System Engineering for
the battery & automotive industry

Laser clamp head

thyssenkrupp

Extensive experience, a global leader with close proximity to the customers

thyssenkrupp System Engineering is an operating business unit of the Automotive Technology segment of the thyssenkrupp AG, a system partner for all important components of the process chains car body and powertrain in automotive industry.

The product range also includes automation solutions for electrical storage and drive systems as well as solutions for innovative lightweight designs.

The company is a strong and reliable partner to its customers, optimizing their value added chain and strengthening their efficiency.

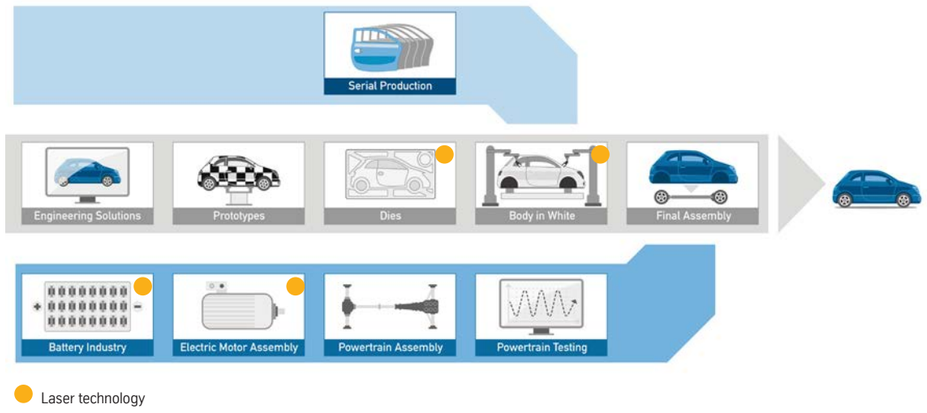
Knowing the process, understandir

We at thyssenkrupp System Engineering build compact and flexible bodywork laser welding systems. Over the last years, continual work and extensive R&D testing has been done to develop the laser clamp head (LSK 05) and its components.
Today, we are proud to offer a world-class laser clamp head that can serve your engineering needs globally. It welds aluminum as well as zinc-plated and ultra high strength bodywork sheet metal. A significant extension of the laser clamp head (LSK) system kit for a wide range of applications.

Advantages of laser welding

- High process speeds
- Low energy usage, low component distortion
- Fantastic strength/rigidity
- High potential automation, limited space needed
- Low need for wear parts
- Reduced flange width/reduction in weight required

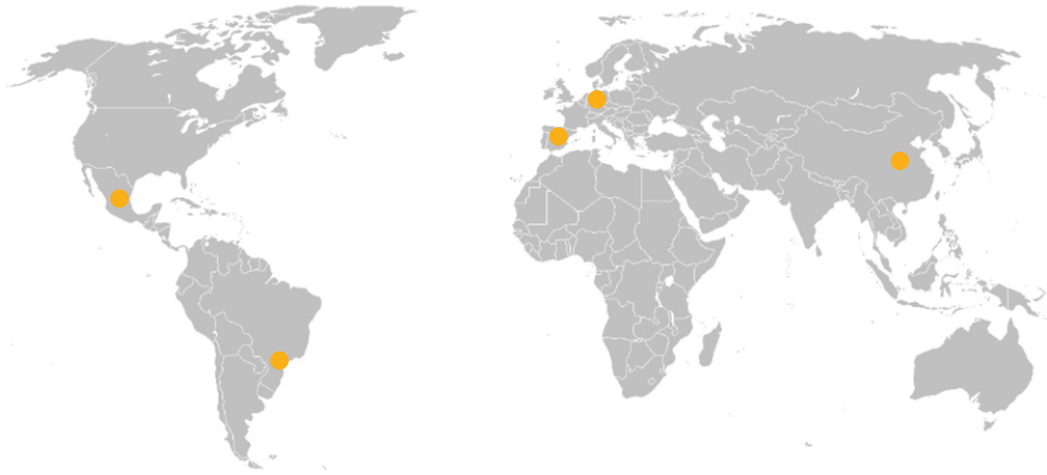
Use of laser technology along the automobile value chain



Worldwide operation.

More than 250

laser clamp heads in use.



"We have more than 100 years experience in overcoming technical limitations through innovation."

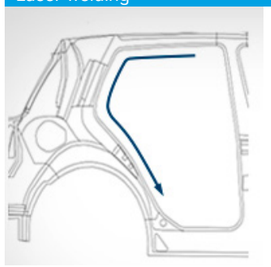
Innovative technology

Advantages of our laser clamp head LSK

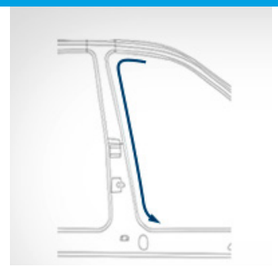
- Manufacture exact and low-tension welded components through patented roller clamping technology (also for high-strength material)
- Cost reduction through simplified equipment, as clamping functions are overtaken by the LSK 05 at the joint
- Adaption to various jointing geometries through modular construction and particular function groups (tools)
- Very good access to parts through extremely light construction
- Minimal parts flange width (up to 6 mm) through patented clamping system
- Zinc degassing through patented degassing system
- Integrated counterbalance for all welding passes
- Online process maintenance possible

Technological advantages - Example of B-pillars & door sill

Laser welding

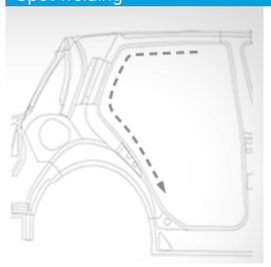


Laser welding (with 4 kW lasers)
Joint dimensions: 1200 mm
Laser seams: 20 (each 45 mm, 15 mm gaps)
Metal sheet combination: 1.5/2.0/0.75 mm
Process times: 40 s (30 mm/s)



Laser welding (with 4 kW lasers)
Joint dimensions: 1500 mm
Laser seams: 29 (each 30 mm, 20 mm gaps)
Metal sheet combination: 1.2/0.75 and 0.7/0.75 mm
Process times: 34 s (45 mm/s)

Spot welding

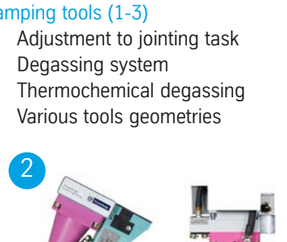


Resistance spot welding with MF technology
Joint dimensions: 1200 mm
Wend spots: 40 (spot intervals: 30 mm)
Metal sheet combination: 1.5/2.0/0.75 mm
Process times: 100 s (2.5 s/spot)

Resistance spot welding with MF technology
Joint dimensions: 1500 mm
Wend spots: 30 (spot intervals: 50 mm)
Metal sheet combination: 1.2/0.75 and 0.7/0.75 mm
Process times: 75 s (2.5 s/spot)

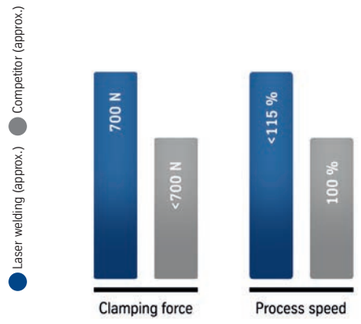
The LSK offers flexibility by modular construction

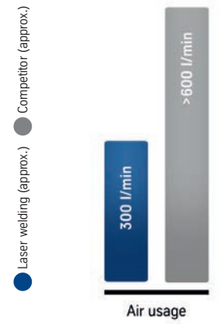
Clamping tools (1-3)
- Adjustment to jointing task
- Degassing system
- Thermochemical degassing
- Various tools geometries

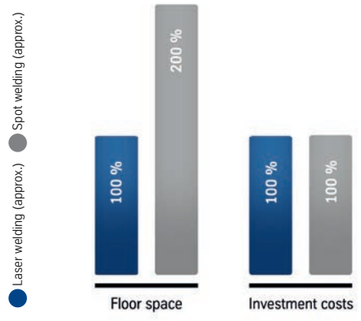


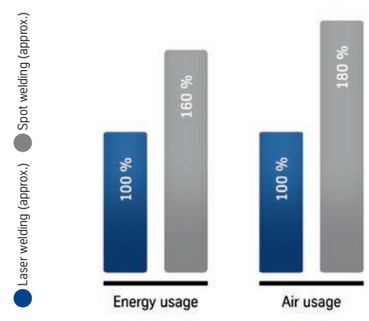
Swivel tools (4)
- With or without pressing clamp function on one side

The LSK directly compared to competitor and spot welding (using the example of a welding line)





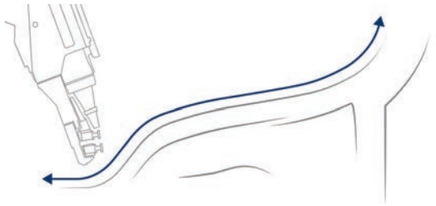




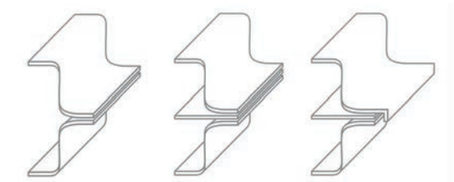
Laser clamp head LSK 05-01

The Laser clamp head LSK 05-01 forms the core of our products in the area of automated laser welding processes. It impresses through its multiple usage capabilities and high degree of flexibility through its modular construction - engineering for your needs.

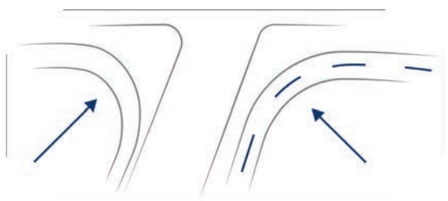
Welding of 3D path contours



Adaptability to various flange geometries

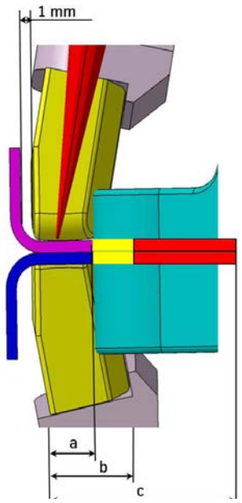


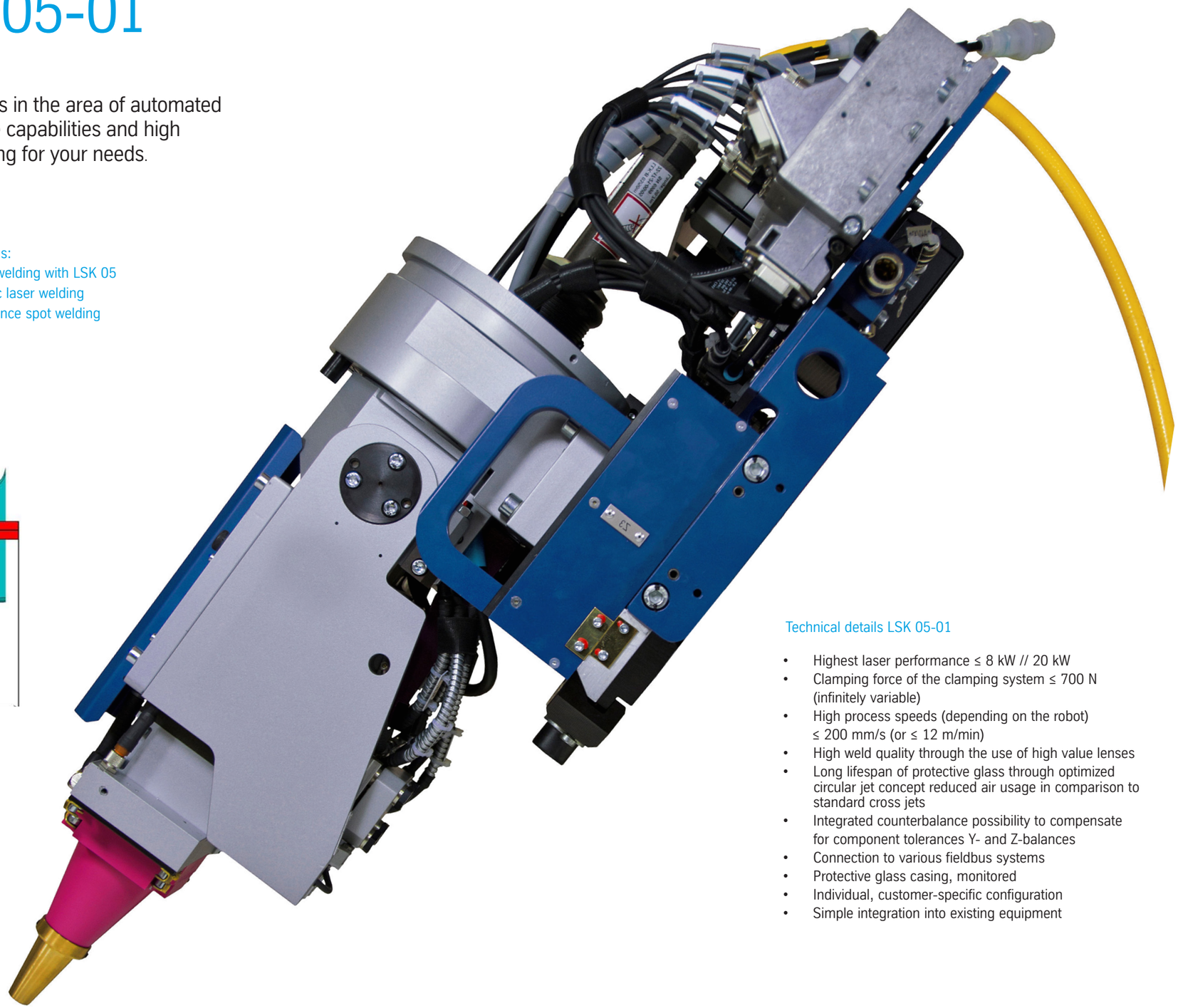
Welding seam radius > 20 mm



Reduction of flange widths:

a = 6 mm laser welding with LSK 05
b = 10 mm classic laser welding
c = 16 mm resistance spot welding





Technical details LSK 05-01

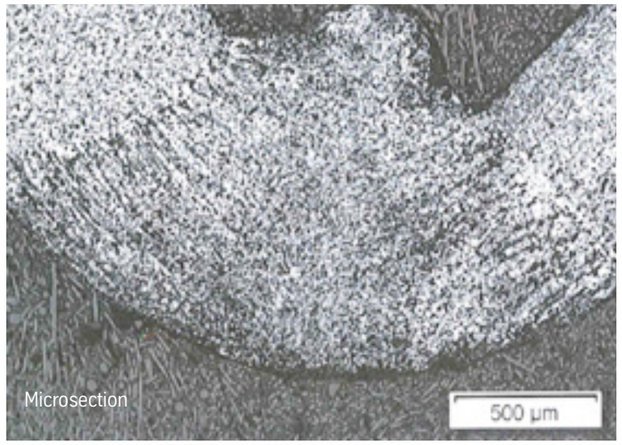
- Highest laser performance ≤ 8 kW // 20 kW
- Clamping force of the clamping system ≤ 700 N (infinitely variable)
- High process speeds (depending on the robot) ≤ 200 mm/s (or ≤ 12 m/min)
- High weld quality through the use of high value lenses
- Long lifespan of protective glass through optimized circular jet concept reduced air usage in comparison to standard cross jets
- Integrated counterbalance possibility to compensate for component tolerances Y- and Z-balances
- Connection to various fieldbus systems
- Protective glass casing, monitored
- Individual, customer-specific configuration
- Simple integration into existing equipment

Laser clamp head LSK 05-05

The laser clamp head LSK 05-05 has the capability of working from pressing from one side.

This allows for greater accessibility and creative solutions for single side welding applications.

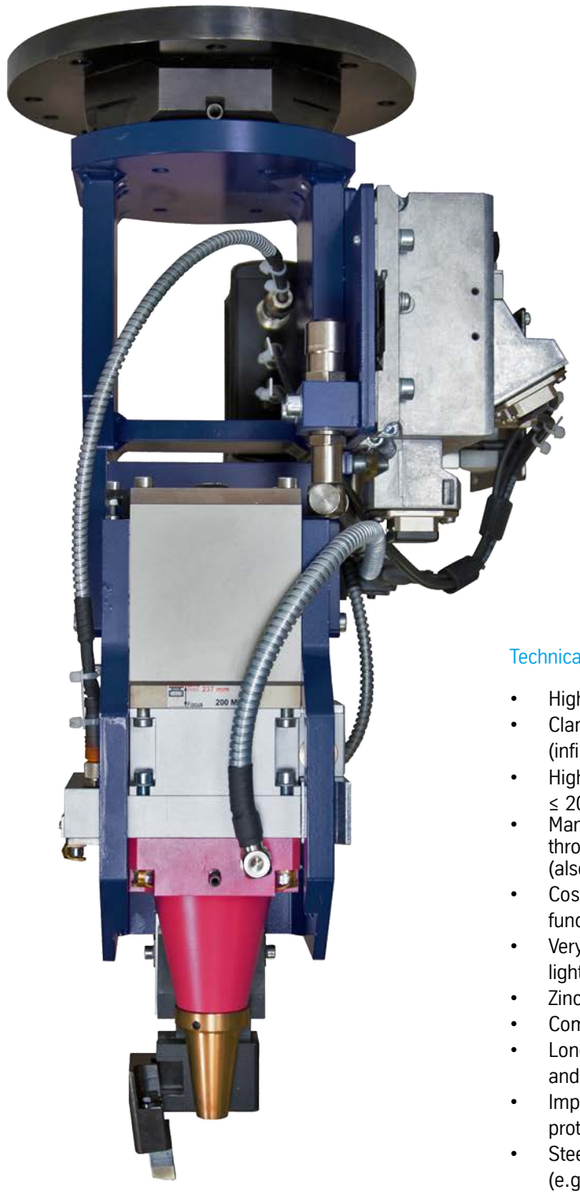
Example of this application are welding battery deflectors.



Microsection

LSK in use: laser welding of battery can’s

LSK in use: laser tab welding of lithium ion cells



Technical details LSK 05-05

- Highest laser performance ≤ 8 kW // 20 kW on demand
- Clamping force of the clamping system ≤ 700 N (infinitely variable)
- High process speeds (depending on the robot) ≤ 200 mm/s (or ≤ 12 m/min)
- Manufacture exact and low-tension welded components through patented roller clamping technology (also in the case of high-strength material)
- Cost reduction through simplified equipment, as clamping functions are overtaken by the LSK 05 at the joint
- Very good access to parts through extremely light construction
- Zinc degassing through a patented degassing system
- Completely variable clamping power between 100 and 700 N
- Long lifespan of protected glass through flow and use-optimized circular jet (< 250 l/min)
- Improved protection of optical components through second protective glass
- Steering and diagnosis through fieldbus system (e.g. Interbus, Profibus, Profinet)
- Minimal maintenance and upkeep required through usage of high-value components
- Extremely repair-friendly through pre-installed replacement and wear part sets

Laser clamp head

LSK 05-08

With high flexibility through dynamic beam manipulation by means of a scan unit for beam guiding and shaping. The LSK 05-08 has an integrated scan module for specific beam deflection (dynamic beam guide and forming) with optional seam guide.

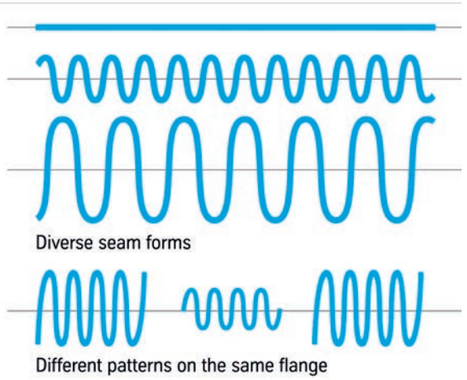
The integrated gas venting solution guarantees high quality welding jointts for zinc-plated sheet metal.
Welding speeds of up to 12 m/min can be attained depending on beam source and material.

New dimension

- Independent of layer thickness
- Variable seams
- Reduction of delays
- Increase of effective seam lengths
- Increase of ability to weld aluminum connections

Sinusoidal seam by use of scan unit

Sinusoidal seam on a part



Possible shapes of seam

Technical details LSK 05-08

- Highest laser performance
  ≤ 8 kW // 20 kW on demand
- Clamping force of the clamping system
  ≤ 700 N (infinitely variable)
- High process speeds
  (depending on the robot) ≤ 200 mm/s
  (or ≤ 12 m/min)
- Usage of all functions and innovations of the LSK 05-01 in combination with the most modern beam manipulation
- High flexibility through a variety of possible seam forms and variable sheet strengths
- Focused heat input in the case of ultra high-strength steels (ability to weld)
- Minimalizing of delays in case of simultaneous increase in length to be connected
- A fundamental improvement in degassing in the welding of galvanised sheets
- Welding of aluminum alloys
- High accessibility through
  - One-sided and two-sided system with various tools
  - Sleek construction
- Use with thin disc, fiber, diode and rod lasers
- Effective on very small flange widths

Laser clamp head

LSK 05-10

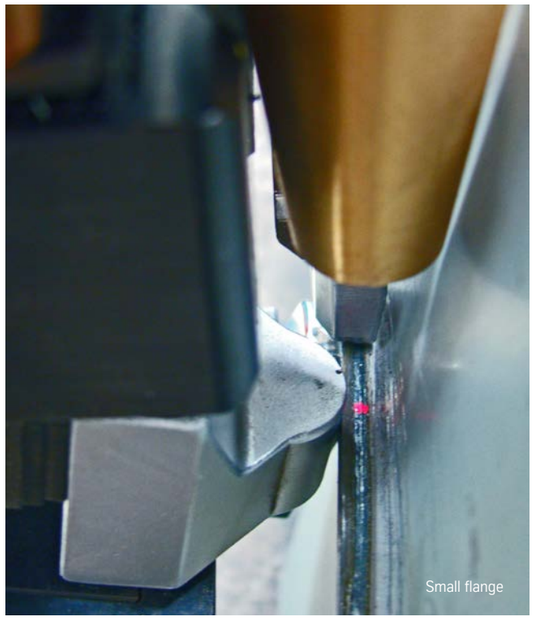
The laser clamp head LSK 05-10, uses functions and innovations of the LSK 05 in combination with modern beam guiding. Freely attached to the support with 0 ° lens or the 90 ° lens for the laser clamp head without clamping function. The laser ray is always positioned vertically above the component.

Technical details LSK 05-10

- Highest laser performance ≤ 8 kW // 20 kW on demand
- Clamping force of the clamping system ≤ 700 N (infinitely variable)
- High process speeds (depending on the robot) ≤ 200 mm/s (or ≤ 12 m/min)
- High flexibility by a multitude of seam shapes
- A pointed heat input at ultra-high strength steels (weldability)
- Minimisation of distortion, at once increasing of seam lenght
- Essential improving of zinc degasification at galvanized sheet metals
- Welding of aluminium alloys (weldability)
- High accessibility through
  - Optional clamping system with different tools
  - Slim design
- Use of diode, disc or fiber laser
- Realisation of very small flange widths

New option:
Adaption of seam tracking and process monitoring system by Lessmueller

Laser clamp haed LSK in use



Small flange

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