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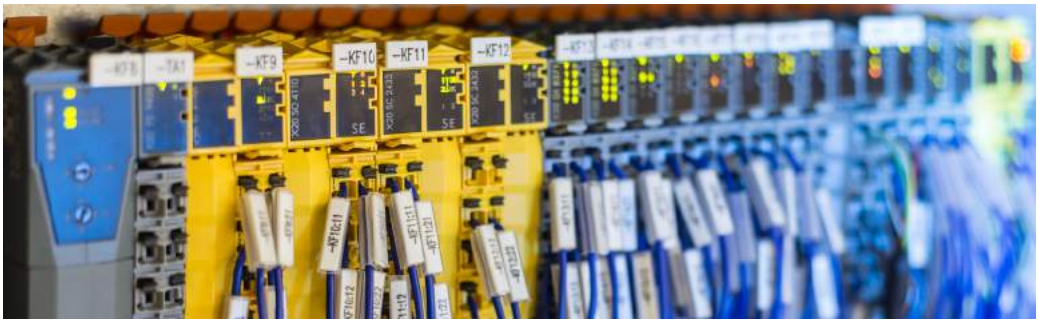
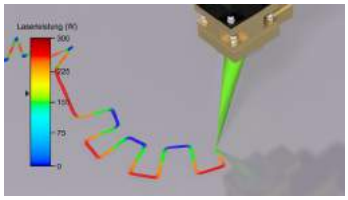
The control

The deep integration of all components, the synchronicity, speed and open standards provide safety and productivity



Everything strictly in cycle



The control is the brain of the machine, it is responsible for the flawless communication between all components. LASERVORM has created a control concept which works up to 40 times faster than competitive products and which guarantees a synchronicity that is accurate to the µ second. These characteristics allow an adaptive machining in real time.

The open Industry 4.0 communication protocol OPC-UA ensures a flawless interaction of all components. In order that the positive characteristics of all automation products are conserved, LASERVORM uses the powerful field bus powerlink within the machine. With the flexible control system, the machine can grow modularly without loss of performance. In this way, one can integrate for example new laser processes, or change the feeding concept or kinematics concept respectively. The safety concept of a laser machine plays an important role within the control system. The use of open-SAFETY according to IEC61 508 provides both safety and high productivity. Besides the cost-reducing effect, that housings become smaller and walls become thinner, the rights that are related to user groups convince with functional safety. With an involvement of the laser machine into a production line or at the master control level integration, the control concept supports also other communication profiles.

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Service +

- Laser hardening
- Laser welding
- Laser cladding
- 3D laser processing
- Sample production
- Sustainable production
- Best quality
- Process control
- Technology consultancy
- Special Machinery
- Service
- Maintenance and servicing

SYNCHRONICITY - SPEED - SAFETY

LASERVORM GmbH
Südstraße 8
09648 Altmittweida

Internet www.LASERVORM.com
Telephon +49 37 27 99 74 - 0
Telefax +49 37 27 99 74 - 10

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Specifics

The details make the difference

The control offers new possibilities for the laser material processing:

- integration of different laser sources independently from the manufacturer
- open communication protocol OPC-UA for machine-to-machine communication and master control level integration
- connection for example to other production / feeding systems without any problems
- a real-time communication of all individual components that is accurate to the µ second
- RFID controlled user/group administration with group-related programmable safety rules
- more safety and productivity thanks to high-performance safety technology openSAFETY
- central data storage for all technologically relevant data of the unit
- quality data backup in real time
- data backup of the last workpiece machining at the push of a button
- smooth qualification and validation thanks to reproducibility of the data
- the universal data transfer, either digital (XY2-100 protocol) or analogue, allows to connect different scanner systems
- LASERVORM uniaxial or biaxial scanner LV LineScan and LV SpinScan
- adaptive machining with different measuring systems (e.g. measuring sensor, line scanner, pyrometer regulation)
- Teaching on the fly: the reduction of the operator inventions to the minimum saves time and increases the quality
- control and operation on the basis of G instructions (DIN 66025)
- availability of automatic NC programming (3D CAD/CAM)
- use of the Ethernet field bus for a comprehensive remote maintenance solution

How does it work?

Programmable beam quality

The programmable beam quality is the combination of the synchronous movement on the feeding line (NC axes), the adaptation and modification of the laser power or laser pulsing respectively, and the fast deflection of the laser beam in one to three axes (optical axes).

Industry standards

External

CANopen, DeviceNet, PROFIBUS, EtherNet/IP, PROFINET, EtherCAT

Internal / External

ETHERNET POWERLINK, open SAFETY, OPC UA

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Südstraße 8
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info@laservorm.com
www.LASERVORM.com

As of: 05 / 2016

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Functional examples and customer benefit

Path dependent modification of location-independent parameters
Functional example 1:
Adaptation of the laser power when finishing a machining movement
Benefit during welding: Ramping down at the end of the seam prevents crater cracks, and thus, the optical appearance of the seam is improved.
Functional example 2:
Variable beam formation width along the advance path
Benefit during welding: The width of the weld bead can be adopted to the conditions of the component, thus variable clearances are absorbed for example.
Benefit during hardening: The width of the hardening path can be adopted without interruptions to sudden changes of the component's geometry - without formation of soft tempering zones.
Benefit during cladding: The cladding cross section can be adopted to the geometry of the components.

Speed-dependent modification of location-independent parameters
Functional example 1:
Adaptation of the laser power depending on the current feeding rate
Benefit during welding: A constant path energy is entered, even if the actual welding speed cannot reach the programmed welding speed (e.g. in case of very small radiuses).
Benefit during marking: The marking pattern is created in a better quality.

Time-dependent modification of location-independent parameters
Functional example 1:
Output of a programmed laser power and time profile
Benefit during welding: Spot weldings or counterlaid seams can be optimised concerning the optical appearance and the splash inclination.
Benefit during light curing: An optimised heat introduction profile allows greater hardness penetration depths without fused surfaces.

Pulsing depending on the path length
Functional example 1:
Output of a rectangular pulse or of a programmed pulse shape at fixed intervals on the surface of the component
Benefit during welding: A constant path energy entry is attained, as well as a constant flake formation.
Benefit during perforation: A mathematically precise perforation pattern can be obtained even in acceleration and braking paths.

Pulse-width modulation
Functional example 1:
Output of pulses of variable width, depending on the feeding rate
Benefit during welding: A constant path energy entry at constant welding penetration depth is attained.
Benefit during cutting: Even at delicate cutting contours (acute angles), a lower energy input with an optimal cut formation at the same time is obtained - the producible resolution increases significantly.

... and the best:
All above-mentioned possibilities can be combined freely among each other and synchronised with measured value acquisition activities to the greatest possible extend!

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Examples and customer beneftits

Simultaneous Teaching

The simultaneous teaching from 1 to n axes from n NC axes is made, for example, with an industrial-suited 3 axis analogue joystick or with a hand wheel.

- At the operating panel you can choose between several parametrisations of the joystick (axes allocation of the motion system to the joystick axes as well as their type)
- **On-The-Fly-Teach:** This functionality is in demand when you have to take corrective actions with every new component. The laser welding facility LV Special works through the determined NC programme and asks the operator at checkpoints to confirm the components or to make corrections. Thus, work flows are accelerated and thereby (partly) automated. The operator intervention is reduced to the absolutely logically necessary minimum. The effect is high productivity and a low operator-related error rate.
- Teaching for a recipe creation: At the creation of a new programme or new recipe, the positions of the axes can be registered via the approach by the joystick and takeover demand – in doing so, programmes for new products develop quickly and safely.

Recipe solution

The recipe solution is an alternative to the universal NC surface, which is generally used for special purpose machines and semi-automatic machines. The second generation offers the possibility to describe even complex sequences of program steps for movements, laser parameters, teach processes, mathematical functions, sharpening and the like without knowledge of NC programming.

The operator can concentrate on his real task with the mask-based recipe creation. The special feature of this solution is that a NC programme is created and managed in the background (without operator intervention). With this, all the created recipes also exist for documentation and qualification purposes in a standardised text format. Conventional recipe solutions create data in an exclusively machine-readable format, the technological documentation of the processing can only be made in a machine-related and manufacturer-specific context.

We thank you for supporting our developments:

Europa fördert Sachsen. EFRE Europäischer Fonds für regionale Entwicklung

GEFÖRDERT VOM Bundesministerium für Bildung und Forschung

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