

New development for gear production line

齿轮生产线的新发展

EMAG Technology Expo

2015/10/22



1 VISION EMAG

2 DCT gear process chain

3 VL3 DUO new machine

4 Technology chamfering/deburring

5 Line solutions

6 Summary

- EMAG WORLDWIDE
埃马克在全球



Key figures for the EMAG Group in 2014

埃马克集团 2014

Turnover 总营业额	Export share 出口份额	Workforce 员工总数	Apprentices 培训生	Technology companies 技术公司	Manufacturing companies 生产公司	Market companies, branch establishments, sales + service 营销公司, 分公司, 销售和售后办事处
473 Mio. €	58 %	2317	143	6	3	24



Turning
车削



Milling 铣削



Heat Shrink Assembly
热套技术



Grinding 磨削



ECM / PECM
电化学、精密电化学
加工



Gear Hobbing 滚齿



Laser Welding
激光焊接



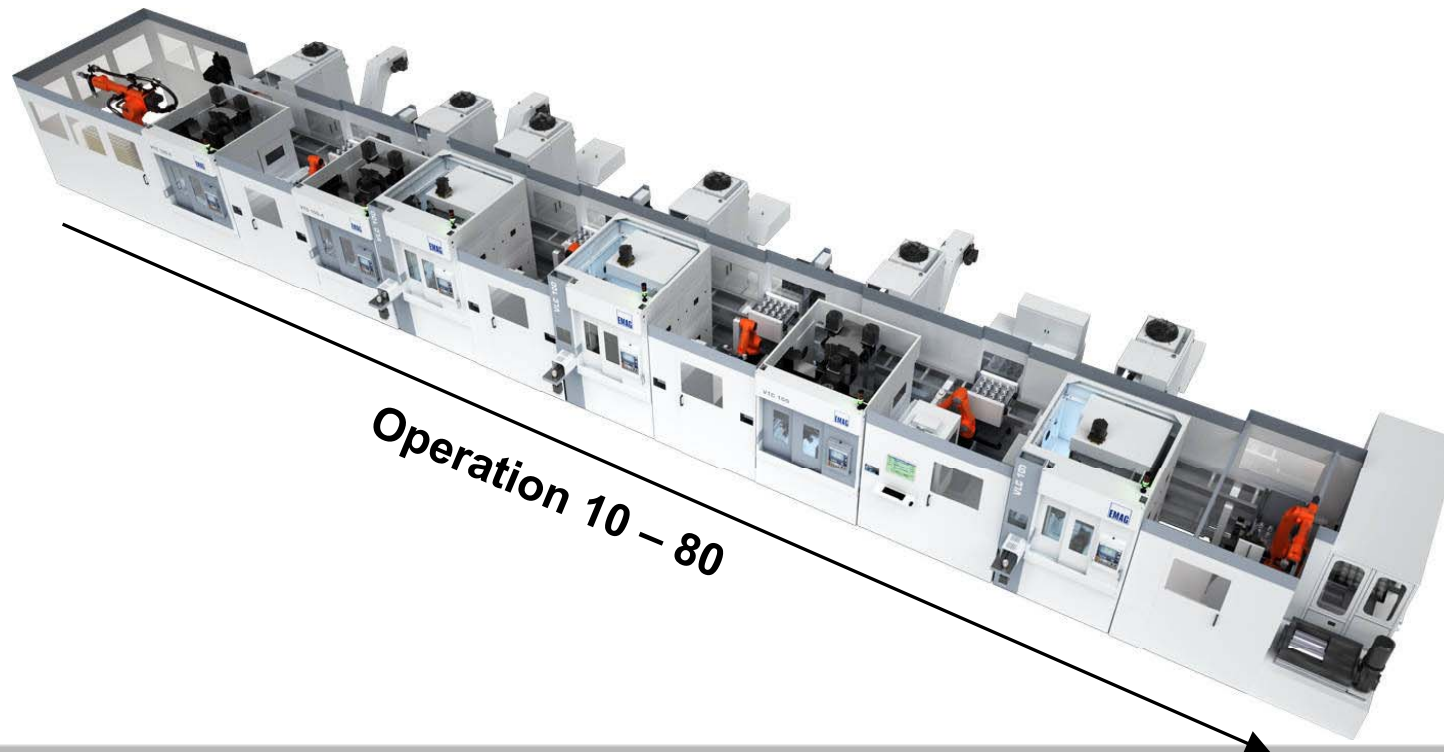
Inductive Hardening
感应热处理

Mission 使命

EMAG is a customer focused and global supplier of manufacturing systems. On the basis of technological leadership and innovation, EMAG is fast to develop the most efficient solutions for our customers.

埃马克是一个以客户为中心的，提供加工制造系统解决方案的全球供应商。

基于技术领导和创新的基础上，埃马克快速为客户提供最有效的解决方案。



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2 DCT gear process chain DCT 齿轮加工工艺链

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SOFT MACHINING 软加工

Green turning 软车



Gear hobbing 滚齿



Synchronizing ring
assembly + laser welding
同步环
压装+激光焊接



HEAT TREATMENT 热处理

HARD MACHINING 硬加工

External /internal grinding
or hardturning
磨削外圆和内孔或者硬车



Gear grinding
磨齿



OP Flow	Process Description	Manufacture	
工序	加工工艺描述	设备制造商	
	Soft turning 1st side	软车第一面	EMAG
	Soft turning 2nd side	软车第二面	EMAG
	Gear Hobbing	滚齿	EMAG
	Deburring + Chamfering	倒棱&去毛刺	EMAG
	Washing	清洗	Sub-supplier
	Press & Welding	压装& 焊接	EMAG
	Heat Treatment	热处理	
	Internal Honing or hard turning	内圆珩磨或硬车	EMAG
	Cone Grinding	磨锥面	EMAG
	Gear Grinding	磨齿	Sub-supplier
	Nicking	齿轮啮合	Sub-supplier
	Washing	清洗	Sub-supplier

基于EMAG同一模块化的机床,使得两台单机VL2连线非常容易

Easy concept for line linking for 2 sets single VL2 machine ,base on EMAG modular production rang.



齿轮加工系统方案

MANUFACTURING SYSTEM FOR AUTOMOTIVE GEARS

整个工艺链是基于EMAG同一模块化的机床

Supplier of the complete process chain on basis of EMAG modular product range

VL3 DUO

OP10 & OP20 Turning



VLC 200 H:

OP 30: Hobbing



VLC 100 D or C:

OP 40: Chamfering



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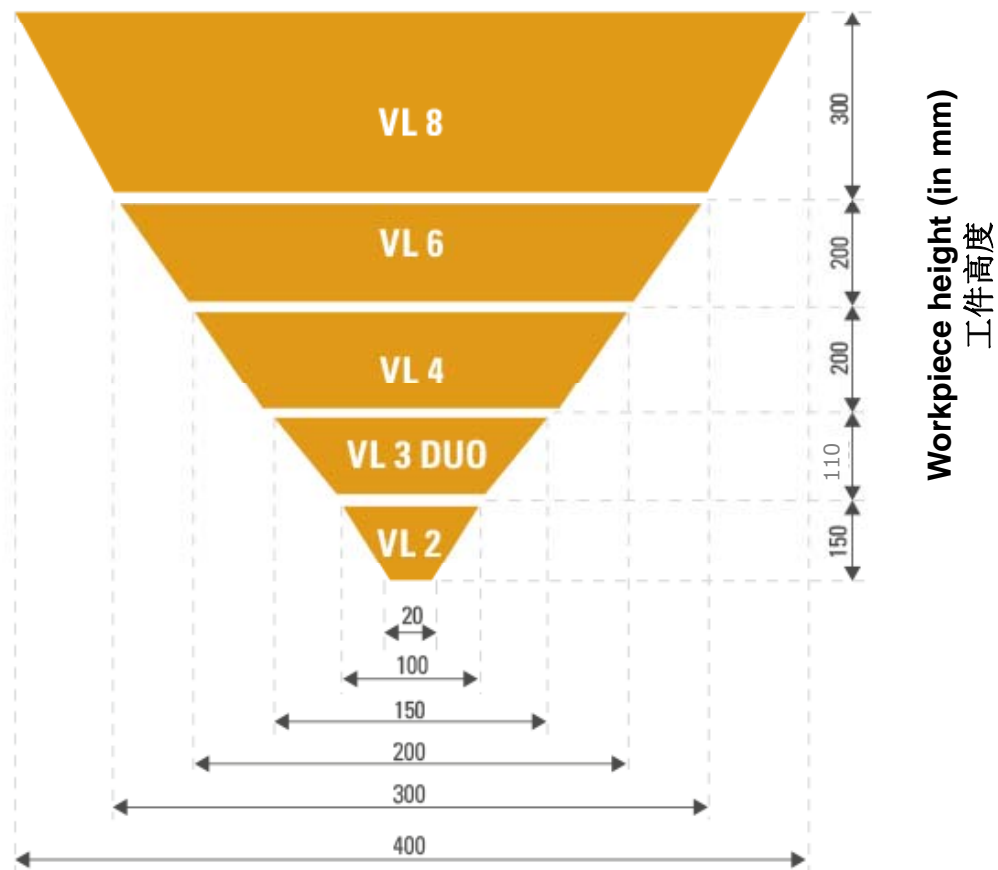
4 Technology chamfering/deburring

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WORKPIECE RANGE

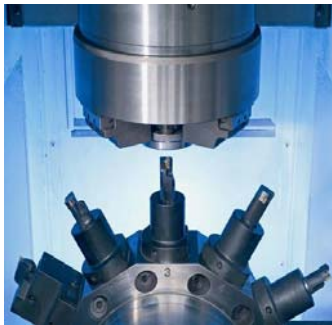
工件直径范围



GEARS 齿轮软车

SOFT TURNING OP10 + OP20

VL3DUO



VL 3 DUO - TECHNICAL DATA

VL3 DUO – 技术参数



MACHINE 机床	VL 3 DUO
Chuck diameter 卡盘直径	210 mm
Swing diameter 回转直径	250 mm
Workpiece diameter / height, max. 工件直径/高度, 最大.	150* / 110 mm
Travel in X (working stroke) X轴 (工作行程)	500 mm
Travel in Y (optional) Y轴行程 (备选)	±30 mm
Travel in Z Z轴工作行程	250 mm
Chip-to-chip time (depending on workholding unit) 屑对屑时间 (取决于夹持夹具)	5-6 s

*standard value / higher value possible
(depends on chuck diameter)

* 标准数据/ 可能数据更大,
(具体取决于卡盘直径大小)

MAIN SPINDLE 主轴 ▪Spindle nose to DIN 55026 主轴法兰标准 ▪Spindle bearing front, dia. 主轴前端轴承直径 ▪Speed, max. 最大转速	2 off Size 6 100 mm 5,200 rpm
MAIN DRIVE 主驱动 AC asynchronous motor 40 / 100% duty cycle 40%ED和100% ED时的功率 Full power at spindle speed of 达到满功率是的主轴转速 Torque 40 / 100% duty cycle 40%ED 和100% ED是的扭矩	Qty 2 22 /13.9 kW 2,250 rpm 93 / 59 Nm

VL 3 DUO – DIMENSIONS

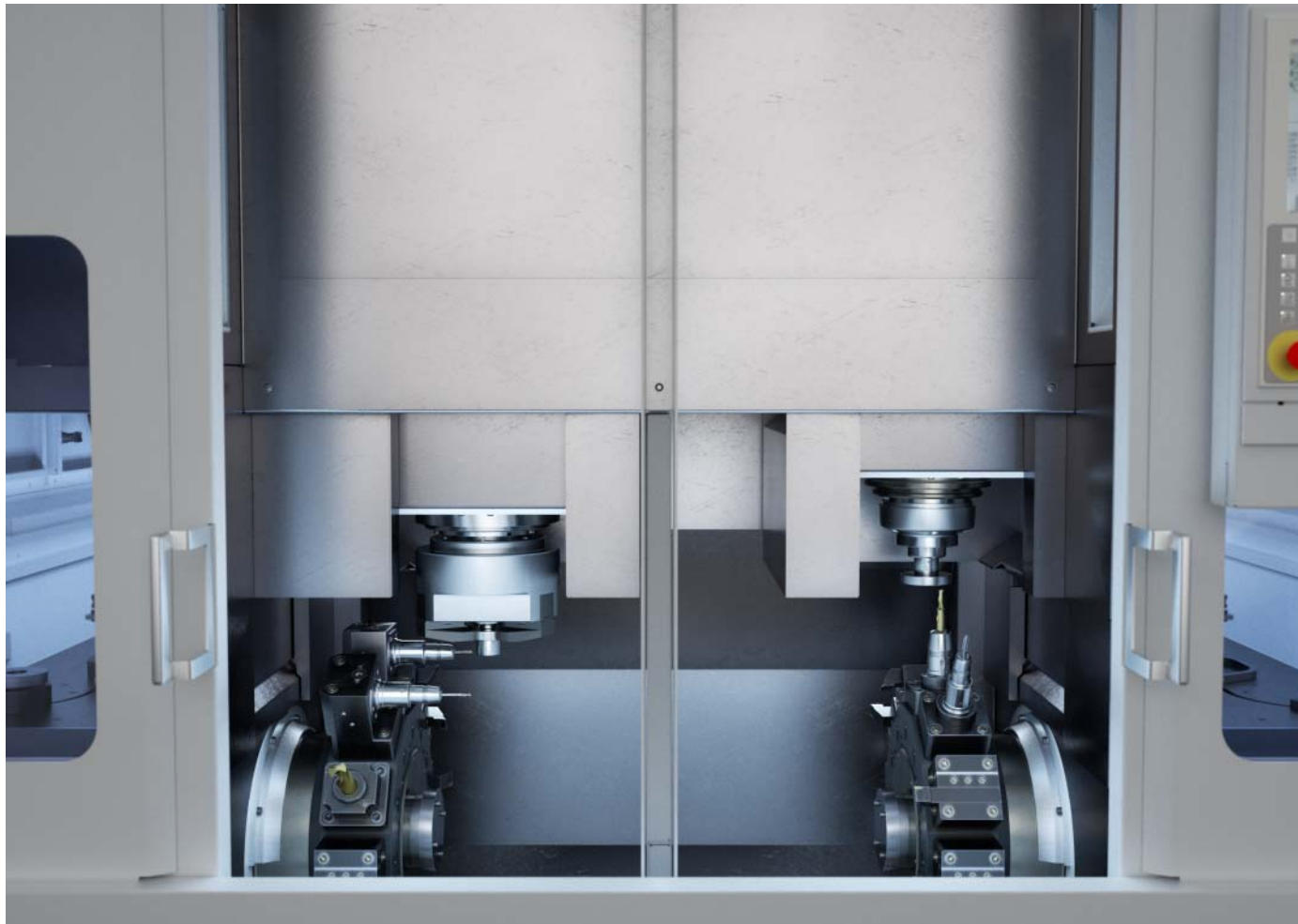
VL3 DUO - 机床尺寸



MACHINE 机床	VL 3 DUO
DIMENSIONS AND WEIGHT 尺寸和重量	
Depth 长度	3,000 mm
Depth including chip conveyor 长度包括排屑器输送系统长度	4,500 mm
Width 宽度	2,200 mm
Height (including cable carrier) 高度 (包括自动输送系统)	2,530 (3,100) mm
Weight 重量	approx. 10,000 kg



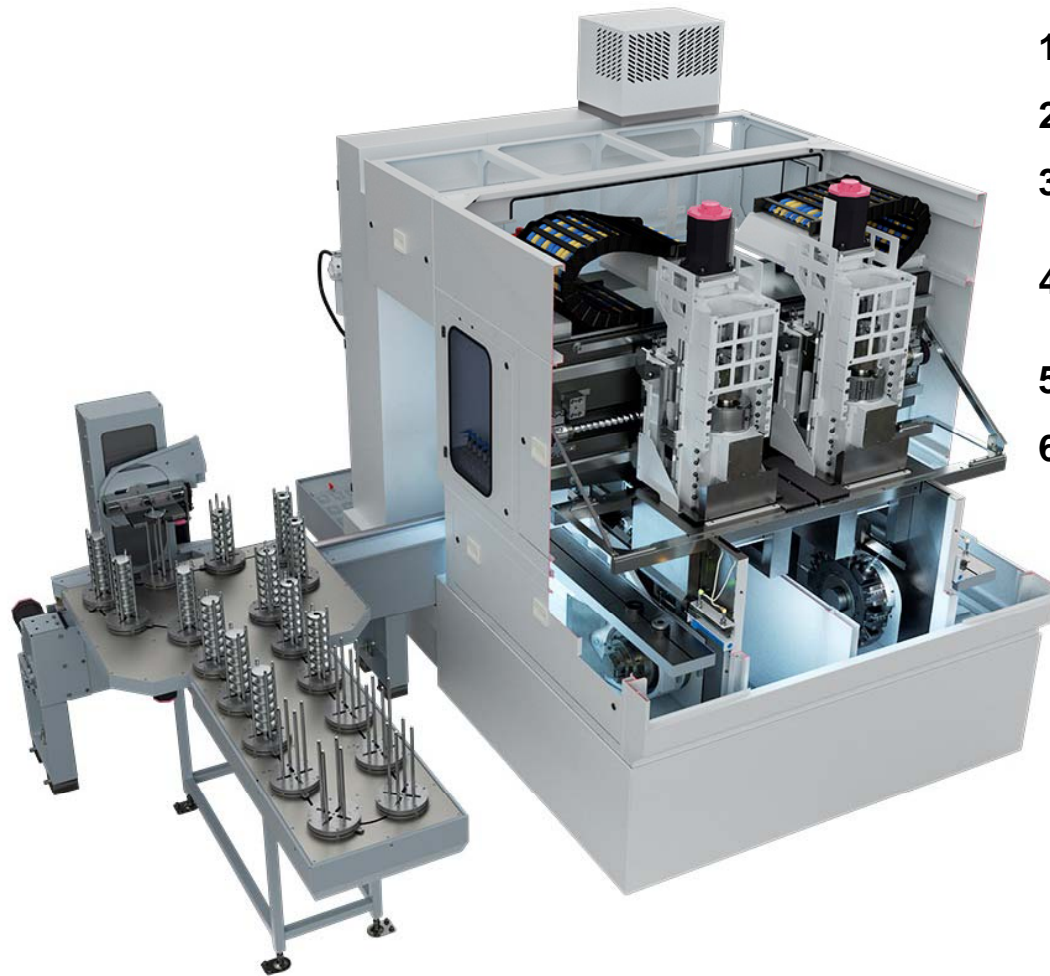
VL 3 DUO - MACHINING AREA
VL 3 DUO - 机床加工区域



Machining area OP 10
OP10 加工区域

Machining area OP 20
OP20 加工区域





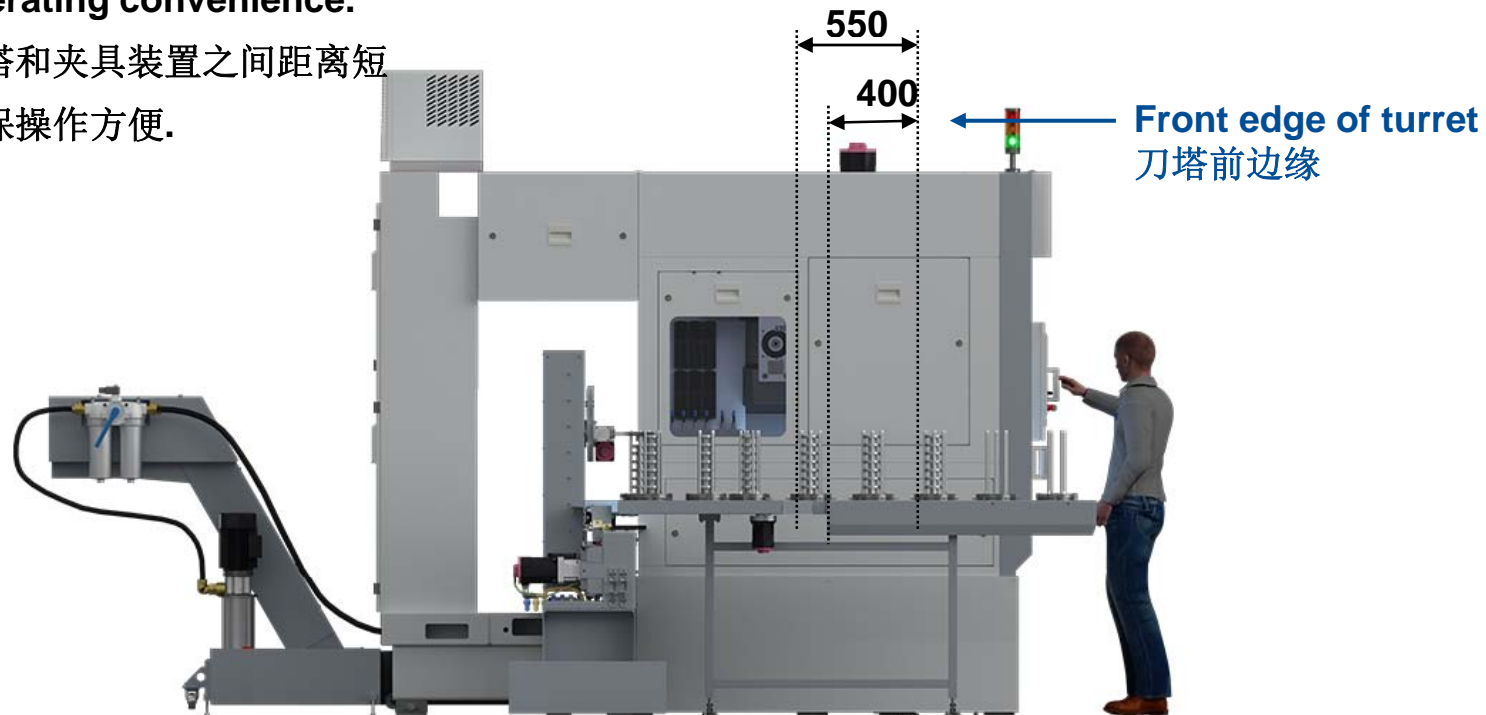
1. **Base machine** 基本机床
2. **Z-slide** Z 轴
3. **X-slide including pick-up spindles** X 轴包括拾取主轴
4. **TrackMotion automation system** 自动输送系统
5. **2 x measuring** (optional) 2X 测量单元 (备选)
6. **2 x turret** (Option Y-axis) 2X 刀塔 (备选 Y轴)

EXCELLENT OPERATING CONVENIENCE

操作方便

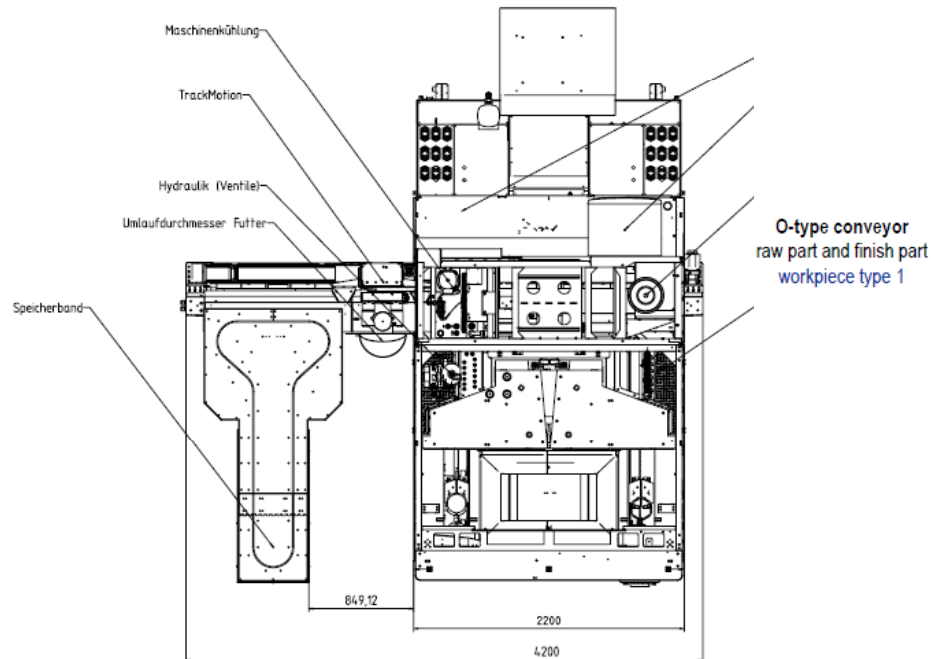
Short distances to tool turret and clamping device ensure excellent operating convenience.

刀塔和夹具装置之间距离短
确保操作方便.



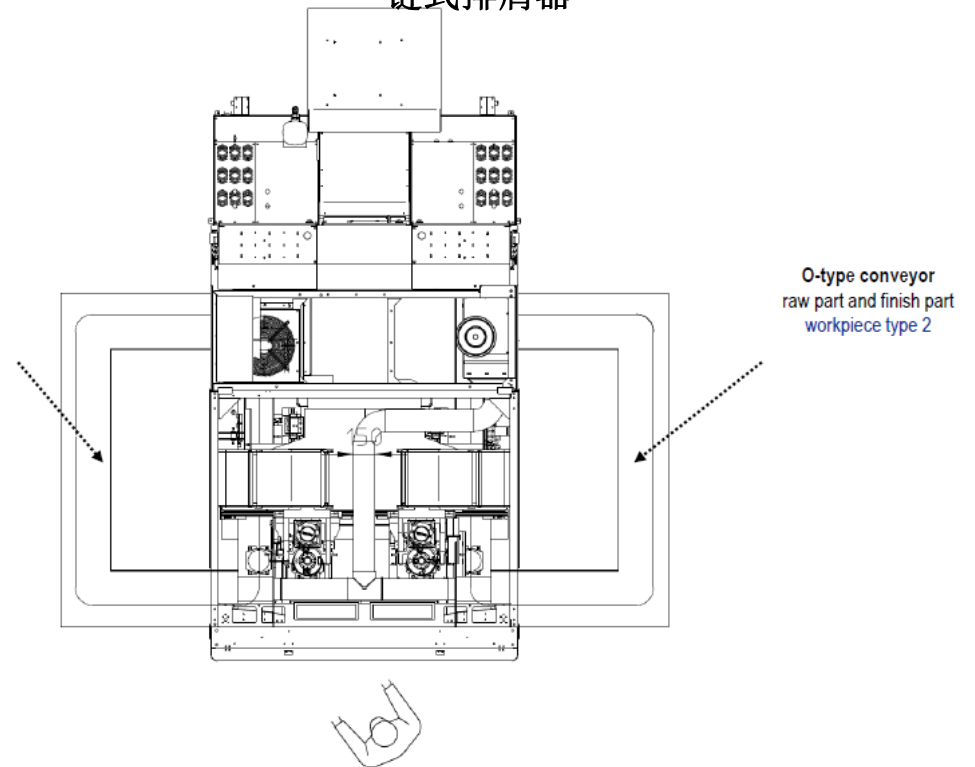
**AUTOMATION WITH
TRACKMOTION**

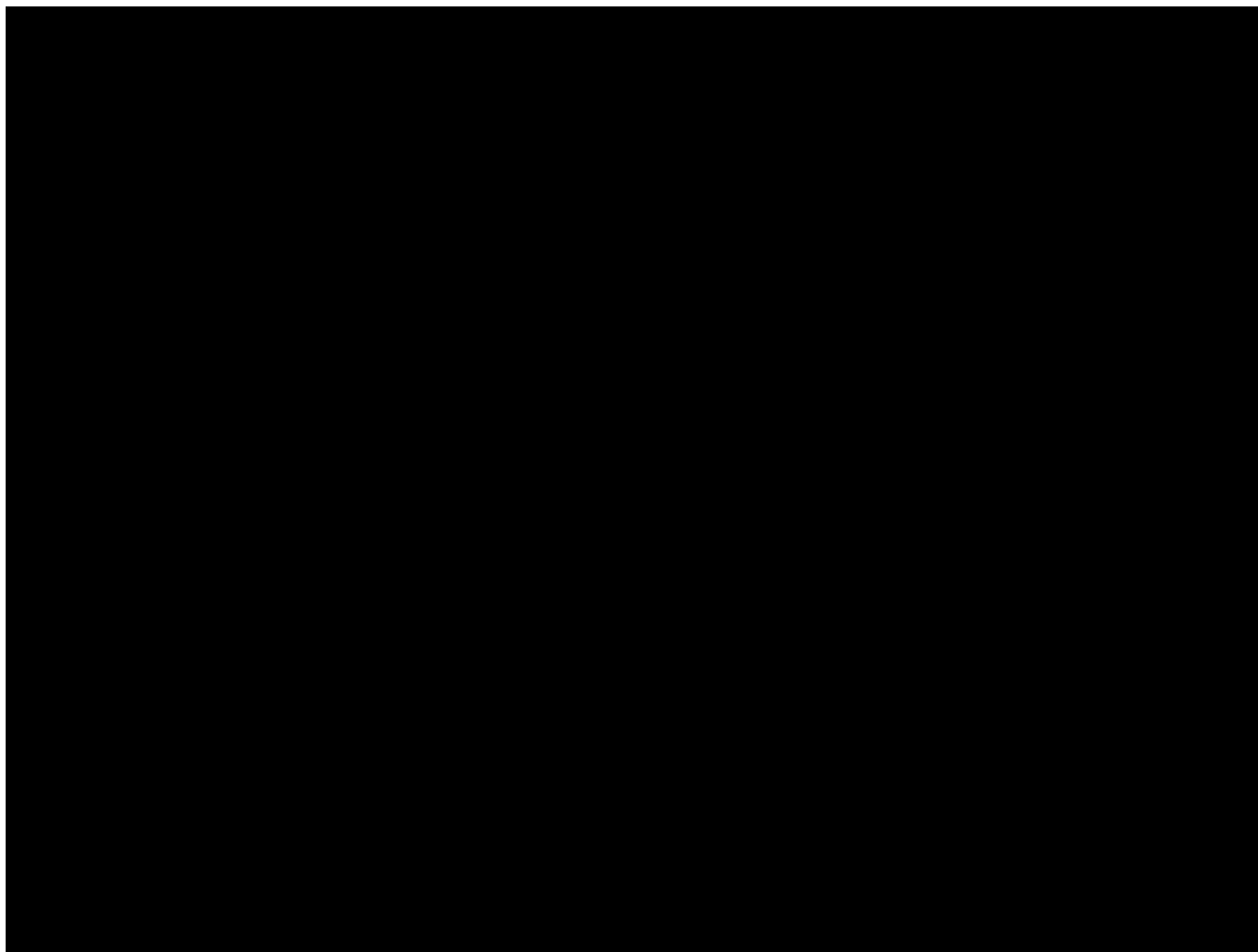
自动化设备带
移动运输轨道系统



**AUTOMATION MIT
CHAIN-TYPE-CONVEYOR**

自动化设备 MIT
链式排屑器





Benefits 优势

-compact construction / small footprint

结构紧凑、占地面积小

-flexible regarding automation-systems (trackmotion, ...)

灵活自动化系统 (移动运输轨道系统, ...)

-easy access to all service units

各服务单元方便接近及操作

-common-parts strategy simplifies stock holding

通用零部件设计, 减少备件库存

- Fanuc control system (VL 3 DUO - standard)

法那克 Fanuc 系统 (VL3 DUO- 标准)

- Siemens control system (VLC 150 DUO - customized)

西门子控制系统 (VLC150DUO- 定制)

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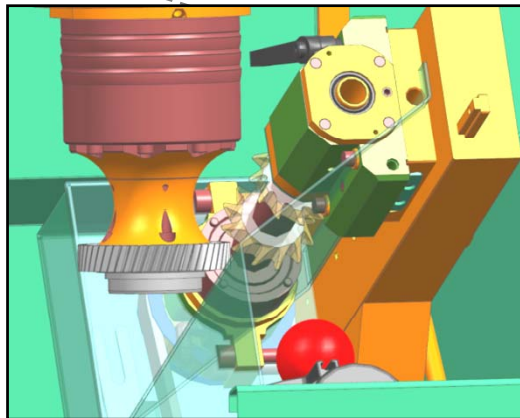
6 Summary

Technology chamfer Cut or pess deburring in one machine

在一台机床实在倒角或去毛刺

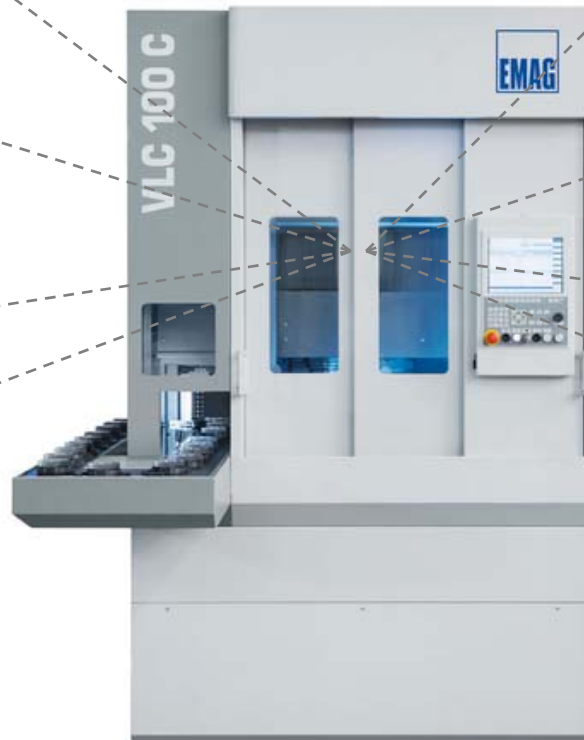
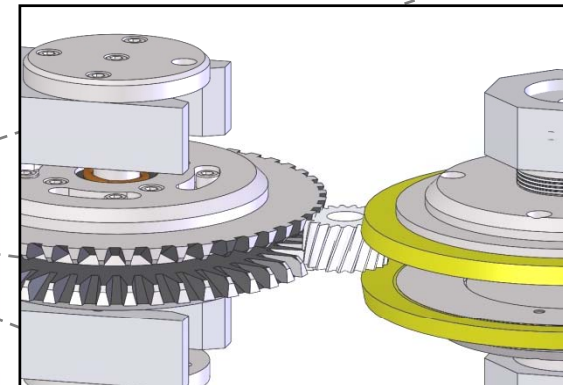
ChamferCut

倒角



Pressdeburring

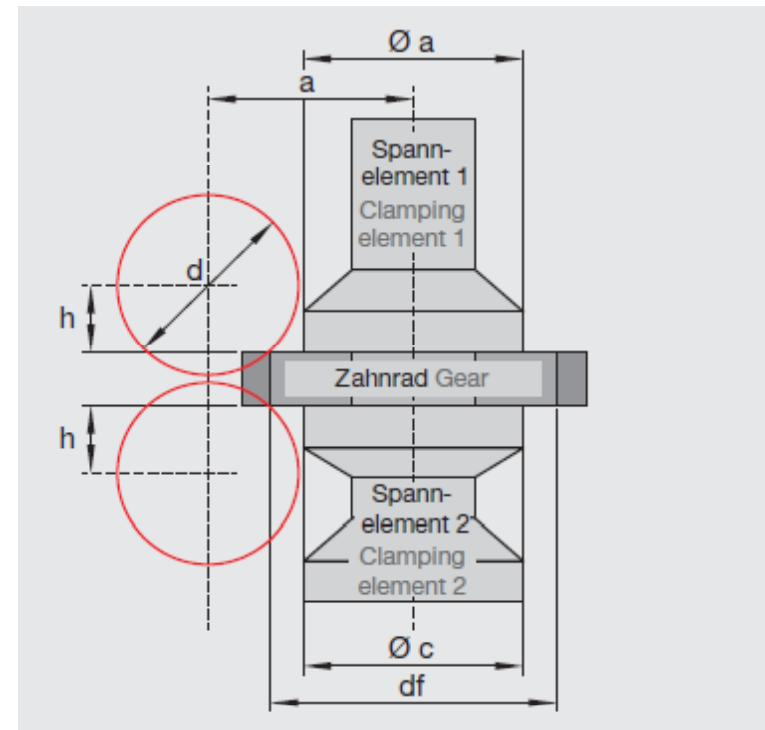
压装去毛刺



Integration of gearhobbing + chamfer cut

→one machine for two processes

滚齿+斜切 两种工艺集成于同一台机床上



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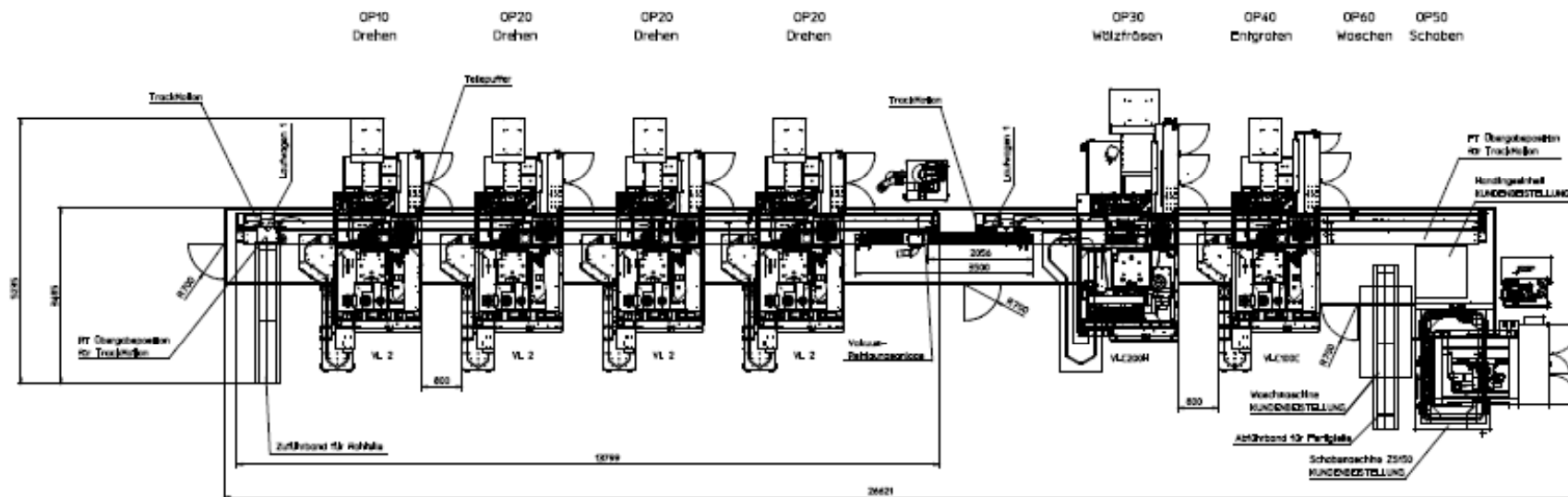
LINE SOLUTION - TURNING - GEARHOBBING - CHAMFERCUT – TRACKMOTION
成线解决方案- 车削-滚齿-倒角- 自动化传输系统

OP10 - OP20

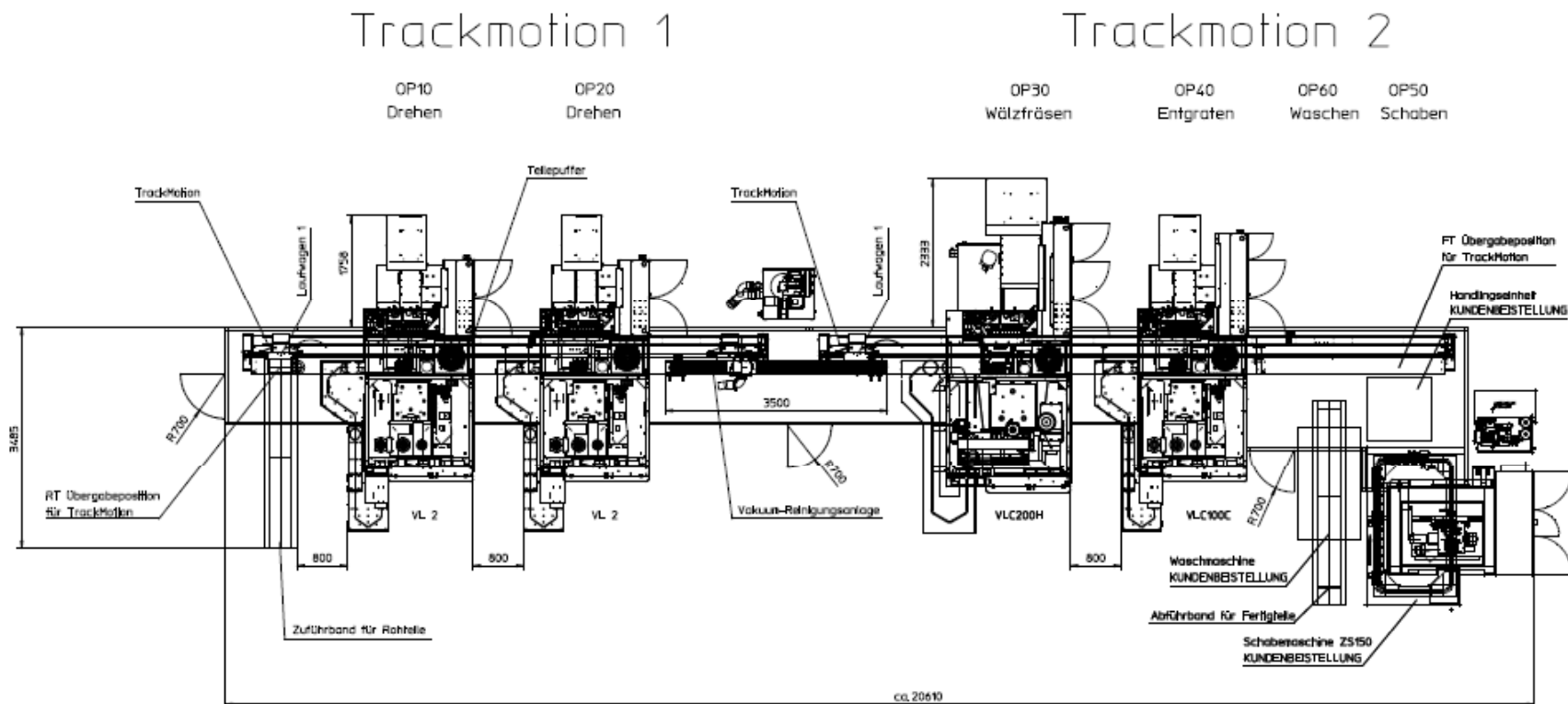
OP30 - OP60

Trackmotion 1

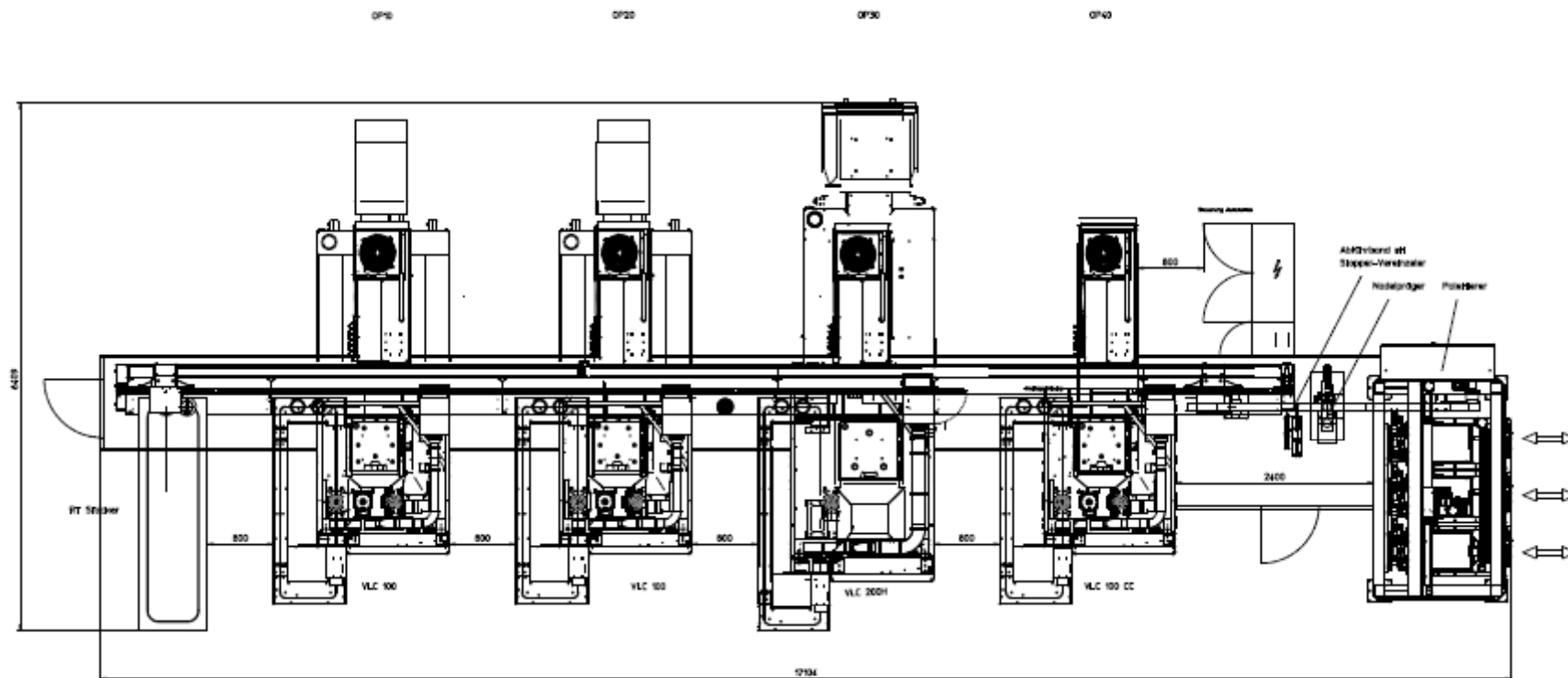
Trackmotion 2



LINE SOLUTION - TURNING - GEARHOBBING - CHAMFERCUT – TRACKMOTION
成线解决方案- 车削-滚齿-倒角- 自动传输系统



LINE SOLUTION - TURNING - GEARHOBBING - CHAMFERCUT – TRACKMOTION
成线解决方案- 车削-滚齿-倒角- 自动传输系统



Benefits

优势

-compact construction / small footprint

结构紧凑、占地面积小

-high flexibility regarding trackmotion

高效灵活运输轨道系统

-easy access to all service units

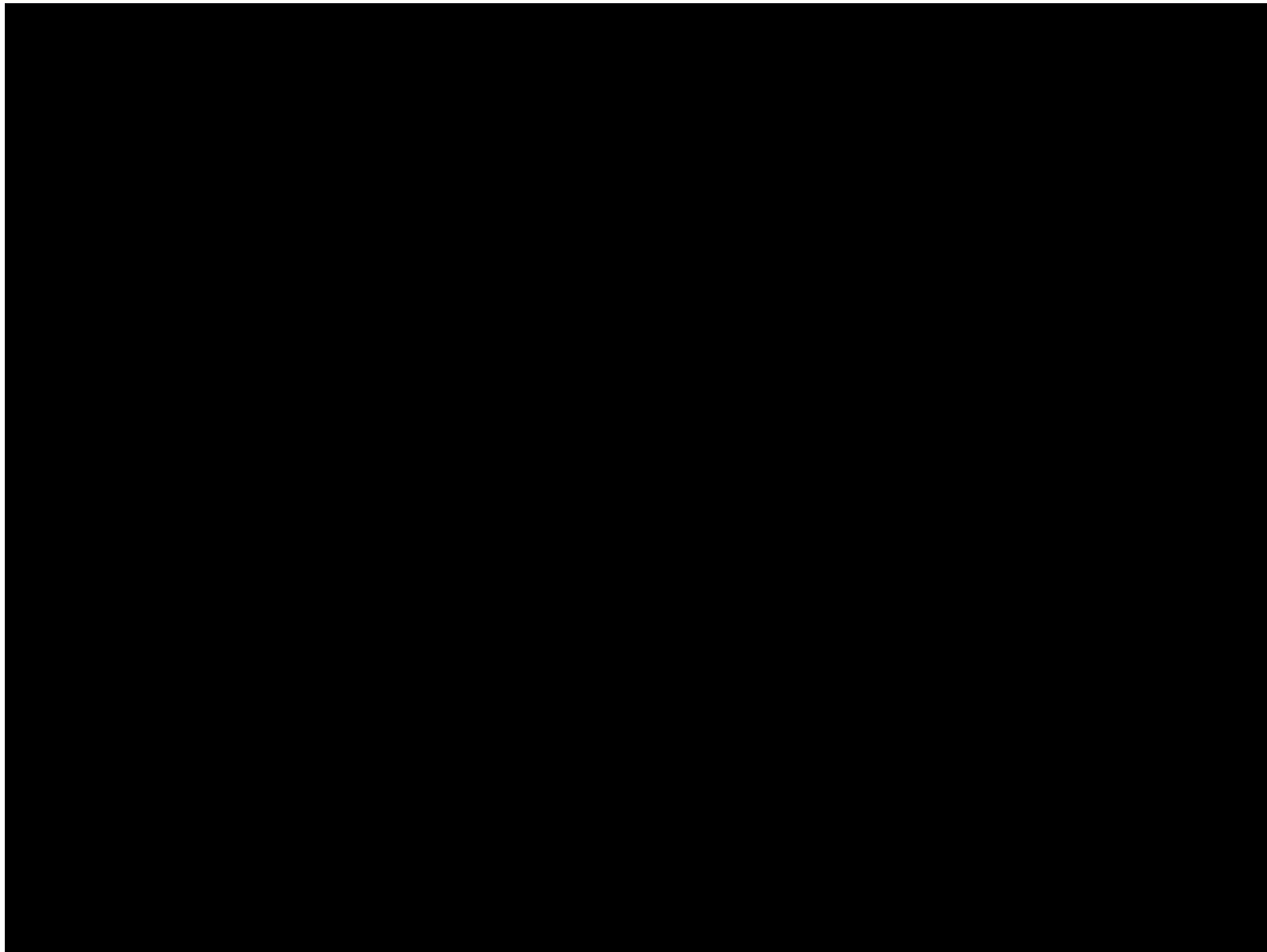
各服务单元可轻松操作

-different technologies with plug&play in line

不同技术集成，即插&即用成线

-SIEMENS/Fanuc control system

SIEMENS或者Fanuc 控制系统



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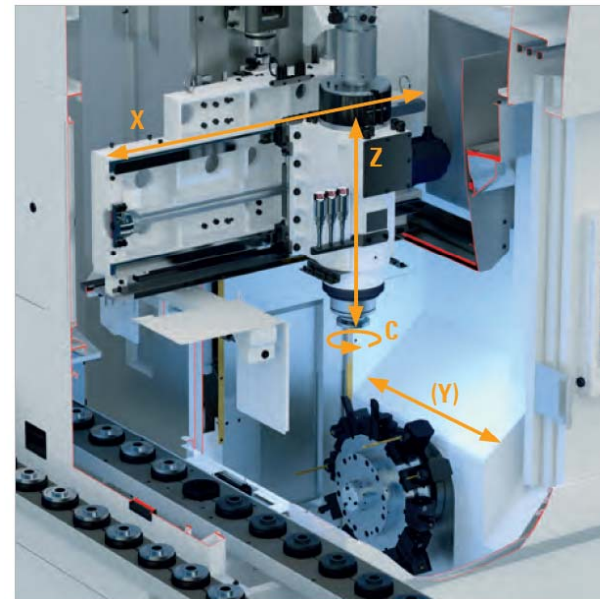
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ALL MACHINING PROCESSES ON ONE MACHINE PLATFORM

所有加工生产线基于一个模块化机床平台



- **Integrated automation**
集成工件自动输送系统
- **Short travels for loading and machining, resulting in shortest possible cycle times**
上下料工位到加工区的行程短，
单件加工时间很短
- **High degree rate**
开机率高
- **Ideal chip flow conditions**
落屑理想
- **Very short chip -to-chip times**
屑对屑时间短
- **Small footprint**
占地面积小



Beneficial to customer:

有益于客户

- Turning, hobbing, laser welding, grinding including automation, all from one resource
车床、滚齿机、激光焊接机、磨床包括自动化装置，都由埃马克提供
- Single machine integrated with automation, easy concept for line linking.
单台设备集成自动化，易于连线
- Turn-key solutions for the complete line
整线交钥匙解决方案
- Less operators and easy maintenance
较少人工操作，易于维护
- Every operation and the degree of automation can be changed at will.
Thus, the manufacturing system can always be perfectly adjusted,
even with increasing quantities or changed component requirements.

每一个工序和自动化程度都可以根据需要灵活改变。

因此，可以对生产线进行完美的调整，即使增加产量或者改变工件加工要求。