LASER LINE ULTRA

State-of-the-art ultra-short pulse
laser technology for maximum flexibility

Key parameters

The LASER LINE ULTRA carefully machines all commercially available cutting materials such as carbide, CBN, ceramic, PCD, CVD-D and MCD without producing heat, thus producing exceptional surface quality. It has a clamping range up to 200 mm in diameter and up to 250 mm in length, making it very versatile in its field and the first choice when a great deal of flexibility is required in applications.

EWAG
KÖRBER SOLUTIONS

Ewag AG

The origins of Ewag AG date back to 1946 when the company manufactured precision tool grinding machines for the Swiss watch industry. Today the EWAG product range includes manual machines for grinding and regrinding tools as well as the production of small precision parts, CNC tool grinding machines for grinding as well as a laser machine for indexable cutting inserts and rotationally symmetrical tools made from carbides.

Ewag AG is part of the UNITED GRINDING Group within Körber AG which has significant financial strength and well tested processes. Together with our sister company, Walter Maschinenbau GmbH, we consider ourselves to be a supplier of systems and solutions for the complete machining of tools and can offer a wide range of products, including grinding, rotary eroding, laser machining, measurement and software.

Our customer focus and our global sales and service network of company-owned locations and employees has been appreciated by our customers for decades.

LASER LINE ULTRA

The LASER LINE ULTRA is the leading technological high-end laser machining unit for demanding applications. It has state-of-the-art ultra-short pulse laser technology, ensuring all cutting materials are machined carefully to produce exceptional quality. The EWAG Laser Touch Machining® Process (LTM®) achieves highly complex geometries with exceptional surface quality - in just one clamping operation. The LASER LINE ULTRA offers a great deal of flexibility thanks to its kinematics, 3D programming, ultra-short pulse laser technology and integrated automation.

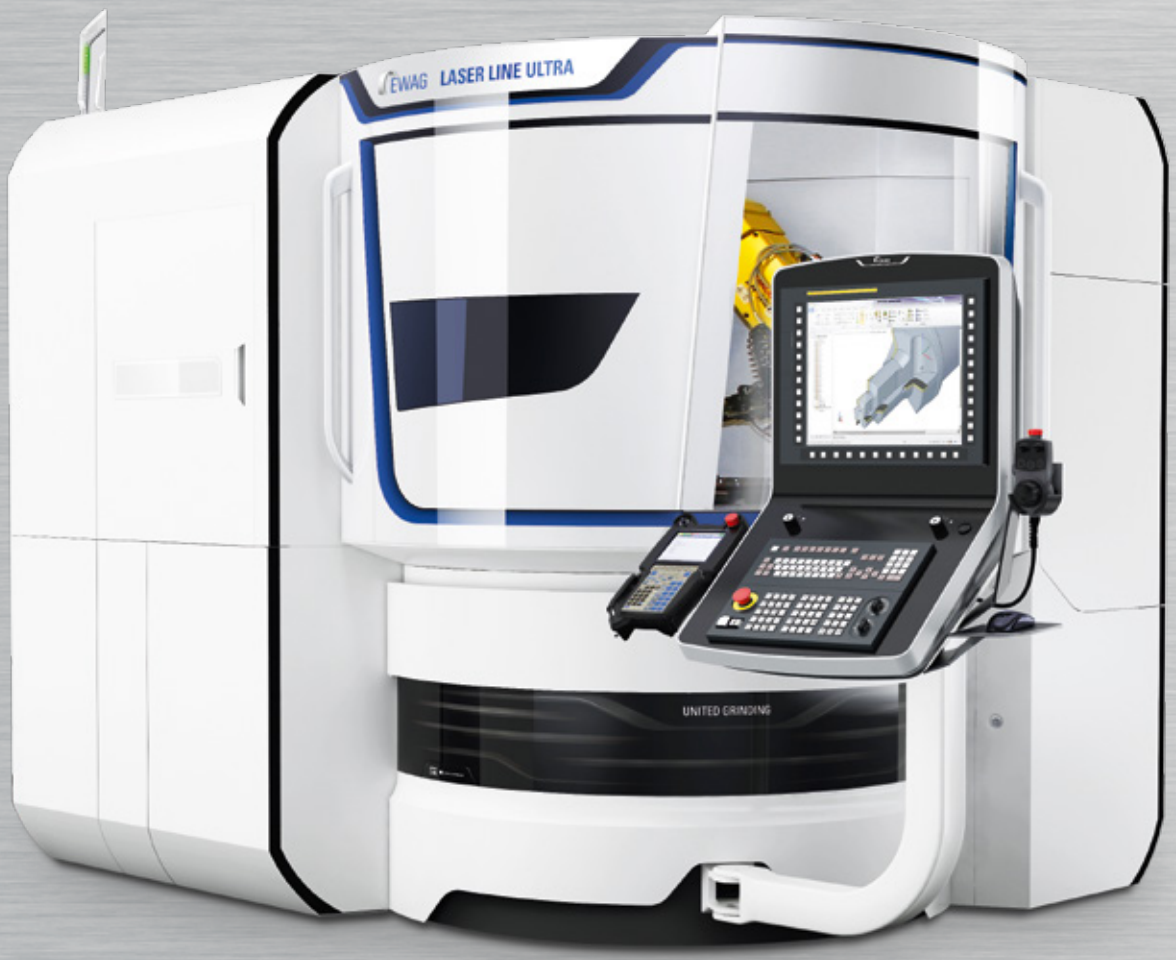
LASER LINE ULTRA at a glance

Application

- All-in-one machining of blades, cavities and chip grooves followed by marking in one clamping operation
- 3D machining of all commercially available cutting materials
- Ultimate surface quality for long tool life
- Indexable inserts from 3 mm inscribed diameter and up to 50 mm circumscribed diameter
- Holds rotationally symmetrical tools of 0.5 to 200 mm in diameter and of up to 250 mm in length
- Materials HM, cermet, ceramic, CBN, PCD, CVD-D, MCD/ND

The machine

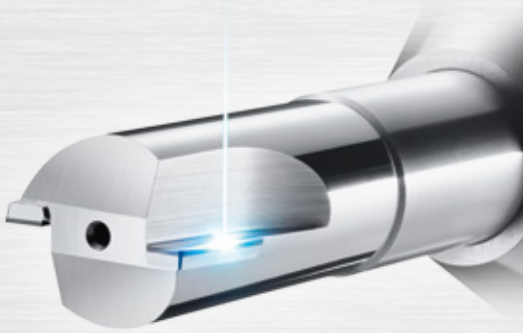
- Ultra-short pulse laser with picosecond pulses
- Low-vibration cast-iron machine bed
- 5-axis CNC tool machine plus overlaid 3-axis laser beam guide
- Direct drives in the linear axes
- Torque motors for B and C axes
- Automatic HSK 63 interface
- Shielded machining room for laser protection class 1
- Beam guide in protective atmosphere
- Integrated laser output measurement and monitoring (IPC)
- Automatic focus position detection
- Automatic calibration of CNC/optical axes
- Integrated 3D measuring probe
- FANUC control, the global standard
- Automation peripheral equipment includes FANUC 6-axis robot



LASER LINE ULTRA – by implementing ultra-short pulse laser technology with a pulse duration of 10 picoseconds, all commercially available materials, in particular cutting materials such as CVD-D or MCD, can be machined.

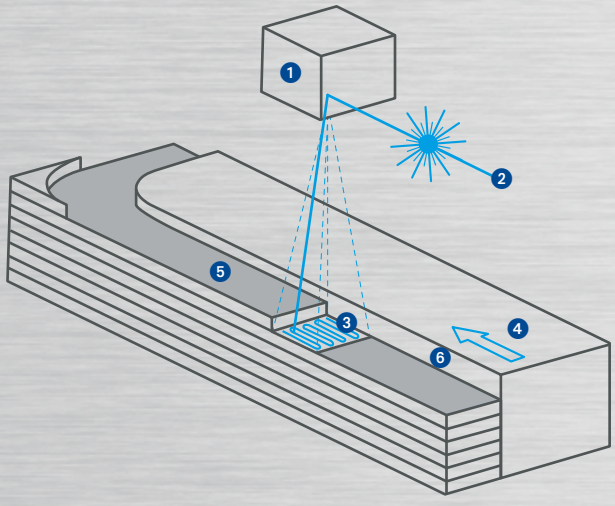
Software

- EWAG LaserSoft combines laser and machine control
- Direct 3D CAD/CAM interface
- Simplest definition of laser removal path using the 3D model
- Standardised, simple operation on all EWAG CNC machines: Human Machine Interface HMI
- CNC program with wizard technology
- Management of laser monitoring, hardware, tools, production and order processing



Ultra-short pulse laser with direct vaporisation without any significant heat input maintains material properties
The ultra-short pulse laser works with direct vaporisation without any significant heat input thanks to laser pulses of 10 picoseconds (cold ablation). The tool is therefore not subjected to thermal damage during erosion, which significantly increases its service life. Furthermore, the ultra-short pulses in combination with high repeat rates generate high-quality surfaces.

Thanks to the unique 8-axis kinematics concept, the LASER LINE ULTRA machines highly complex geometries in just one clamping operation. The 6-axis robot guarantees ultimate productivity during minimally manned multi-shift operation. LASER LINE ULTRA and robots are coordinated via FANUC control technology.

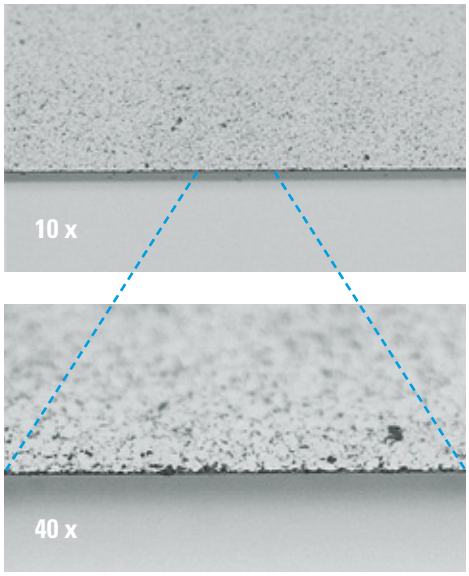


EWAG Laser Touch Machining®
Tangential laser beam machining generates top-quality cutting edges and cutting geometries in an efficient manner. In this process, the surface is shaped with the outer surface of the laser beams. The cutting groove is produced by the repetitive hatching pattern of the laser scanning unit and by the simultaneous travel movement of the CNC axes. This unique, patented machining technology is marketed under the brand EWAG Laser Touch Machining® (LTM®).

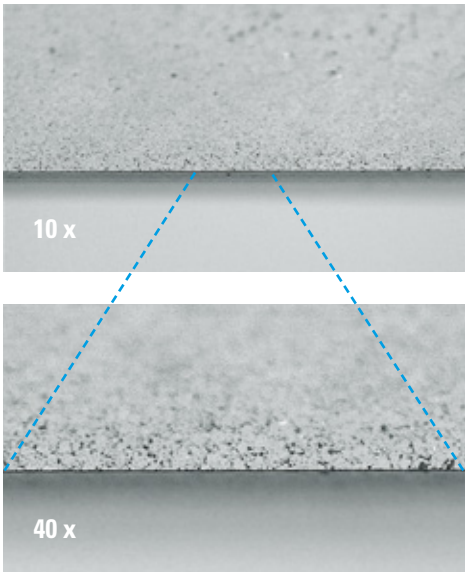
1. 2D scanning unit; moves the beam in the X/Y plane
2. Laser beam
3. Repeating 2D pattern
4. Workpiece movement via 5-axis CNC (X/Y/Z/B/C)
5. Machined erosion paths
6. Final geometry/free surface

Ultimate surface quality for all materials

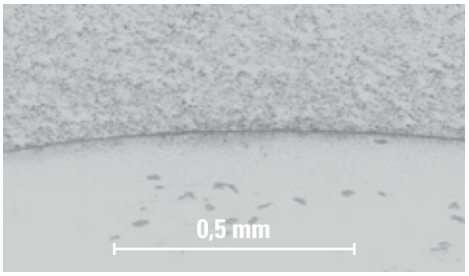
Conventional machining
Material ILJIN CXL-II
2 µm – 40 µm mixed grain



Laser machining
Material ILJIN CXL-II
2 µm – 40 µm mixed grain



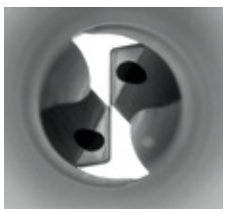
Concave blade
Material ILJIN CXL-II
2 µm – 40 µm mixed grain



- No grain cracks
- Very sharp cutting edges can be achieved
- No thermal damage

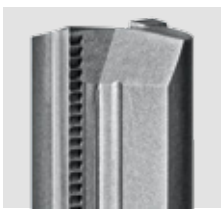
Excellent cutting quality
The effortless erosion process with the picosecond laser prevents cracks on the blade – unlike in conventional procedures. It also enables a higher level of flexibility; for instance, concave cutting cycles are possible. 3D machining of diamond or carbide allows tools to be manufactured that have advanced functionality. Moreover, the cutting material can be selected as required. State-of-the-art CVD-D tools, used on very popular materials like carbon-fibre composites or aluminium alloys can be produced with outstanding results on the LASER LINE ULTRA.

TC applications

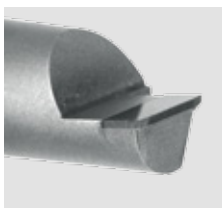


CBN applications

PCD applications



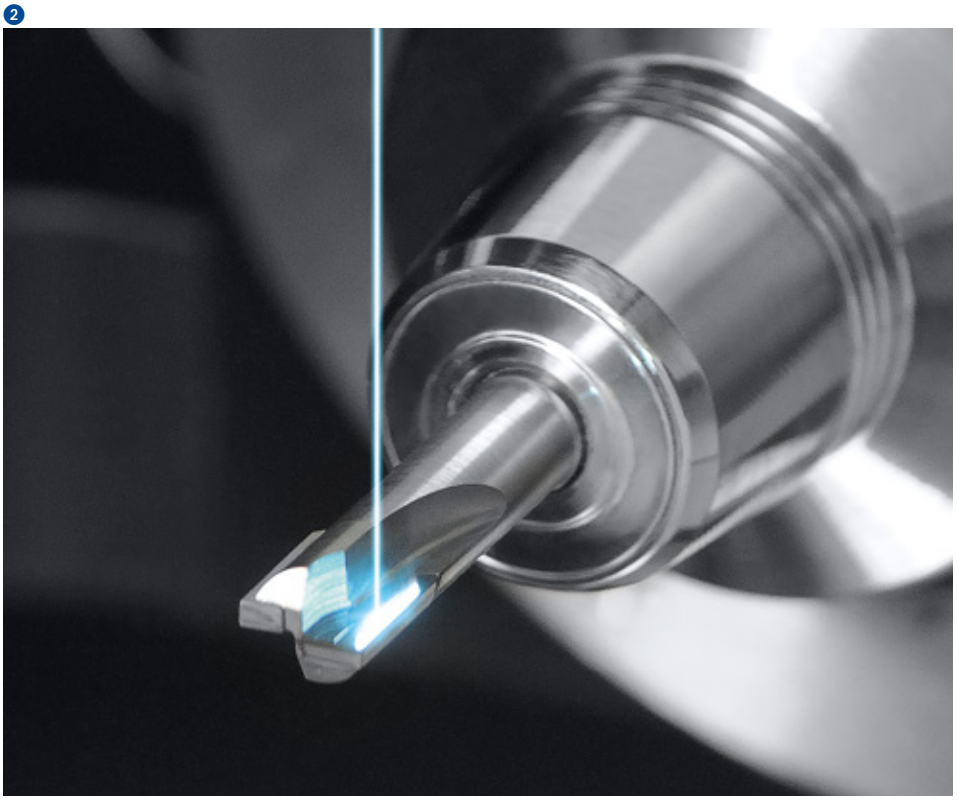
CVD-D applications



Kinematics and laser pulses shape each geometry

1

2



- High removal rates
- Ultimate surface quality
- Unique kinematics

High-end laser source
The picosecond laser achieves ultimate erosion performance and surface quality, while causing almost no thermal damage to the workpiece.

Stable beam environment
The beam guide ensures ultimate process stability and constant beam properties. The beam path is fully encapsulated and is guided into a protective atmosphere under excess pressure. The deflection mirrors are monitored and sensitive optical components are integrated into the cooling circuit.

Unique machine concept
The intelligent kinematics concept with 5 CNC axes and one overlaid 3-axis laser beam guide guarantees the highest possible levels of flexibility when machining highly complex tools.

1 Workroom

2 Flute groove machining

1

HSK 63 interface
The highly accurate tool holder is imperative for a precise machining result and it is compatible with a wide range of clamping devices on the market.

2

Clamping indexable inserts
Indexable inserts can be clamped with a clamping station or using a nail clamp.

3

Automation of cylindrical workpieces
The double gripper of the robot automatically loads the cylindrical workpieces, e.g. drills and milling cutters, from pallets.

- Low-maintenance linear drives
- HSK 63 tool interface
- 3D measuring probe
- Automatic calibration of CNC/optical axes, laser output and focus position

4

Automatic calibration
The machine calibrates automatically for highly accurate machining. Both the 5 CNC axes and the 3 optical axes of the deflection system as well as the laser output and focus position are measured exactly in an automatic process.

5

3D measurements
Soldering errors are detected via an integrated 3D measuring probe and the plate position is automatically compensated in LaserSoft, the laser software from EWAG. The exact plate height is also detected in order to accurately readjust the focus position.

1 HSK 63 interface
2 Clamping station for clamping indexable inserts
3 Pallet system and double gripper for cylindrical workpieces
4 Automatic calibration, CNC axis alignment and focus position via camera, laser output via sensor head
5 3D measuring probe

Flexible automation

- Space-saving robot integration
- Customer-specific tool handling
- Profitability, even for small batch sizes

Customer-specific tool handling
Tool handling in the LASER LINE ULTRA is tailored precisely to customer requirements: indexable inserts can be clamped automatically in series or in alternating series . Rotating tools can be loaded automatically via HSK 63 tool holders or via the double gripper head. Rack and pallet systems, including automatic pallet stacker solutions, are available.

Triple gripper
In order to reduce change times to a minimum, indexable inserts are loaded using a triple gripper head on the FANUC robot. The robot detects the tool and the allocated clamping system; the gripper takes the tool from the pallet and transfers it to the clamping station in the correct, precise machining position.

Robot integration
The efficient EWAG rotating drum solution for integration of a FANUC 6-axis folding-arm robot with various gripper systems enables automatic multi-shift operation. Laser machining cells and robot cells have a beam-proof design and are integrated to save space. Transformer substations and automatic part detection also support automatic operation.

How to get optimum use out of the LASER LINE ULTRA

In order to get optimum use out of your laser processing machine we offer a customised training session. At the end of the training session you are given a certificate showing the training has been successfully completed. This provides you with evidence of the solid practical training your employees have received.

The training lasts one week and is held on the EWAG site in Switzerland. It consists of the following modules:

Module 1, Laser principles:
General laser technology, structure of a laser system, principles of optical systems and properties of laser beams.

Module 2, Laser ablation:
Erosion mechanisms in 2D and 3D erosion, properties of short and ultra-short laser pulses, differences in machining quality.

Module 3, Machine structure:
Description of machine-model constraints of EWAG LASER LINE series, technical questions such as general operation and maintenance of the machine.

Module 4, CAD/CAM:
Basic tool-production skills and basic machining data for machining your geometries. Training on a simple geometry, direct implementation in the course.

Module 5, Cutting edges:
Creation of a typical cutting geometry, direct application on a typical workpiece.

Module 6, Advanced strategies:
Generation of negative chamfers, chip breakers and labelling of workpieces.

EWAG LaserSoft with plug-in LaserPro 3D

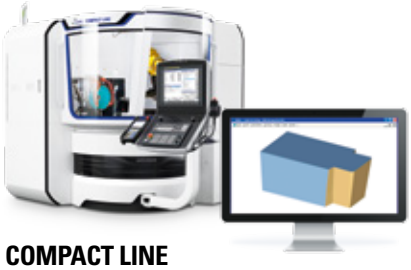
LaserSoft – more than just software!
LaserSoft is a customer-focused software package from EWAG that will fully satisfy even your most challenging expectations. Programs can be created quickly and easily on all EWAG CNC machines in accordance with the standard philosophy. The input screens feature 3D graphics. Thanks to the Ethernet, the machines can be integrated into company networks. At the same time, our specialists have access for diagnostic and maintenance purposes.

EWAG Standard Application Framework

- Human Machine Interface HMI
- Laser administration
- Production
- CNC programming
- Hardware
- Job management

LASER LINE ULTRA
LASER LINE PRECISION
LaserSoft laser software
with plug-in LaserPro 3D

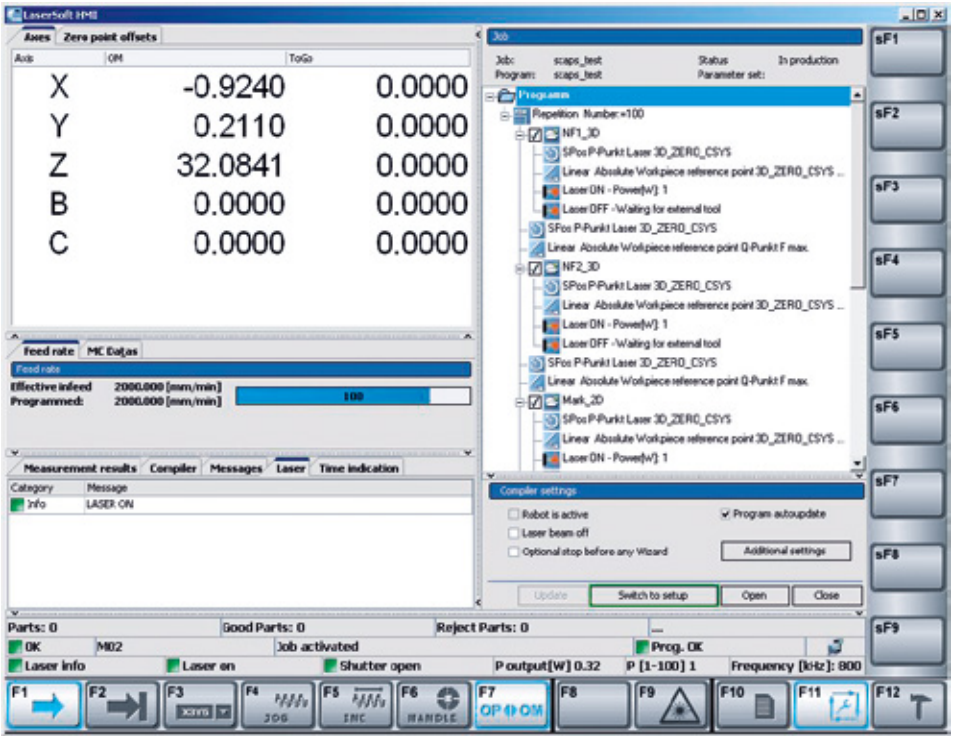
EWAMATIC LINEAR
ProGrind grinding software
with plug-in NUMROTO*plus*

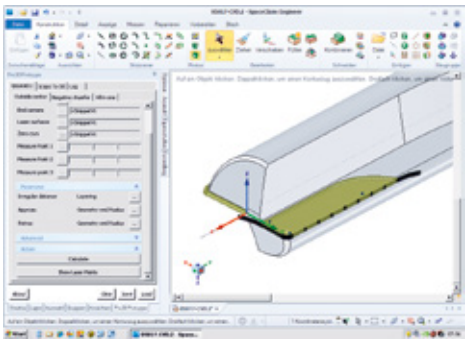


COMPACT LINE
ProGrind grinding software
with plug-in CyberGrinding

INSERT LINE
ProGrind HSM grinding software
with plug-in EWAG Insert HMI

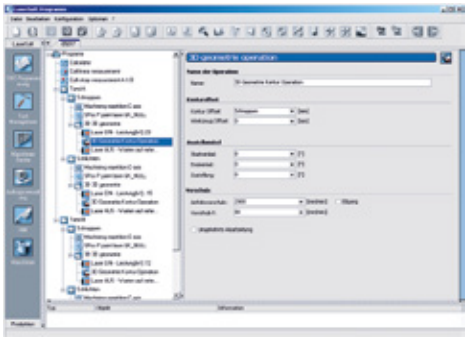
Human Machine Interface HMI
HMI contains all relevant data views. It supports the user when setting up production orders whilst informing him of production-related facts in real-time.





Direct programming via the 3D model
In order to machine complex 3D structures, the tool geometries are read in a popular 3D data format and are broken up into removal layers. The machining strategy and scanner parameters for the layer removal can be defined and stored in a machining file. Tool laser marking can also be defined in accordance with the same procedure and can be integrated into the program tree.

- Modular software modules
- All in one machining
- 3D interface
- Lettering add-on



Proven program tree structure
Programs in LaserSoft can be easily and flexibly created using a range of program modules. Laser commands can be executed and machining functions can be loaded into the program tree. The monitoring and control of the laser source as well as job administration and robot programming for production operation are fully integrated in LaserSoft.

FANUC control unit, the global standard

- Multi-processor system – high system security
- FANUC bus for digital drives – fault-free communication
- CNC and robots from a single manufacturer – no interface problems

With the FANUC control unit, EWAG relies on the global standard of control technology. For the user, this means the highest degree of reliability, availability and operating comfort.

Customer Care

WALTER and EWAG deliver systems and solutions worldwide for all areas of tool machining. Our leadership is based on ensuring maximum availability of our machines over their entire service life. For this we have thus bundled numerous services in our customer care program.

From “Start up” through “Prevention” to “Retrofit”, our customers enjoy tailor made services for their particular machine configuration. Around the world, our customers can use helplines, which can generally solve a problem using remote service. In addition to that, you will also find a competent service team in your vicinity around the world. For our customers, this means:

- Our team is close by and can quickly be with you.
- Our team will support you to improve your productivity.
- Our team works quickly, focuses on the problem and its work is transparent.
- Our team solves every problem in the field of machining tools, in an innovative and sustainable manner.

Start up
Commissioning
Extension of the guarantee

Qualification
Training
Support for production

Prevention
Maintenance
Inspection

Service
Customer service
Customer advice
Helpline
Remote service

Material
Spare parts
Replacement parts
Accessories

Rebuild
Machine overhauling
Refurbishing of assemblies

Retrofit
Conversions
Retrofitting parts
Taking machines back

Technical data, dimensions

Mechanical axes

X axis	440 mm
Y axis	140 mm
Z axis	170 mm
Rapid motion [1]	15 m/min
B axis	± 110°
C axis	∞

Optical axes

Max. scanning field size	50 x 50 mm²
Automatic focus position displacement	± 4 mm
Max. beam deflection speed	10 m/s

Laser source

Industrial high-performance ultra-short pulse laser	50 W / 100 W
Wave length	1,064 nm
Repetition rate	0.4 – 1 MHz
Pulse duration	< 15 ps
Beam profile and quality	TEM_{00} (M^2 < 1.5)

Accuracy

Linear resolution	0.0001 mm
Radial resolution	0.0001°

Smoke gas suction/filter system

Volume flow	170 m³/h
Low pressure	2,800 Pa
Dust filter / Filter module	HEPA H14

Others

Power consumption at 400 V/50 Hz	approx. 11 kVA
Weight incl. robot cell	approx. 4,000 kg

Tool data

Automatic clamping system for indexable cutting inserts

Min. inscribed circle of indexable cutting insert [2]	3 mm
Max. circumscribed circle of indexable cutting insert [2]	50 mm

Automatic clamping system for rotationally symmetrical tools

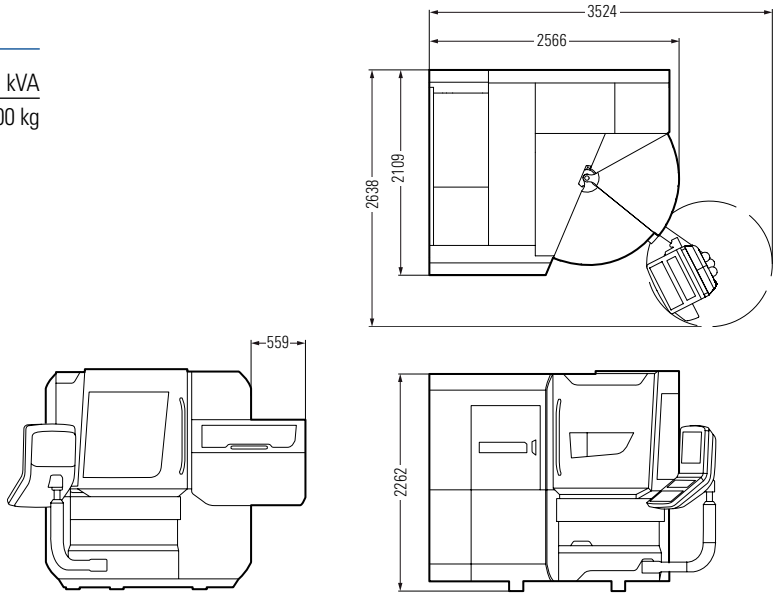
Interface	HSK 63 A
Max. diameter of rotating tools [2] [3]	200 mm
Max. tool length [2] [3]	250 mm

Options

- Water reverse-flow cooling unit
- Automation with FANUC robot
- HSK 63 rack
- Pallets for rotating tools
- Pallets for indexable inserts
- Pallet changers
- Customised clamping solutions

Services

- LASER LINE ULTRA training
- Development of customised tools



LASER LINE ULTRA with stacker

LASER LINE ULTRA

[1] Linear max. CNC speed in X/Y, this is limited to 5 m/min.

[2] The maximum tool dimensions depend on the type of tool and its geometry, as well as the type of machining.

[3] From surface contact HSK 63 interface.

Creating Tool Performance

WALTER and EWAG are globally leading market-oriented technology and service companies, and are system and solution partners for all areas of tool machining. Our range of services is the basis for innovative machining solutions for practically all tool types and materials typical for the market with a high degree of added value in terms of quality, precision, durability and productivity.

Grinding – Grinding of rotationally symmetrical tools and workpieces

WALTER machines	Use	Materials	Tool dimensions [1] max. length [2] / diameter
HELITRONIC ESSENTIAL	P R	HSS TC C/C CBN	255 mm / Ø1 – 100 mm
HELITRONIC MINI POWER	P R	HSS TC C/C CBN	255 mm / Ø1 – 100 mm
HELITRONIC MINI AUTOMATION	P R	HSS TC C/C CBN	255 mm / Ø1 – 100 mm
HELITRONIC BASIC	P R	HSS TC C/C CBN	350 mm / Ø3 – 320 mm
HELITRONIC POWER	P R	HSS TC C/C CBN	350 mm / Ø3 – 320 mm
HELITRONIC VISION 700 L	P R	HSS TC C/C CBN	700 mm / Ø3 – 200 mm
HELITRONIC VISION 400 L	P R	HSS TC C/C CBN	420 mm / Ø3 – 315 mm
HELITRONIC VISION 400	P R	HSS TC C/C CBN	370 mm / Ø3 – 315 mm
HELITRONIC MICRO	P	HSS TC C/C CBN	120 mm / Ø0.1 – 12.7 mm
	R	HSS TC C/C CBN	120 mm / Ø3 – 12.7 mm

EWAG machines	Use	Materials	Tool dimensions [1] max. length / diameter
EWAMATIC LINEAR	P R	HSS TC C/C CBN PCD	200 mm / Ø0.2 – 200 mm
WS11/WS11-SP	P R M	HSS TC	- / up to Ø25 mm
RS15	P R M	HSS TC C/C CBN PCD	- / up to Ø25 mm

Eroding – Electrical discharge machining and grinding of rotationally symmetrical tools

WALTER machines	Use	Materials	Tool dimensions [1] max. length [2] / diameter
HELITRONIC DIAMOND EVOLUTION	P R	HSS TC C/C CBN PCD	185/255 mm / Ø1 – 165 mm
HELITRONIC POWER DIAMOND	P R	HSS TC C/C CBN PCD	350 mm / Ø3 – 320(400) mm
HELITRONIC DIAMOND	P R	HSS TC C/C CBN PCD	370 mm / Ø3 – 320(400) mm

Software – The intelligence of tool machining and measuring for production and regrinding

Customer Care – Comprehensive range of services

Grinding – Grinding of indexable inserts

EWAG machines	Use	Materials	Indexable inserts [1] Inscribed / circumscribed circle
EWAMATIC LINEAR	P R	HSS TC C/C CBN PCD	Ø3 mm / Ø50 mm
COMPACT LINE	P R	HSS TC C/C CBN PCD	Ø3 mm / Ø50 mm
INSERT LINE	P R	HSS TC C/C CBN	Ø3 mm / Ø75 mm
RS15	P R M	HSS TC C/C CBN PCD	- / up to Ø25 mm

Laser – Laser machining of indexable inserts and/or rotationally symmetrical tools

EWAG machines	Use	Materials	Tool dimensions [1] max. length / diameter
LASER LINE ULTRA	P R	TC C/C CBN PCD CVD-D MCD/ND	250 mm / Ø0.1 – 200 mm
LASER LINE PRECISION	P R	CBN PCD CVD-D	250 mm / Ø0.1 – 200 mm

EWAG machines	Use	Materials	Indexable inserts [1] Inscribed / circumscribed circle
LASER LINE ULTRA	P R	TC C/C CBN PCD CVD-D MCD/ND	Ø3 mm / Ø50 mm
LASER LINE PRECISION	P R	CBN PCD CVD-D	Ø3 mm / Ø50 mm

Measuring – Contactless measurement of tools, workpieces and grinding wheels

WALTER machines	Use	Tool dimensions [1] max. length [2] / diameter
HELICHECK PRECISION	M	420 mm / Ø1 – 320 mm
HELICHECK ADVANCED	M	420 mm / Ø1 – 320 mm
HELICHECK PRO	M	300 mm / Ø1 – 200 mm
HELICHECK PRO LONG	M	730 mm / Ø1 – 200 mm
HELICHECK PLUS	M	300 mm / Ø0.1 – 200 mm
HELICHECK PLUS LONG	M	730 mm / Ø0.1 – 200 mm
HELICHECK 3D	M	420 mm / Ø3 – 80 mm
HELISET UNO	M	400 mm / Ø1 – 350 mm
HELISCALE	M	300 mm / Ø1 – 50 mm

Use: P Production R Regrinding M Measuring

Materials: HSS High speed steel TC Tungsten carbide C/C Cermet/ceramics CBN Cubic boron nitride PCD Polycrystalline diamond CVD-D Chemical vapour deposition MCD/ND Monocrystalline diamond/natural diamond

[1] Maximum tool dimensions are dependent on the tool type and geometry, as well as the type of machining.
[2] From the theoretical taper diameter of the workpiece holder.

EWAG
KÖRBER SOLUTIONS

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