

TURNING WITH HIGHEST EFFICIENCY

FTC 160 Flexible Turning Center





Precision hard
turning of
hardened gears



Ultra rapid machine
loader with double
gripper

FTC 160 Flexible Turning Center

The self loading machine for maximum economical advantage

Lowest cost per part, highest reliability, lasting accuracy within microns. The FTC sets new standards for economy and quality for green and precision hard turning.

Specifically designed for high performance machining processes and the environmentally friendly dry cutting of chucked components. The FTC 160 reduces the cost per part up to 50% and achieves turning quality that previously required a grinding finish.

The FTC 160 is a maintenance friendly, easy to operate production machine build in a serial modular production process. With the ultra rapid loading arm, double gripper and positively driven loading door, the FTC 160 is the new bench mark for loading times of production turning machines. The short travel of the turret in both X and Z axis specifically designed for the work envelope drastically reduces idle times.



Green machining of precise chucked components

With the FTC 160 the focus is on high performance chip removal for serial production parts. Even in high power, machining of forgings with turning, drilling, and milling, the rigid machine structure and high performance guarantees the shortest cycle times and highest quality with excellent process capability.

Precision hard turning – dry cutting and high accuracy

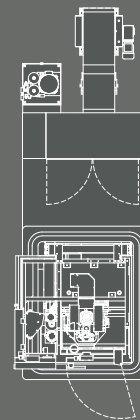
The FTC160 is specifically designed for precision dry machining of hardened work pieces and thereby eliminates high cost finish grinding processes that require coolant. Extreme stiffness and stability with a maximum of damping characteristics are the convincing arguments for this flexible high volume production machine.

Relentlessly cutting chips, but steady and stable at the tool tip

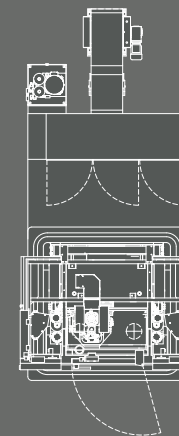
The direct connection from the tool into the work piece

- ▶ Large dimensioned guide ways and guide way spacing
- ▶ Short leverage ratios between the guide ways, tool tip and work piece
- ▶ Integrated turret into the Z-axis housing
- ▶ Monoblock machine base made from ultra high performance concrete

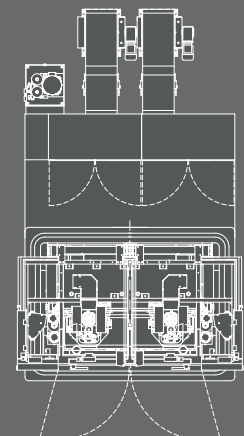
Single Spindle, Flexline



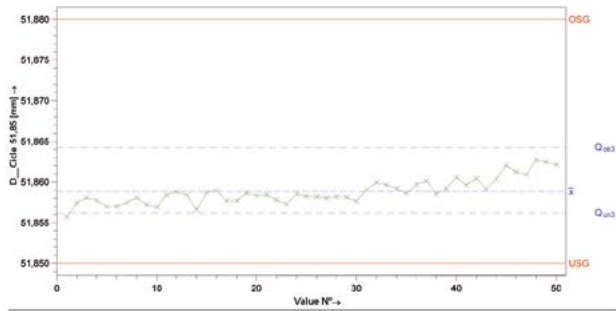
Pendulum Machine, Flexline



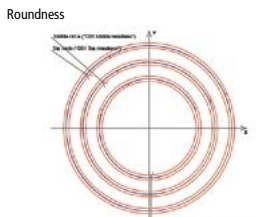
Twin Spindle, Flexline



Bore Diameter



Model distribution		Johnson-Transformation	
Calculation		M4; Percentil (0,135%-299,865%)	
Potential capability index	C_{pk}	$3,00 \leq 3,74 \leq 4,47$	1,67
critical capability index	C_{pk}	$2,09 \leq 3,36 \leq 4,03$	1,67
Requirements are met (C_{pk} , C_{pk})			
Felsomat_A_Part			

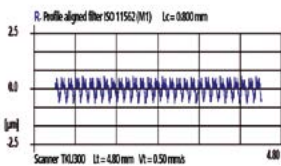


Designation	Actual value	Tolerance
DIN Roundness top	0,002	0,010
DIN Roundness middle	0,002	0,010
DIN Roundness middle	0,002	0,010

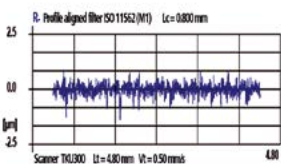
Engineering tolerance

Designation	Actual value	Tolerance
DIN Rectitude A	0,000	0,005

Hard Shot



Finish polished



The competitive edge with superior machine technology

Machine Bed

- ▶ Maximum rigidity with optimum damping characteristics are guaranteed by the massive machine base made from ultra high performance concrete.
- ▶ Form fit assembly faces for the work piece spindle and the linear guide rails made from high tensile steel, all machined in one set up for the highest accuracy.
- ▶ Thermally stable with chips free falling into the chip trough and the stainless steel work area covers isolated from the machining components.

Spindle module for higher productivity

- ▶ The work piece spindle, designed for high volume production has a large performance range for metal cutting. The maintenance free direct drive spindle motor is liquid cooled for long life. The spindle, built into a cartridge design is mounted directly into the machine base.

Compound slide made from nodular cast iron with integrated tool carrier

- ▶ This is the basis for long tool life and the absorption of high cutting forces.
- ▶ The extremely short distribution of forces, the short distance from the center of the work piece spindle to the guide way of the Z-axis, as well as a minimum number of connected components absorbing machining forces guarantees minimal deflection at the tool tip.

Direct absolute encoded linear scales

- ▶ The resolution of 0,1 μm in the X- and Z-Axis, together with the short, high precision ball screws, ensures machining components with a high process capability and accuracy previously only achieved by grinding.

FTC 160 Flexible Turning Center – High performance facts

- ▶ Chip to chip time < 4 s, with the ultra rapid machine loader and double gripper.
- ▶ Well designed operator access and ergonomic tooling and work holding facilitates fast changeover < 10 min.
- ▶ Finish turning with the closest possible tolerances.
- ▶ Singular construction design with lift hooks for easy redeployment.
- ▶ Increased tool life leading to lowest cost per piece.
- ▶ Easy operator interface with intelligent technology software package.

The Control: Siemens 840D SolutionLine

The applied control and drive technology of the newest Siemens generation together with FELSOMAT technology software enables:

- ▶ Simple tool organization screens
- ▶ Enhanced HELP-Functions for intuitive diagnosis
- ▶ Easy set-up programming
- ▶ Interactive programming of the turning process parameters

All security relevant functions are controlled by Siemens Safety Integrated (SI).

Options:

- ▶ Total Production Maintenance (TPM)
- ▶ Machine Data Acquisition (MDA)
- ▶ Remote diagnosis with modem or network

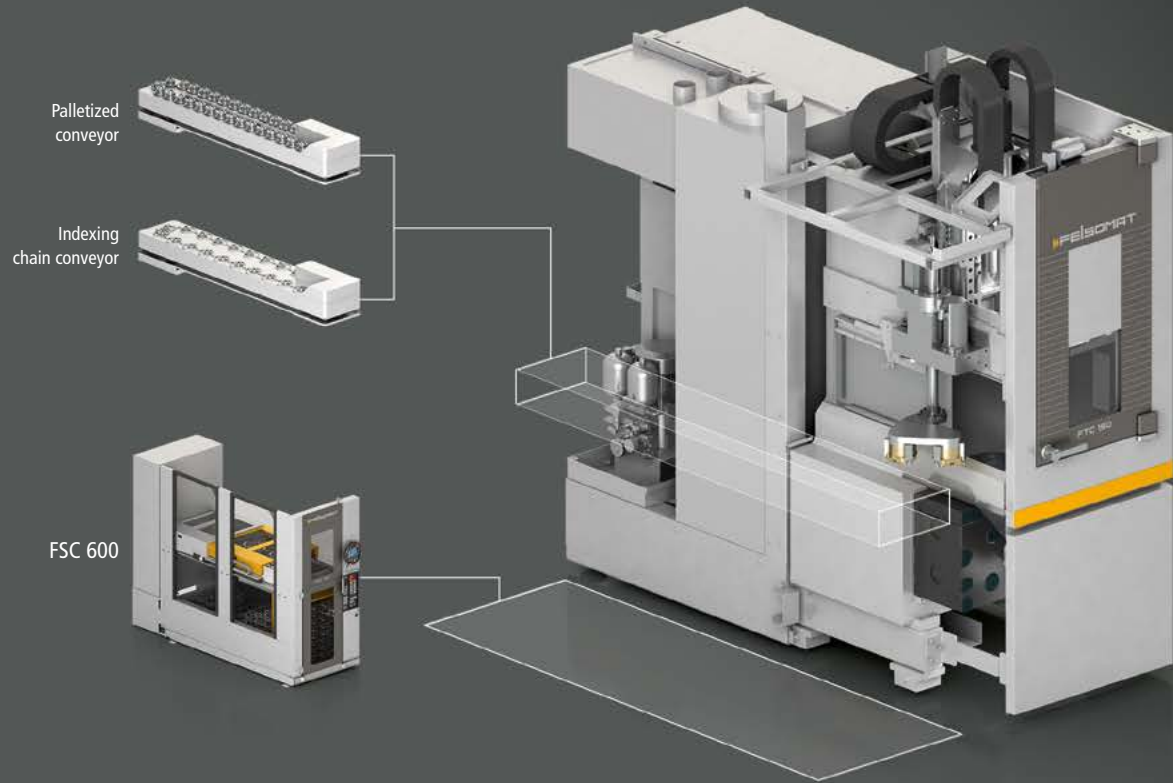
With this functionality, and in the event of an error it is possible for remote support, or automatic email or text alert.



Machine combination and automation – tailor made to the requirements

The individual machines can be linked together in random number with the modular automation concept into a highly efficient manufacturing system. Optional configuration between technology driven, decoupled parallel or process driven serial One-Piece-Flow-manufacturing systems. The production machines can, without retrofitting at any time, be relocated, replaced or for capacity reasons added at a later time to the manufacturing system.

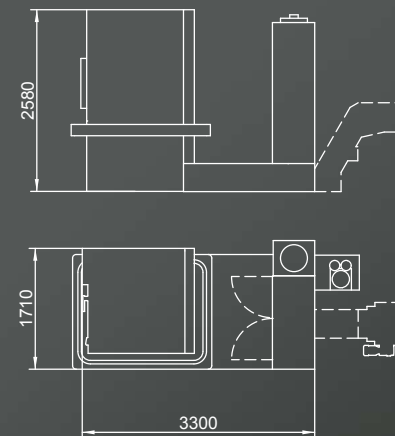
For different components and different batch sizes, the internal material flow and additional integrated system components such as gauging, assembly, washing, or different buffer systems and work piece grippers are all possible.



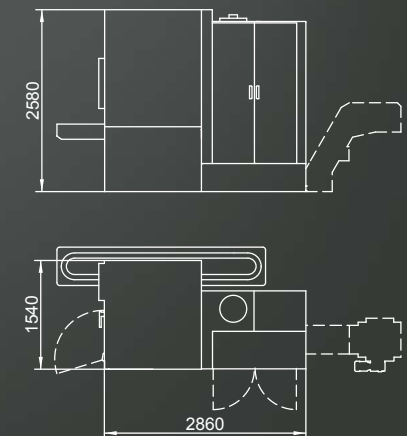
Technical data FTC 160

Work area		Turret	
Swing diameter	320 mm	Number of tools	8
Turning diameter	160 mm	Tooling system	VDI 40 / Capto C5 (Option)
Axis travel in X	200 mm	Option: 2 driven tool stations	HSK 40
Axis travel in Z	200 mm	Power 25% ED	28 Nm, 4.500 min ⁻¹
Work holding diameter max.	250 mm		
Work piece spindle		Dimensions / Weight	
Spindle connection DIN 55026	A 6	Length	2.860 mm
Spindle bearing diameter	120 mm	Length incl. chip conveyor (optional)	4.200 mm
Spindle through hole diameter	52 mm	Width	1.540 mm
Power at 40 % / 100 % ED	18,8 / 14,7 kW	Height	2.580 mm
Torque at 40 % / 100 %	180 / 140 Nm	Foot print	ca. 4.4 m ²
Rpm, max.	4.500 min ⁻¹	Weight	ca. 9.000 kg
		Noise emission	ca. 78 dB(A)
Feed drive		Electrical connection	
Rapid speed X/Z	45 / 45 m/min	Voltage	400 V / 460V
Feed rate X/Z	45 / 45 m/min	Frequency	50 Hz / 60Hz
Feed force X/Z at 100 % ED	4 / 4 kN	Connected load	20,5 kW
		Control: Siemens 840 Dsl with dynamic drives	
		Siemens Simatics	

Flexline-Variant



Base Line Variant



Flexline: Efficient, low cost, in the highest quality

The future of gear manufacturing

The Competence

Machine, Work Holding, Tooling and Automation including integrated quality control for each individual process – with our complete competence REISHAUER and FELSOMAT have redefined the complete process chain of gear manufacturing.

The Task

Combination of all manufacturing technologies in one system. All manufacturing steps are included in one synchronized flow production. Through put time and work in process are drastically reduced.

The Result

A high efficient complete standardized production system, built with interchangeable technology modules and automation components for lowest cost per piece and a maximum of profit without compromising quality and capability.



REISHAUER
GROUP

REISHAUER

FELSOMAT

Felsomat GmbH & Co. KG
Gutenbergstraße 13
75203 Königsbach-Stein
Germany
Phone +49 72 32-4 01-0
Fax +49 72 32-4 01-149
info@felsomat.de
www.felsomat.de

Felsomat USA, Inc.
1700 N. Penny Lane
Schaumburg, IL 60173
USA
Phone +1 847-9 95 10 86
Fax +1 847-8 85 26 91
info@felsomat.com
www.felsomat.com

Felsomat China
FELSOMAT (Beijing) Machine Tool Co., Ltd.
Room 2009, Tower A, Sanlitun SOHO
No.8 Gongti North Road
Chaoyang District, Beijing 100027
P. R. China
Phone +86 10 57 85 31 30
Fax +86 10 57 85 31 71
info@felsomat.cn
www.felsomat.com

Felsomat India Pvt. Ltd.
#A-149, 3rd Cross
Industrial Estate,
Peenya 1st Stage
Bangalore 560058
India
Phone +91 80 28 39 32 23
Fax +91 80 28 39 32 23
bhat@felsomat.in
www.felsomat.in

