LASER TEC

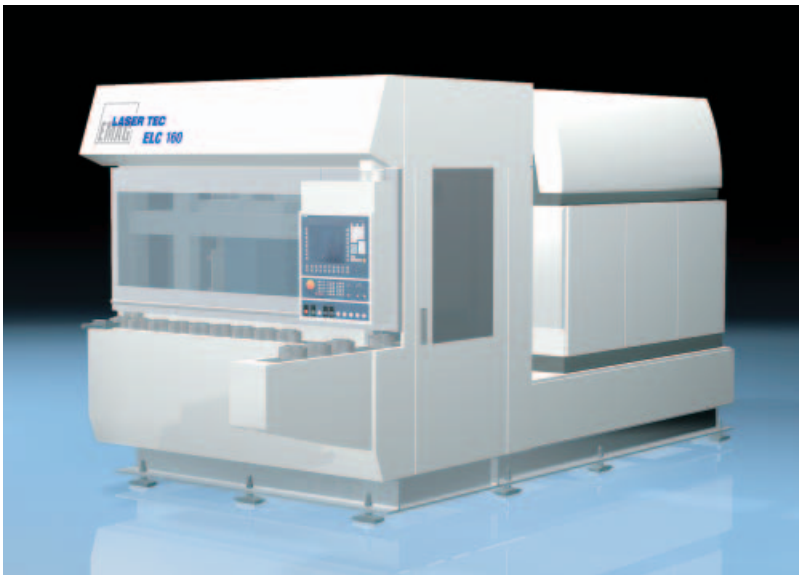
EMAG

LASER-WELDING SYSTEM

ELC 160

Highly productive, compact, economical

A new machining system



The transmission industry can no longer imagine being without the high-tech machining process of laser-welding. The integration of gearwheel and synchro through laser-welding forms the basis for a more compact, more efficient transmission system. Modern laser beam sources and optimised workholding ensure that welding distortion is kept to a minimum - a precondition for low engine noise and easy gear changes.

The EMAG LaserCell press-fits synchro and gearwheel and welds the two components together with a laser beam.

Expansion modules allow for the EMAG LaserCell to be adapted to your particular requirements.

A magnetic preheating device ensures that even materials difficult to weld can be welded with exceptional process capability.

Idle times have been reduced to a minimum in the EMAG LaserCell. This increases output to its maximum and guarantees the best possible utilisation of the laser beam source.

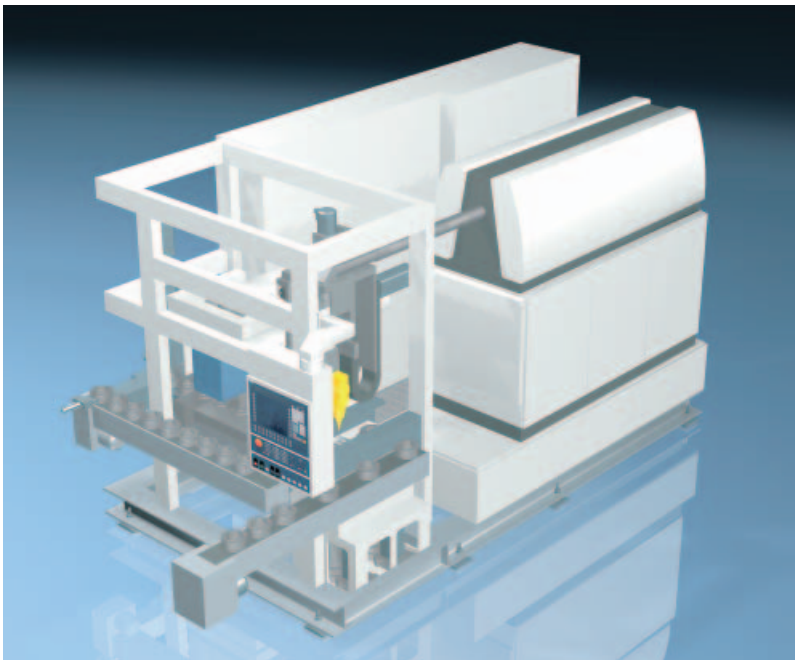
Efforts expanded on the setting up of the machine have been reduced through the extensive application of NC features. The reduction in mechanical components saves money and time.

THOUGHT-OUT IN DETAIL

In view of increasing cost pressures TCO (Total Cost of Ownership) has become an important aspect in the valuation of capital goods.

In this, the compact design of the EMAG LaserCell also sets new standards, as all system components are firmly mounted on a self-supporting base frame.

- Minimum footprint
- Adjustment of the laser-welding system is not dependent on foundation elements
- Requires minimum installation effort
- The system is easy to relocate and to adapt to changed production requirements
- The system features an integral water-to-water heat exchanger for the laser
- Ease of access to all system components lightens service and maintenance work



The EMAG LaserCell all-in-one laser-welding system

The solution for the manufacture of gearwheels

Advantages for the user:

- Extensive integration of workhandling and laser-welding reduces the number of machining operations in the production process.
- A CNC mating press joins synchro and gearwheel. The EMAG LaserCell has no need for hydraulics.
- The joining process is monitored by an integrated force/stroke monitor.
- Magnetic preheating of demanding components (without adverse effect on the cycle time).
- Optimised workholding technology reduces distortion of the synchro.
- The use of state-of-the-art CO_2 lasers with highest beam quality results in perfect welding seams.
- All quality-defining parameters are NC-controlled and can be reproduced at any time.
- To safeguard your production actual values are monitored.
- Can be integrated into any automation system.
- The space-saving, compact design reduces the installation effort and increases reliability.
- High productivity through short idle times and fast, safe set-ups.

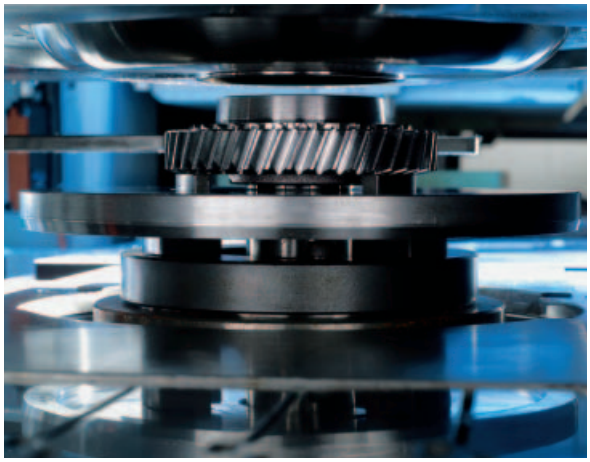
EMAG laser-welding machines meet the stringent demands for productivity, quality and availability.

Flexible automation: EMAG ELC 160

The gearwheels are loaded via conveyor belt. The laser-welding unit can be loaded either manually or automatically. All current automation concepts can be adapted, e.g. conveyor belts for continuous operation or automation cells for the loading of components from baskets.

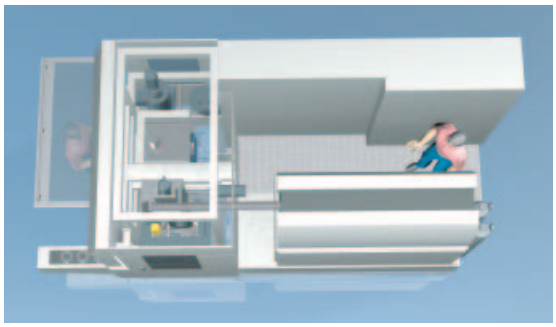
As the synchros are taken from the conveyor a vision sensor checks their pointed section against a background reference display. Wrongly positioned parts are transferred out.

The mating press is NC-controlled, with the mating force value being imported from the NC program. The required force is evaluated during the mating process.

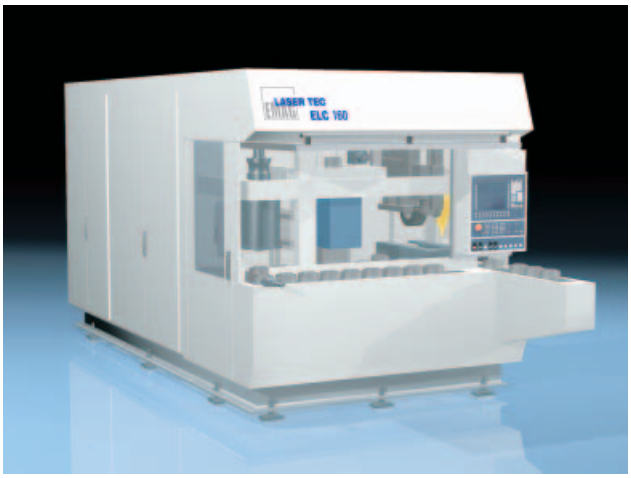


Optimised workholding technology ensures distortion is kept to a minimum.

Workpieces that have not been joined properly are transferred out. This is important, to avoid compromising component quality.



Ease of access makes set-ups fast and safe.



Also suitable for difficult materials

The integral preheating station is used when the material or the condition of a workpiece dictates that it should be preheated.

A special feature of the ELC 160 is a two-stage preheating station. In contrast to the single-stage design, this ensures that the warm-up time for workpieces of a larger diameter does not increase the overall cycle time of the laser-welding system.

Unlike preheating in an oven, the "one-piece-flow" is not interrupted and component flow in general not unnecessarily compromised.

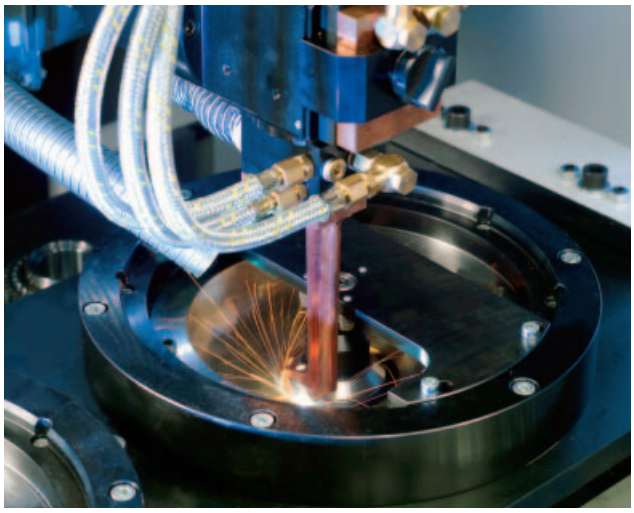
The workpiece is being preheated.

Compared to inductive preheating, the EMAG method distinguishes itself by homogenously preheating the whole workpiece. Cooling time is increased, process management is made less difficult and the workpiece is not liable to suffer undesirable thermal gradients.

Laser-welding: process-capable and accurate

THE POWER PLANT IN ALL ELCS

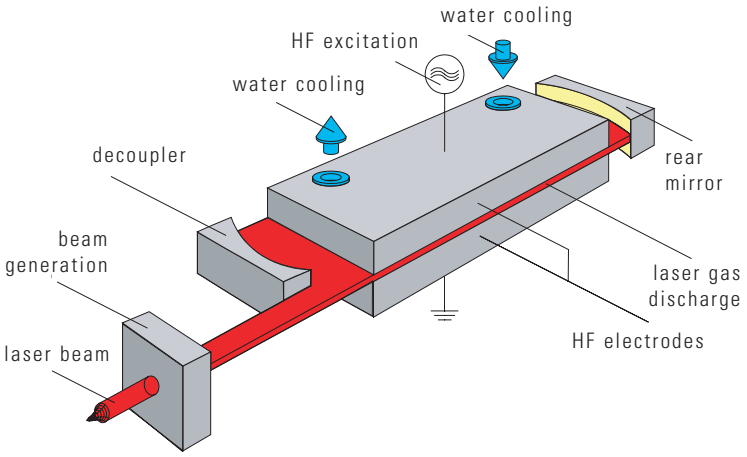
The CO_2 laser



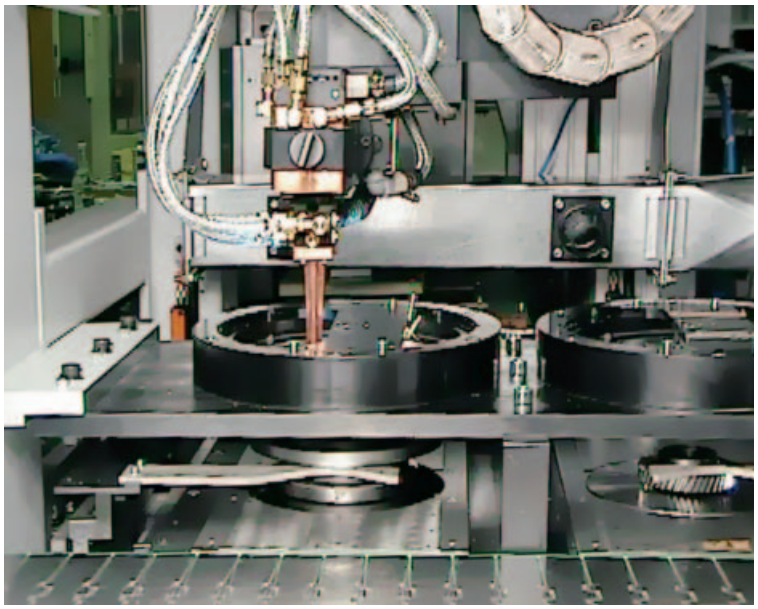
- A resonator of simple, robust design
- Best beam quality possible
- Extremely low laser gas consumption
- Extended life expectancy for optics
- High efficiency levels, resulting in low operating costs
- Compact design
- No need for a gas circulation system
- No need for an external laser gas supply

The ELC 160 can be equipped with CO_2 lasers of a maximum rating of 6 kW. These lasers represent cutting edge technology in laser-welding and are setting new standards in beam quality, welding result, simplicity of construction, ease of maintenance and – last but by no means least – lower operating and service costs.

Beam guide and optics are stationary. This guarantees maximum thermal and optical stability and ease of access to all component parts. Requirements are defined by the range of components to be processed.



The laser design: uncomplicated, efficient and robust



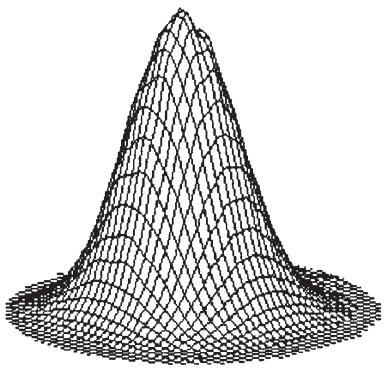
The welding seam can be narrow and deep, using little heat, but also wider, if required.

The welding station is of a twin-spindle design, i.e. it features two rotational axes. The workpiece is centred in the bore of the gear and clamped axially against a so-called welding rest.

The tip of the synchro and the running gears are protected against weld spatter, and distortion is reduced to a minimum.

Beam guide and welding optic are well-proven, robust components that are easy and safe to handle.

The excellent focusing capability ($K > 0.9$) makes it possible to fine-tune the welding seam geometry to suit particular workpiece requirements.



Power distribution of the laser: close to the physical optimum.

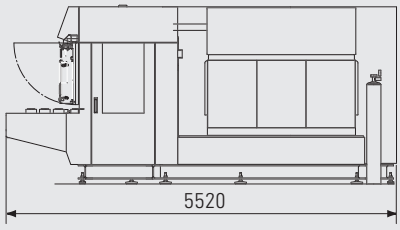
TECHNICAL DATA

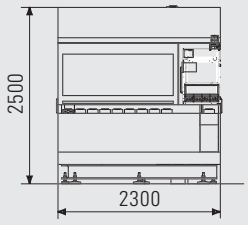
WORKPIECE DIMENSIONS	
Max. O/D	160 mm
Max. height	60 mm
MATING STATION	motorised mating press
Max. press force	30kN
Drive	servomotor
Position feedback	by encoder (resolution 1 µm)
Force monitoring	by motor power evaluation, alternatively by external force monitor
BEAM GUIDE	
Aperture	50 mm (3" deflecting reflector)
Reflector	OFHC-Cu, indirectly water-cooled
Focusing mirror	parabolic mirror, Mo-lined, indirectly water-cooled
Focal length of mirror	alternatively f = 200 / 250 / 300 mm
Crossjet system	integrated
LASER	
Power output (rating)	2,0 / 2,5 / 3,0 / 3,5 / 4,0 / 4,5 / 5,0 / 6,0 / 8,0 kW
Power range	10 .. 100% of rated power
HEAT EXCHANGER	integrated into ELC, water-to-water connection
Effective power of cooler	to match laser requirements, max 80kW for DC050
Temperature of water (to be supplied by user)	max 15° C
Refrigerant	R407c (free of CFCs)
DRIVE AND CONTROL TECHNOLOGY	SIEMENS SINUMERIK 840D
Drives	SIMODRIVE 611 D
Operating system (HMI)	OP012 / PCU50 / machine control panel MSTT
Servomotors	SIEMENS 1FK7xxx
POWER SUPPLY	3*400V 50 Hz, PE
COMPRESSED AIR SUPPLY	system pressure 6bar / 0,6 MPa
Scavenging air processor	integrated
OPTION	
Electro-magnetic preheating unit	System EMAG
Power rating	110 kW

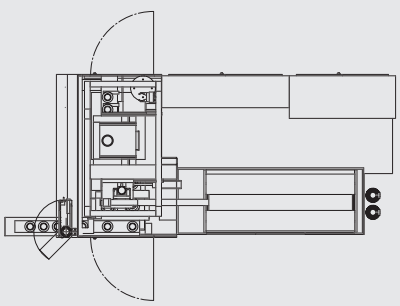
Subject to change without prior notice

WEIGHT AND MEASUREMENTS:

Length	mm	5520
Width	mm	2300
Height	mm	2500
Weight	kg	9.000







The EMAG Group – World-wide partner in forward looking production techniques

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