to Ø 23.6"
Working depth	max. 250 max. 9.8"	max. 350 max. 13.8"	max. 540 max. 21.3"
Radial travel	20 0.79"	40 1.57"	60 2.36"
Axial travel	100 3.94"	120 4.2"	150 5.9"
Collet diameter	Ø 80-300 Ø 3.2"-11.8"		
- Short collet arms min. Ø	/		
max. Ø			
- Long collet arms min. Ø	/		
max. Ø			
- Long collet arms min. Ø	/		
max. Ø			
Drive	electric 230/110 V, 50/60 Hz or pneumatic 6-7 bar		

Dimensions in mm (inch)

### The TD machines, like all EFCO machines, form a complete repair system.



The wealth of accessories supplied with these machines enables them to be fitted and adjusted precisely to virtually any equipment. The standard accessories include a range of turning tools. The machine and its accessories are accommodated in a practical workshop trolley. The possibilities for upgrading and variations in configuration are virtually limitless.

Examples include:

- Working at greater depths
- Interchangeable drive motors (electric / compressed air).
- Additional adjustable support when submerged at great depth.
- Variable or special installation accessories
- Infinitely adjustable axial feed using an additional pneumatic or electric motor

Simply specify what it is that you want – EFCO will implement it for you.

Subject to technical change.

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Otto-Brenner-Straße 5 – 7 • D - 52353 Düren • Phone: +49-(0)2421-989-0 • Fax: +49-(0)2421-86260

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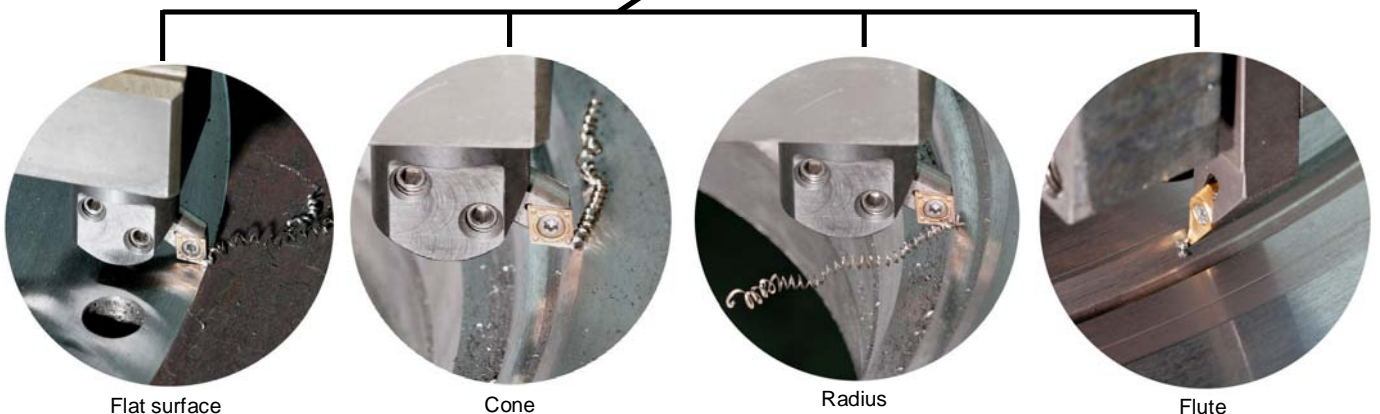
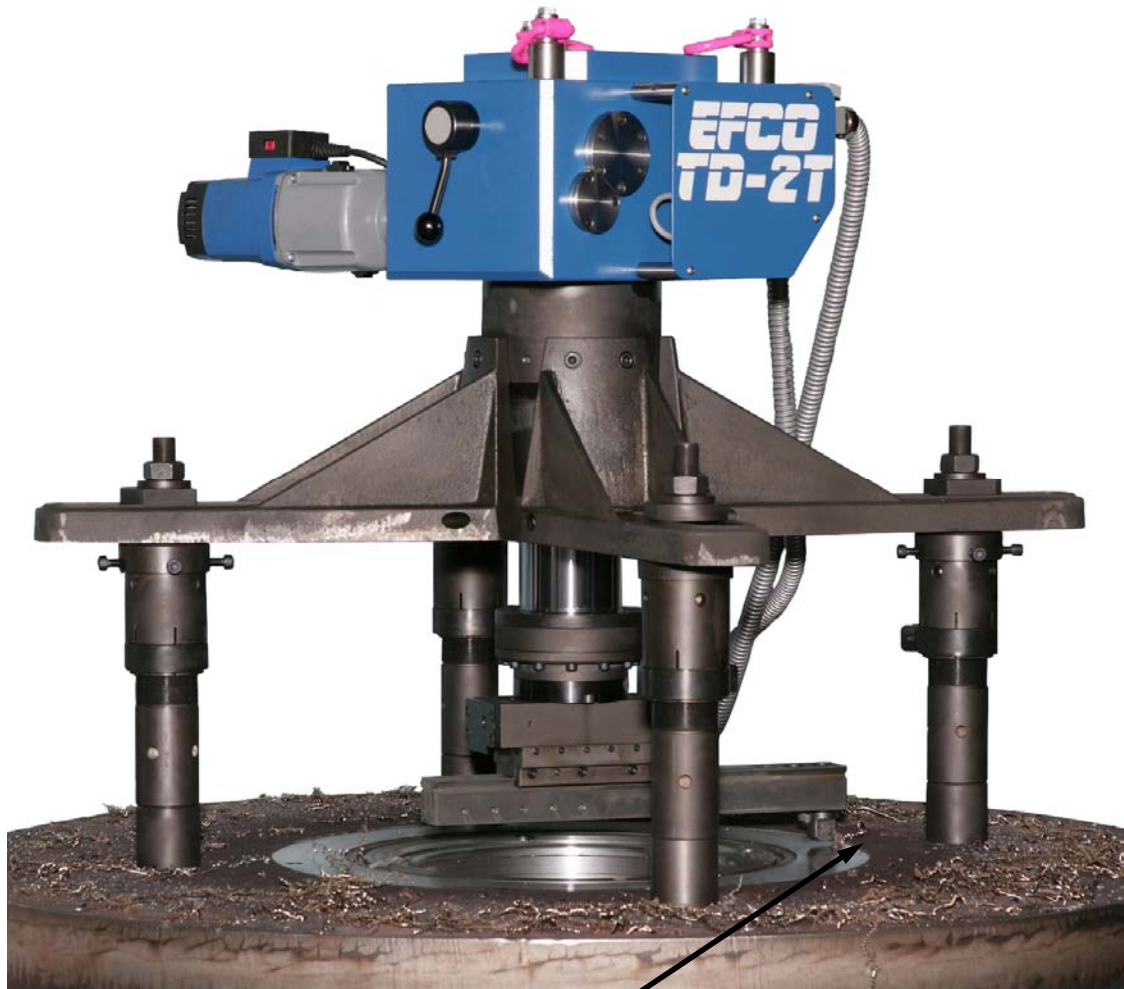


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# TD-2T

**Portable turning machine for flat surfaces,  
cylindrical surfaces, radii and cones**



Flat surface

Cone

Radius

Flute

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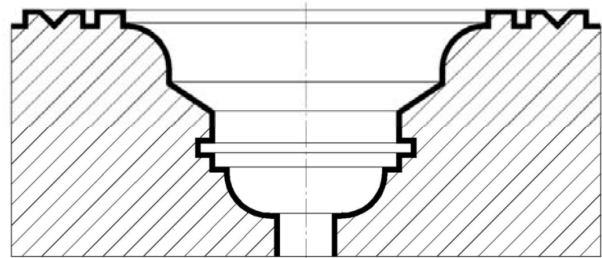
## Tomorrow's technology to machine today's valves

The TD-2T is a portable turning machine with an external clamping system. It can be controlled in two axes (X and Z).

This machine version, as are all TD series turning machines, is designed for the machining of internal and flat faces of rotationally symmetrical components.

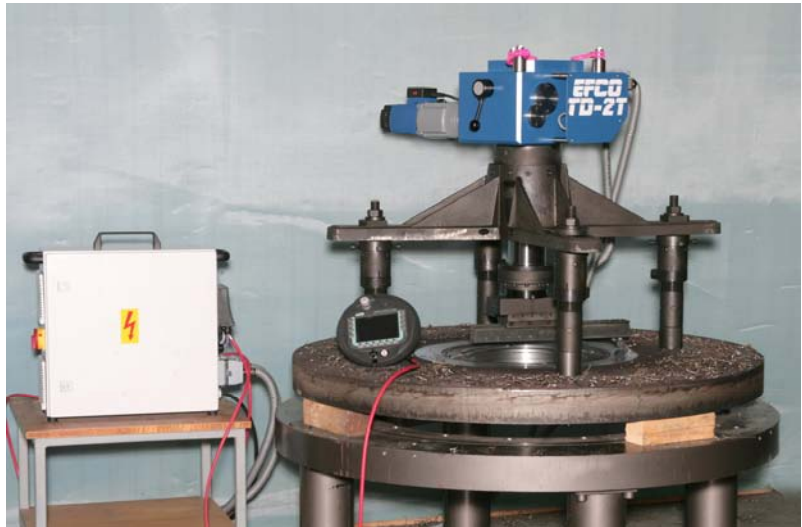
The TD-2T has the following features:

- Many different faces can be machined
- External operation ⇒ no operation at turret required
- Complete machining without additional tools
- Infinitely adjustable axial and radial feeds
- Compact design ⇒ low weight
- Requires little maintenance
- Either manual or automatic operation
- Simple to use



Many different faces can be machined

Just using the basic equipment, it is possible to carry out almost all types of turning work on valves, e.g. machining of valves, non-return valves, pumps, flanges, cylinders and similar workpieces.



The standard equipment consists of:

- **Standard machine**

The standard machine consists of the complete gear unit and the shaft encoders for X and Z axes.

The basic version of the machine comes with a facing head (radial stroke 100mm (3.9")).

- **Clamping system**

Using four clamping bolts, the machine is mounted outside the surface to be machined. This may, for example, be the valve flange.

On workpieces without flange, an optional tensioning chain may be fitted around the workpiece.

- **Extensive lathe tool range**

Using the standard tools, flat faces up to a diameter of 800 mm (31.5") can be machined. In addition, bores up to a depth of about 600 mm (23.6") can be machined. The maximum bore diameter at this insertion depth is about 600 mm (23.6").

- **Machine controller**

The TD-2T is equipped with a 2 axes controller which makes it possible to move both axes simultaneously at different speeds.

The components of this controller are situated in a small control box.

Simple machine operation via a portable electronic console.

**Examples:**



- Turning cones -

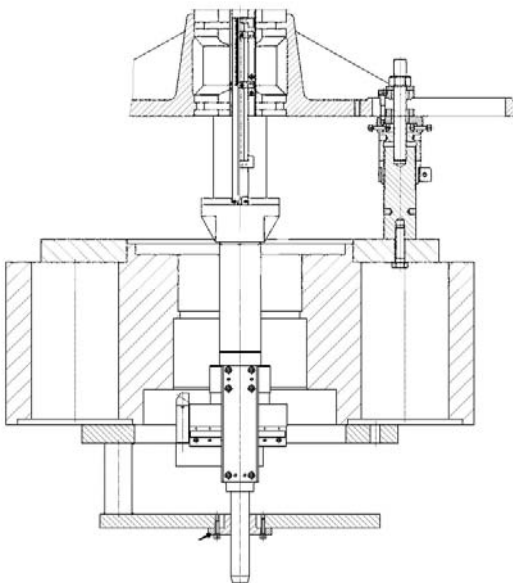


- Turning radii -

**Option**

- **Insertion depth extension to 1500 mm (59")**

In addition, the machine can be equipped with an insertion depth extension. With additional thrust bearing below the turret. Also suitable for backing off flat surfaces.



## TD-2T Specification

Facing range	0-800 mm (0-31.5")
Bore machining I - up to max. insertion depth of 100 mm (3.9")	50-800 mm (2"-32")
Bore machining II - up to max. insertion depth of 200 mm (7.8")	240-800 mm (9.4"-31.5")
Bore machining III - up to max. insertion depth of 600 mm (23.6")	240-600 mm (9.4"-23.6")
Max. working depth	600 mm (23.6")
Cutting speed	276 m/min (10.9")
Machining feed	0-2 mm/rotation (0-0.079")
Chip thickness	0-2 mm (0-0.079")

The TD-2T machine, as do all EFCO products, provides a complete repair system.

The machine is supplied with extensive accessories. Machine and accessories are supplied in a practical and robust workshop trolley.



**TD-2T in workshop trolley**

Subject to technical change.

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# SM Series

Stationary grinding and lapping machines for machining sealing faces in gate valves, valves, safety valves, non-return valves, wedges, etc.

The machinery in the SM series is impressive because of its modular design, which allows customer requirements to be adapted in the best possible way.

- Main components:
- Robust pedestal with machine table
  - Swivelling column with clamping facility
  - Spindle head with motorised height adjustment
  - Swivelling control panel

Two machine tables are available for the SM-450:

The **tilt table** for machining gate valves, gate valve wedges etc.

The **eccentrically adjustable turntable** for machining safety valves.



SM-750



SM-450



The machine spindle of the SM-750 is equipped with an **adjustable eccentric**, which allows safety valves to be machined.

Eccentric and grinding movements are actuated separately.

The machine table is designed as a tilt table.

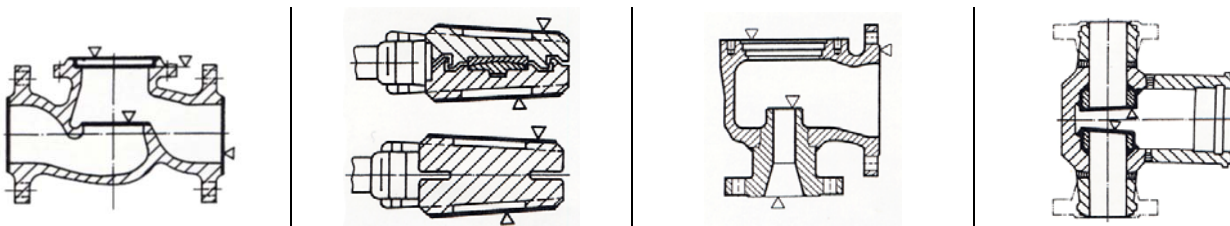
## Technical Data

	SM-450	SM-750
<b>Working range</b> max. overall height of valves max. flange Ø of valves	500 mm (20") 560 mm (22")	1000 mm (40") 950 mm (38")
<b>Spindle</b> Speed Torque	max. 260 rpm 20 Nm	max. 255 rpm 98 Nm
<b>Spindle eccentric *</b> Speed Torque Eccentric adjustment		max. 237 rpm 177 Nm 0 – 20 mm
<b>Spindle head</b> Stroke Stroke speed	400 mm (15.7") 700 mm/min (27.5"/min)	675 mm (26.6") 1000 mm/min (39.4"/min)
<b>Tilt table</b> Size Tilt angle Load	450x450 mm (17.7"x17.7") ± 12° max. 2000N	750x750 mm (29.5"x29.5") ± 12° max. 25000N
<b>Turntable</b> Size Eccentric adjustment Speed Torque Load	Ø 450mm (17.7") 0 – 20mm (0.79") max. 24 rpm 33 Nm max. 2000 N	
<b>Electrical connection</b> Power consumption Voltage Frequency	max. 0.6 kW 230 V 50 / 60 Hz	max. 5.5 kW 400 V 50 / 60 Hz
<b>Dimensions **</b> (L x W x H)	900 x 700 x 1600 mm 36" x 28" x 64"	1200 x 900 x 2650 mm 48" x 36" x 106"
<b>Weight **</b>	approx. 270 kg	approx. 1100 kg

\* The SM-750 is also available without a spindle eccentric

\*\* Data for machine with 1 machine table. The machines in the SM series are also available with 2 machine tables

### Machining options on valves



Subject to technical change.

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# PDM series

CNC-controlled vertical lathes for machining end faces, cylindrical surfaces, tapers, radii and grooves.



- Particularly suitable for machining / repairing fitting housings
- Machining of both sealing surfaces of gate valves in a single chucking mechanism
- Easy operation, no in-depth CNC experience required
- Extremely stable due to gantry design
- Easy to load due to adjustable machine table
- Personnel protection provided by ergonomic machine panelling

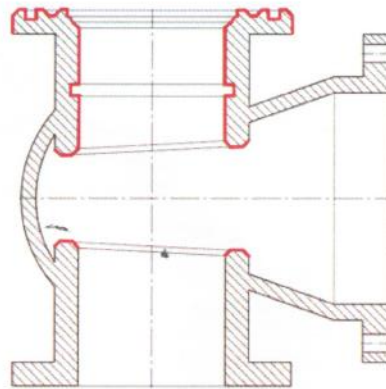


## - The forward-looking technology for machining fittings in repair workshops -

PDM machines are designed for the axial machining and facing of fitting housings (gate valves, valves, check valves), pumps and similar rotationally symmetrical components. They have infinitely variable speed control and axial and radial feeds (Z and X axis) with infinitely variable control that make it possible to move both axes simultaneously at different speeds.

### Machining options:

- Facing
- Longitudinal turning
- Taper turning
- Radius turning
- Punching



Both sealing surfaces of gate valves can be machined by changing the angle setting of the tilting table in a chucking mechanism of the fitting.



Machining can take place inside the fitting housing without extension tools with a directly clamped steel holder by immersing the plunger (including facing head).

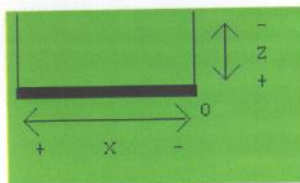


## - Easy operation of machine controller by using standard programs -

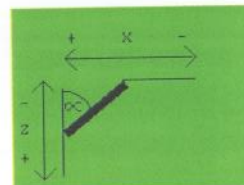
The PDM machines are equipped with CNC programs that are specially tailored to turning requirements. During program development, special attention was paid to making operation as simple as possible. Operation takes place using a portable electronic control unit.



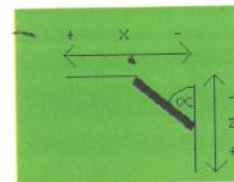
The following **CNC programs with automatic machining cycles** are available:



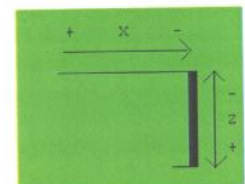
Top facing



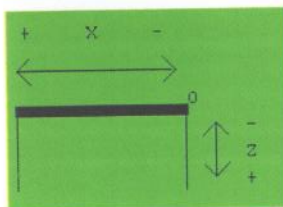
Outer taper turning



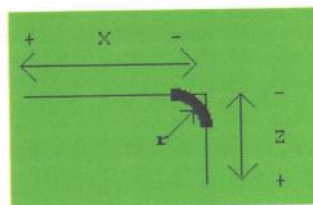
Inner taper turning



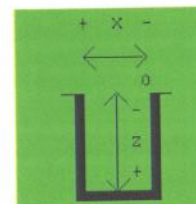
Longitudinal turning



Bottom facing



Radius turning



Axial punching

### Procedure for use of CNC programs:

In order to determine the starting point for the automatic machining cycle, the facing and drilling surfaces are scratched. The required spindle speed, the feed and the chip thickness for machining must be entered. After entering the required final values for the machining program, (e.g. for the X and Z axes during facing or the radius during radius turning) the machining cycle can be started and runs automatically.

During the machining cycle, the program calculates how many passes are needed to remove the material. The machine removes the material in stages. A finishing allowance is left on the surfaces that are created, which is subsequently removed in a finishing pass.

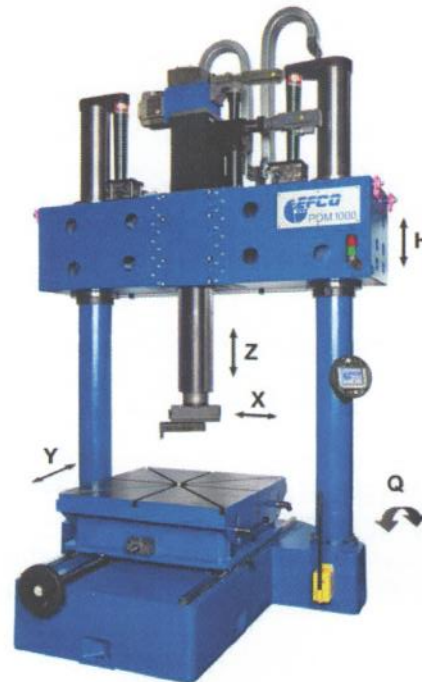
Machining tasks that cannot be fulfilled with the standard programs can be carried out manually. You can move along the X axis and the Y axis by pressing the relevant buttons with the spindle rotating. This makes it possible to **perform machining cycles manually**.

## Technical data

	PDM-600	PDM-1000
Machining Ø	80 - 400 mm (3.2" - 15.7")	350 - 800 mm (13.8" - 31.5")
<b>Machine table</b>		
Size	600 x 600 mm (23.6" x 23.6")	1000 x 1000 mm (39.4" x 39.4")
Clamping diameter	max. 700 mm (27.5")	max. 1100 mm (43.3")
Tilt angle [Q]	$\pm 11^\circ$	$\pm 11^\circ$
Shift [Y]	+ 75 mm / - 300 mm (+3" / - 11.8")	+ 150 mm / - 600 mm (+ 6" / - 23.6")
Q / Y operation	manual	manual
Q / Y clamping	manual	manual
Load	max. 500 kg	max. 1500 kg
Height below facing head	max. 700 mm (27.6")	max. 1500 mm (59")
Passage between columns	780 mm (30.7")	1400 mm (55.1")
Crossbeam stroke {H}		500 mm (19.7")
Plunger stroke [Z]	500 mm (19.7")	800 mm (31.5")
Facing head stroke [X]	60 mm (2.4")	100 mm (3.9")
Spindle speed	0 – 200 rpm (0 – 7.9")	0 – 150 rpm (0 – 5.9")
Cutting depth (with St / GG)	max. 2.5 mm (0.1")	max. 3 mm (0.12")
Space requirement (Width x Depth x Height)	2400 x 2700 x 3200 mm (96"x108"x128")	3000 x 3500 x 5000 mm (120"x140"x200")



PDM-600 \*



PDM-1000 \*

\*Shown without machine panelling

Right reserved to make technical changes.

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Otto-Brenner-Straße 5 – 7 • D - 52353 Düren • Phone: +49-(0)2421-989-0 • Fax: +49-(0)2421-86260

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# SPM-801-N

## Stationary precision turning machines, CNC-controlled

**The optimum solution for complete machining of valves, for  
general overhaul and also for use in production**

The machines of the SPM range have precision inclination tables ( $\pm 12^\circ$ , accuracy  $\pm 10''$ ) and have been optimised for more efficient machining of valves. Due to the flexible design, they can also be used for other machining tasks.



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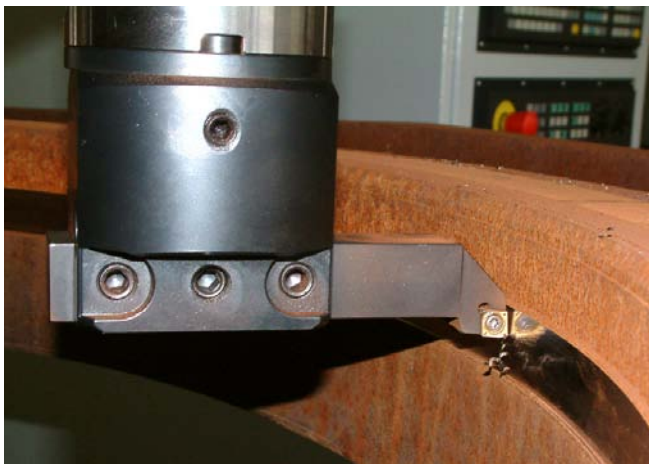
## Tomorrow's technology for today's valve problems

### The SPM machines as turning machines

**Face turning** is made possible by the main movement and the X-axis feed of the turret.



Face turning of flanges



**Cylinder turning** is obtained by the main movement and the vertical movement of the headstock (Z axis).

The angles for the machining of sealing faces in gate valves are adjusted by means of the swivel table (Q-axis).

A particular advantage for the machining of valve sealing faces is the clamping.

It is possible to machine both sealing faces with **only one clamping** by adjusting the angle at the swivel table.

The symmetry of both sealing faces is thus ensured.

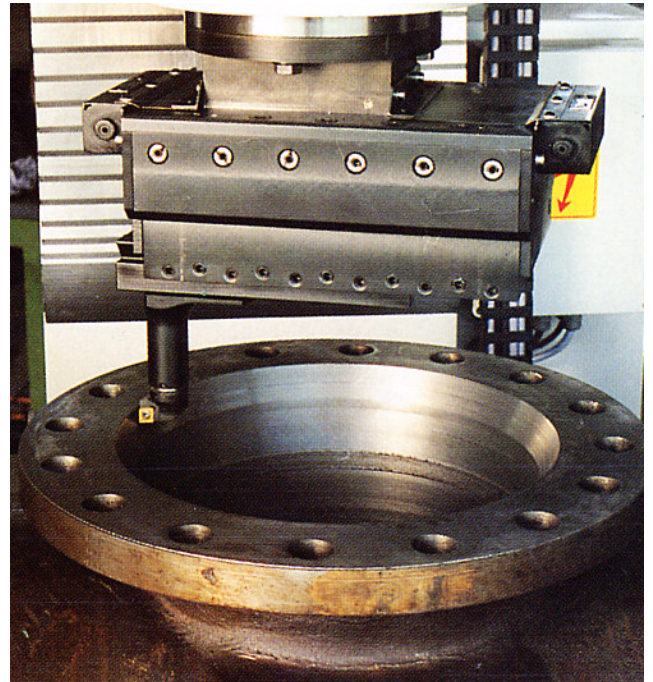


Face turning of sealing faces in valves and gate valves.

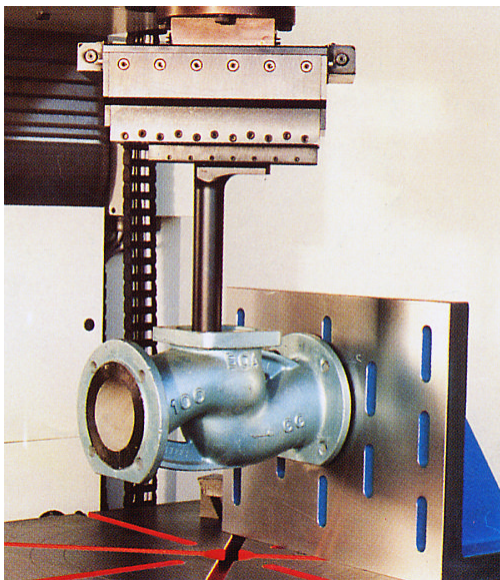
## Conical turning

In addition to the most common operations, such as face turning and cylindrical turning, conical faces, too, can be machined using the EFCO boring head.

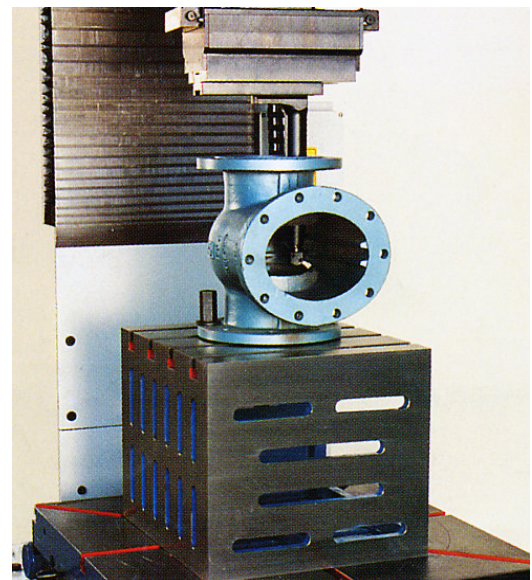
During conical turning, the machining angle is determined by the two feed dimensions - X axis (boring head) and Z axis (headstock). As the X axis and Z axis feeds are adjustable, all angles from 1 to 90° are covered.



Tool holders in various lengths make it possible to use turning tools and indexable inserts.

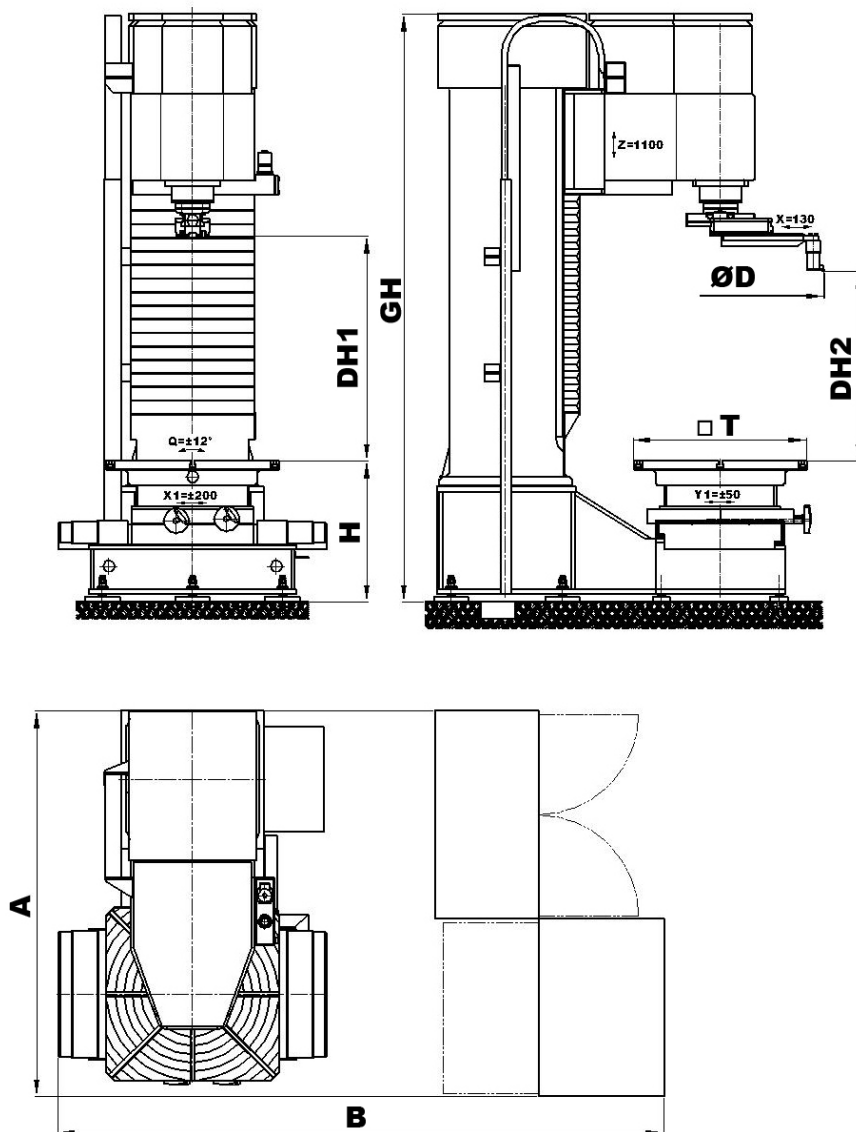


Internal turning of a valve, clamped on a **clamping angle**.



Internal turning of a valve, clamped on a **clamping cube**.

Specification	SPM-801-N
GH	3400 mm (136")
H	820 mm (33")
T x T	1000 x 1000 mm (39.4"x39.4")
DH1	1300 mm (52")
DH2	1100 mm (44")
D	1000 mm (40")
A x B	3250 x 3500 mm (130"x140")
Weight	ca. 8000 kg



Subject to technical change.

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# KS-6

## Grinding bench for facing fittings and machine components



The KS grinding bench is suitable for surface grinding sliding wedges, valve disks, machine components or other workpieces.

The grinding plate is covered with self-adhesive grinding paper or grinding foil.

A limit stop bar is mounted over the grinding disk to prevent the workpieces that are being machined from sliding away.

This can be secured in different positions depending on the size of the workpieces.

To change the grinding paper rings, the limit stop bar is turned away to the side, thus exposing the grinding disk.

Technical data	KS-6
Height	920 mm (36.2")
Width	650 mm (25.6")
Length	900 mm (35.4")
Disk	600 mm (23.6")
Weight of workpieces	50 kg
Supply voltage	230V 50/60Hz
Power	1,5 kW
Rotational speed of disk	20 – 50 min <sup>-1</sup>

### Accessories

- Footswitch
- 2 Abrasives drawer
- Covering hood

The grinding desk's electric drive is equipped with an electronic soft-start system.

A version with quick-change grinding disks is available for use with frequently changing grains.

Subject to technical change.

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# SURFACE LAPPING



FLM-400•FLM-600•FLM-900•FLM-1200•FLM-1500

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## Surface lapping

Lapping is a finishing procedure for fine and finest finishing which achieves high surface quality, extremely high dimensional accuracy and close dimensional tolerances.

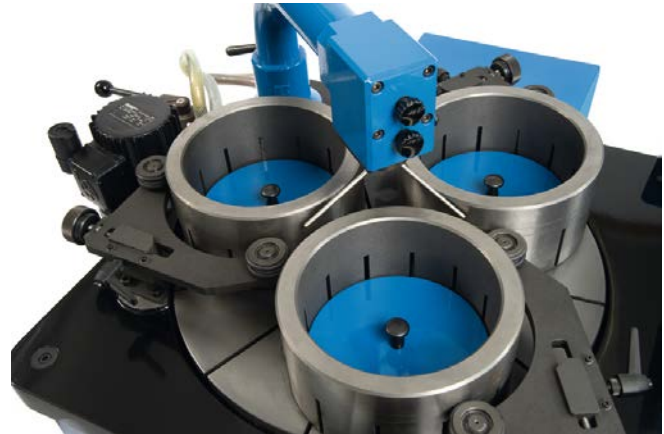
Lapping is defined by DIN 8589 and means machining with loose grains distributed in a liquid or paste (the lapping mixture).

The workpieces are normally placed into dressing rings on a lapping plate which must have a level surface so that the workpiece to be lapped also will be flat. The lapping mixture, a compound consisting of a carrier (lapping liquid), a lubricant and abrasive, sits between workpiece and lapping plate. As the workpiece is normally not heated by the lapping process, there is no deformation.

Lapping has become established as the preferred finishing process where non-leaking shutoff is required (e.g. for safety valves, face seals for boiler water feed pumps, compressor valve disk etc.)

**EFCO-FLM** single plate surface lapping machines are supplied either as table-top machines (FLM-400) or as free standing machines.

The workpieces to be lapped run freely in dressing rings or are placed in appropriate holders (cages) running in the dressing ring. Depending on weight, the workpieces are pressed against the lapping plate using appropriate load plates with a felt being placed between workpiece and weight which equalises different levels.



The lapping plate is continually fed with lapping mixture via a pump system.

The lapping mixture pump with stirrer (FLM-1200/FLM-1500) and the lapping mixture tank are designed in such a way that topping up or replacement of the lapping mixture is easy.

Depending on the lapping mixture used as well as material, shape and size of the workpiece, it is, therefore, possible to obtain a surface finish of  $R_z = 0.1 \mu\text{m}$  or better.

### **EFCO FLM Surface Lapping Machines**

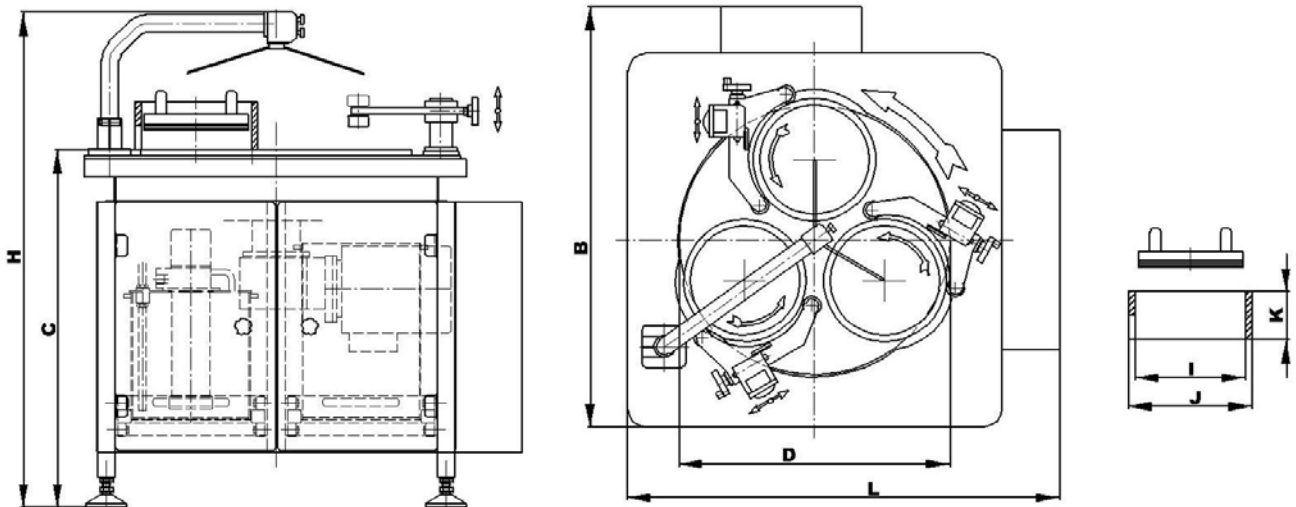
are excellent for lapping of individual or volume production components.

Worn components, such as valve seats, mechanical shaft seals, disks, vanes, gears, can be re-lapped in repair workshops and at refurbishment companies.



EFCO FLM-400





		FLM				
		400	600	900	1200	1500
<b>Machine dimension</b>						
Machine height "H" [mm/inch]		520 (20.5")	1175 (46.3")	1330 (52.4")	1380 (54.3")	1410 (55.5")
Width "B" [mm/inch]		780 (30.7")	1030 (40.6")	1260 (49.6")	1560 (61.4")	1900 (74.8")
Width "L" [mm/inch]		890 (35")	1040 (40.9")	1430 (56.3")	1825 (71.9")	2145 (84.4")
Top edge of lapping wheel "C" [mm/inch]		295 (11.6")	820 (32.3")	950(37.4")	950 (37.4")	950 (37.4")
Ø Lapping wheel "D" [mm/inch]		405 (15.9")	615 (24.2")	915 (36")	1215 (47.8")	1515 (59.6")
<b>Dressing ring</b>						
Number		3				
Inner-Ø "I" [mm/inch]		152 (6")	250 (9.8")	380 (15")	500 (19.7")	625 (24.6")
Outer-Ø "J" [mm/inch]		185 (7.3")	280 (11")	420 (16.5")	550 (21.7")	690 (27.2")
Hight "K" [mm/inch]		90 (3.5")	110 (4.3")	135 (5.3")	140 (5.5")	14 (5.5")
max. component weight-Ø [mm/inch]		120 (4.7")	220 (8.7")	350 (13.8")	470 (18.5")	600 (23.6")
<b>Data and Weight</b>						
Lapping wheel speed [rpm]		8 – 70	8 – 74	8 – 50	8 – 44	8 – 34
Drive motor output [kW]		0,55	3	7,5	9,2	11
Lapping material tank capacity [l]		4	15	33	33	33
Power supply [V / Hz]		230 / 50	400 / 50			
Geräuschemission [db(A)]		< 80				
max. component weight [kg]	single	10	50	100	150	150
	total	30	150	300	450	450
Net weight [kg]		130	540	800	2000	3000

## Testing of workpieces

The following are required to precisely check the flatness of workpieces:

- Interference lamp
- Polishing table with polishing paper
- Plane face lenses Ø25-300 (Ø0.9"-11.8")



Our range includes a surface roughness tester to precisely check the roughness of workpieces.

### Specifications

Measurement range: Ra,Rq: 0.01-100µm  
Rz,Ry: 0.02-350µm  
Pc: 2.5/cm-5000/cm

Measured sections: 0.25 mm, 0.8 mm, 2.5 mm

Parameters: Ra, Ry, Rz, Rq, S, Sm, Pc, r3z, mr, rt, Rp, Rk, Rvk, Mr1, Mr2, A1, A2

Probe tip: Diamond (tip radius 2 µm)

Power supply: via mains adapter or built-in rechargeable battery



## Consumables

The lapping mixture for surface lapping machines consists of abrasive mixed with lapping liquid (ratio: 150-220g abrasive to 1 litre of lapping liquid).

### Abrasive

- Silicon carbide (SiC) - for alloyed and hardened steels, stellites, glass, porcelain etc.
- Aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) – for copper, bronze, coal, cast iron, silicon etc.
- Boron carbide - for carbide, ceramics
- Diamond - for carbide, ceramics

The abrasive can be supplied in various grain sizes.

The most frequently used lapping abrasive is silicon carbide with grain size 600 (coarse) or 800 (finer).

Our EFCO HO-74 lapping liquid, a multi-purpose oil of average viscosity, is suitable for mixing with all types of lapping abrasives.

Subject to technical change.

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# CW-1000

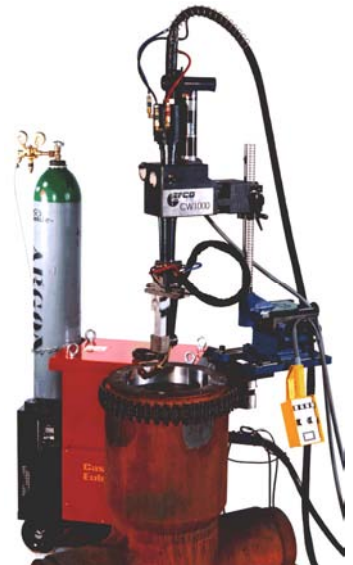
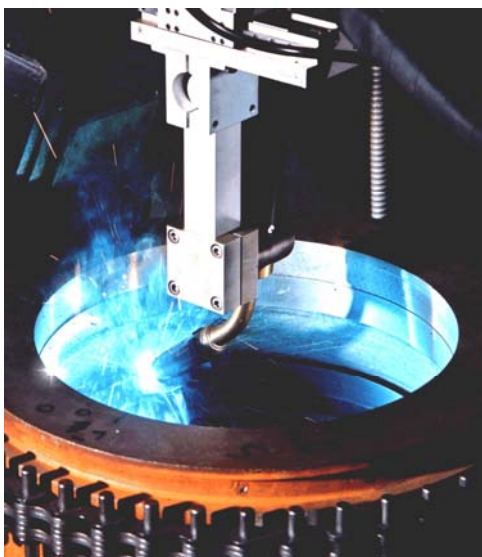
## Circular Welding Machine

30-1000 mm dia. (1.2"-40")

The **EFCO CW-1000** is a complete problem solution for MIG/MAG welding in and on fittings. Automatic welding of sealing faces, circular welding of bores, circular faces, conical faces.

### Benefits:

- Suitable for use on site or in the workshop
- Manual or automatic feed (axial and radial)
- Basic machine designed for MIG/MAG welding
- Built-in rotary transmission leadthrough for wire, inert gas, electricity and cooling water
- Separate operator panel
- Low weight, simple operation
- Extensive accessories
- Can be operated with most commonly used power sources
- Optimum equipment for any application



## CW-1000 Specifications

Axial stroke (manual and automatic)	mm (inch)	175 (6.9")
Radial stroke (manual and automatic)	mm (inch)	90 (3.54")
Weld diameter	mm (inch)	30 – 1000 (1.2"-40")
Machine spindle speed	rpm	0.1 - 5.0
Axial feed	mm/rev.	3 (0.12")
Radial feed 1 (installed)	mm/rev.	3.8 (0.15")
Radial feed 2 (interchangeable)	mm/rev.	3.0 (0.12")
Radial feed 3 (interchangeable)	mm/rev.	4.6 (0.18")
Angular adjustment range (infinite)	degrees	0 ... 90
Power supply	V/Hz	230 / 50
Power consumption max.	VA	160
Weight, approx.	kg	27
Torch connection	special Binzel	

### Various fixtures are available for the CW-1000:

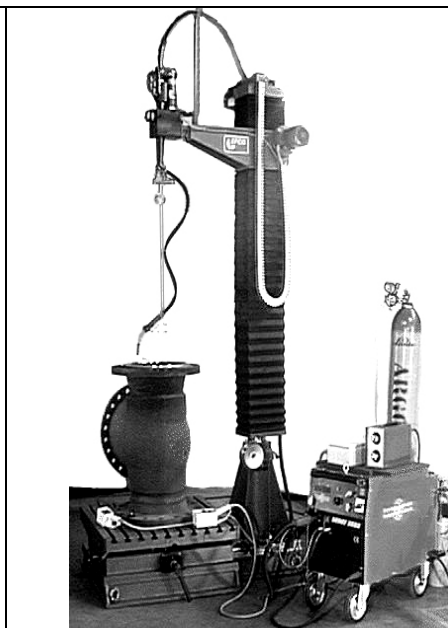


**CWD-4**

Portable welding equipment for sealing faces on valves, pump housings etc.

Valve size:

-1000mm (40") dia. max.



**CWD-ENT-3**

Stationary welding unit for sealing faces in gate valves, for gates and valve housings, with inclined table (1000x1000mm).

Valve size:

- 1000mm (40") dia. max.

- max. height 1100mm (44")



**CWD-5**

Stationary welding unit for sealing faces in gate valves, for gates and valve housings, with inclined cross table (500x500mm).

Valve size:

- 300mm (12") dia. max.

- max. height 500mm (20")

Subject to technical change.

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# MK Adapters

## ENT Tilting Bench

DN 8-2000 mm (3/8"-80")

The MK adapters enable the proven EFCO grinding and lapping tools to be used for fixed-position machining of sealing surfaces in and on fittings.

To align a fitting or slider cone more easily, quickly and safely we recommend the use of an appropriate ENT tilting bench. These benches can be supplied in four sizes, are made in steel and are therefore extremely robust and resistant to impact; they are also designed in such a way that every component can be replaced.

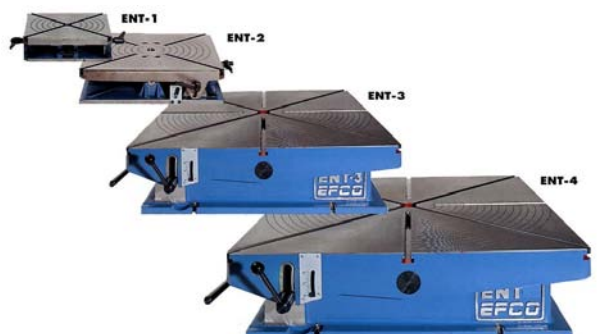


### THE SYSTEM

- Fixed drill
- + MK adapter
- + ENT tilting bench
- + EFCO tools

=

Fittings workshop machine



This configuration enables sealing surfaces in sliders, valves, sliding cones, conical nipples, flanges etc. to be repaired perfectly from a technical point of view in any workshop by means of grinding and lapping.

## Technical Data

EFCO MK adapter TYPE	MK-2		MK-3			MK-5
	with pointed tip Ø12 (0.47")	with ball Ø18 (0.7")	with pointed tip Ø15 (0.6")	with ball Ø20 (0.8")	with ball Ø30 (1.2")	with ball Ø60 (2.4")
for the tools from	Valva-1 Valva-S1	SL-1/ SL-15 Valva-15	SL-15 Valva-S15	SL-15 Valva-S15	SL-15 / SL-2 Valva-S15 Valva-2	SL-3 Valva-3
Overall length (mm)	306 (12")	288 (11.3")	383 (15")	351 (13.8")	356 (14")	610 (24")
Immersion depth TT (mm)	219 (8.6")	201 (7.9")	284 (11.2")	252 (10")	257 (10.1")	455 (17.9")
Weight (kg)	0.68	0.7	1.74	1.68	1.8	12
Max. contact force (N)	~186		~560			~640
Spring travel (mm)	14 (0.6")		20 (0.8")			25 (0.9")



The adapter body is provided with a Morse cone. The driver shaft / driver tip is built into the adapter body and spring-loaded.

Because of the fact that grinding requires a considerably greater contact pressure than lapping, a two-stage spring system has been developed specifically for this adapter. Thus, when pressure is first applied, a weak spring comes into play (range L = lapping). As soon as the travel of the first spring is exhausted, the second spring comes into play (range G = grinding).

EFCO tilting bench TYPE	ENT 1	ENT 2	ENT 3	ENT 4
Size	300x300 (11.8"x11.8")	500x500 (19.7"x19.7")	1000x1000 (39.4"x39.4")	1500x1500 (59"x59")
Max. tilting angle	13°	13°	13°	13°
Max. load (in kg)	120	300	800	2000
For EFCO adapter	MK-2	MK-3	MK-5	Mk-5
Weight (kg)	18.5	71	460	1270

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# TSM-1

## Inspection Set of Telescopic Mirrors with magnetic pick-up tool and integrated light source

The tool set will be delivered in a sturdy aluminium box. It consists of:

- handle with telescopic rod, incl. quick coupling and integrated light source
- three unbreakable acrylic mirrors in different sizes
- a magnifier
- two magnets



### Typical applications:

- for the inspection of locations that are dark, or hard to reach
- for removing items from locations that are hard to reach, e.g. metal chips, screws, etc.
- as a positioning help for EFCO machines with high submerging depths



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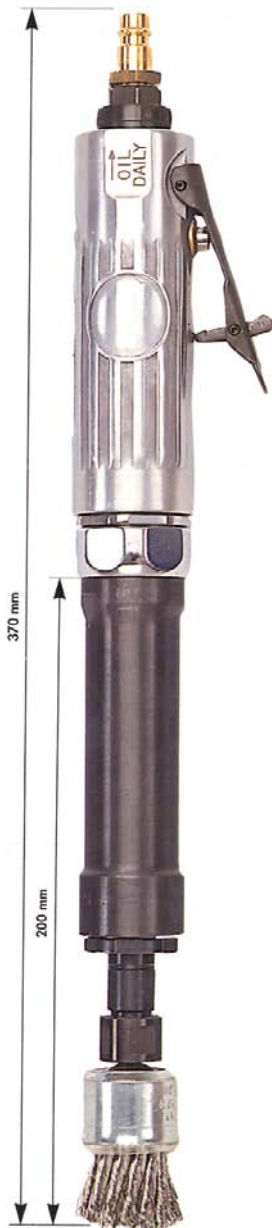
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# ARS

## Cleaning Set for Fittings

**To remove rust, scale, slag, seal residues and contamination**



Developed for cleaning of dirty fittings or housings using **high-speed rotating twisted brushes**.

### EFCO-ARS offers:

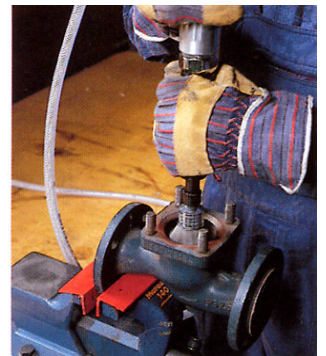
- Low-maintenance, high-power drives (electric or compressed air operation)
- Hand-held for ease of use
- Easy cleaning of inaccessible spots due to:
  - Spreading plaited brushes
  - Bristles flex to any type of surface
  - Large insertion depth



ARS case - electric



ARS case - compressed air



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YOUR PARTNER WORLDWIDE



# Mobile Workshop

Fast reaction times and flexibility are required for on-site valve service. EFCO has a flexible range which helps you to quickly meet the requests and requirements of your customers.

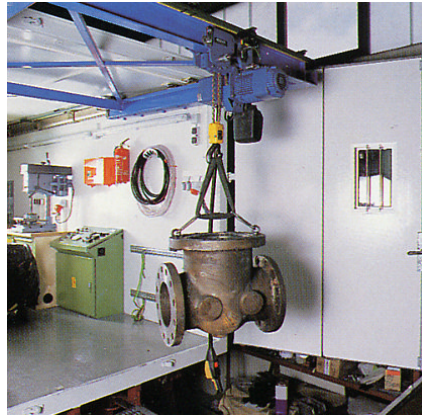
We can develop your own mobile workshop based on your requirements and requests. We offer: container (ISO standard), semitrailer, complete truck with windows.



THE PREMIUM-PRODUCTS – MADE BY EFCO – MADE IN GERMANY



Pillar drill,  
high-pressure cleaner



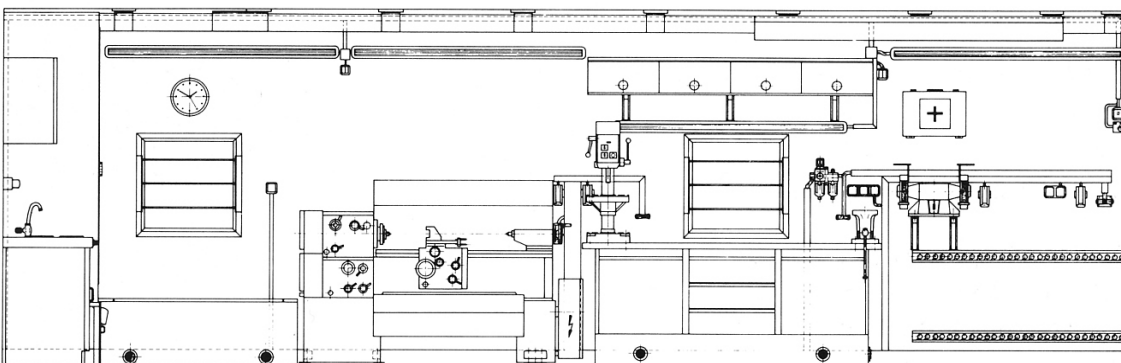
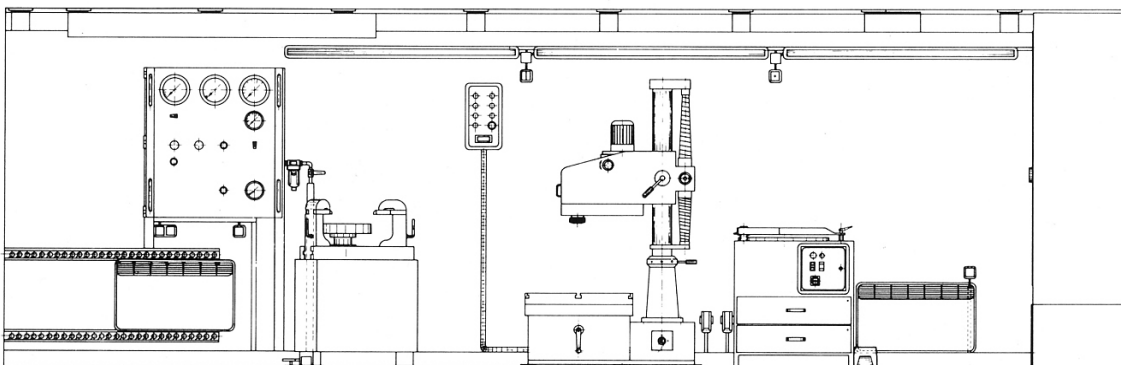
Overhead crane, extending to outside



Generator and compressor in  
heated compartment

Vehicles and bodies are equipped with state-of-the-art technology:

- Fully air conditioned, oil heater for operation whilst stationary or driving.
- Power supply via emergency generator, truck electric system or 230 V supply (automatic switch-over).
- Fully automatic battery charging.
- Fully equipped kitchenette.
- Overhead crane, can be extended to outside of vehicle by 1 m via telescope rails.
- Compartment with quiet compressor and generator.



Example of an EFCO-supplied truck with superstructure for Russia

Subject to technical change.

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## EFCO-Consumables



### GSS SERIES

The EFCO GSS grinding tools are coated with electroplated cubic crystalline boron nitride (CBN). CBN is highly suitable for grinding hard sealing faces with a minimum hardness of 35 HRC such as, for example, steel on cobalt and nickel basis, highly alloyed steels, chromium steel, etc.

The good heat resistance of CBN in combination with its great hardness makes possible economic grinding at the higher machining temperatures of these steels (long life).

### EFCO ABRASIVES

EFCO abrasives have been matched to the EFCO technology after extensive testing. We supply abrasives on a backing in various grain sizes and formulations optimised for the application.

Abrasive backing: Paper, Fabric, Foil

Grain types: Aluminium oxide ( $Al_2O_3$ ), Silicon carbide (SiC), Zirconium corundum ( $ZrO_2 + Al_2O_3$ )

Grain size: Standard grain size: P80-P1800  
(other grain sizes on request)



### EFCOBOR LAPPING COMPOUNDS

In accordance with DIN 8589, lapping is a microfinishing process using a grain distributed loosely in a liquid or paste (lapping compound) which is held on a, usually shaped, counterpart (lapping tool).

EFCOBOR lapping compounds are oil soluble lapping pastes of boron carbide.

Using EFCO lapping compounds, it is possible to achieve

- high surface quality
- highest dimensional accuracy
- close dimensional tolerances independent of the material hardness.

They can be supplied in various grain sizes from P80-P1500 (FEPA) and pack sizes.

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