Combining the expertise in laser applications with an extensive know how in automation, Fives offers high-productivity systems.

**TYPICAL APPLICATIONS**

- **Automotive**
  - Gearbox & transmission components
  - Driveline components
  - Engine parts (shafts, turbochargers, ...)
  - Axle components
  - Tubular chassis components
  - Seat recliners

- **Aerospace & other industries**
  - Cutting/welding of aluminum alloy parts
  - Micro drilling (aero engines)
  - Cutting of tubular products
  - Laser surfacing of used parts (repair of turbine blades)
  - Laser cladding to build up near net shape parts

With over 25 years of experience, Fives is a global player in the design and manufacturing of systems using high power laser (≥ 1 kW) for the welding of mechanical parts. This expertise is now extended to other laser-based applications such as 3-D cutting, wire stripping, hardening, cladding and additive manufacturing.

- From Standalone machines to Multi-featured laser-based assembly lines
- High-production systems
- Standard modular design
- Ability to integrate all types of laser sources: CO₂ Lasers, Solid-state Lasers (YAG, fiber, diode Laser)
Fives proposes both standalone machines and multi-featured laser-based assembly lines as well as the related automation systems.

**STANDALONE SYSTEMS**

Compact and multi-purpose equipment (welding, cutting, hardening, drilling,...)
- Based on a standard modular design fitted with customized fixtures (for round parts, shafts, ...)
- Manual loading upgradable to a fully automated system
- Standalone machine or integrated into a full-featured assembly cell
- Additional functions can be implemented on purpose (pressing, heating, control, ...)
- Available in dual station version:
  - 2 rotating tables
  - 2 spindles
  - 2 upper stops
  - 1 shared focusing head
- Integrated automatic loading/unloading (input/output conveyors)

**FULLY-AUTOMATED LASER ASSEMBLY LINES**

Modular, multi-featured concept & fully automated
The welding operation is supported by a Fives compact welding machine.
Other systems commonly integrated into the laser welding lines:
- Washing & drying module
- Pressing module
- Heating module
- In process & Final welding seam control modules
- Brushing module
- Marking module
- Customized automation & interlinking solutions allowing a flexible layout:
  - Buffer magazine
  - Conveying system
  - Gantry
  - Robot
  - Manipulator

**3-D LASER CUTTING SYSTEMS**

Ideally suited to demanding cuts
- Systems delivering a high-productivity along with a high accuracy
- Little or no dross/burr on exit side/Minimal Heat Affected Zone (HAZ)
- Minimal tooling cost
- Ideally suited to challenging edge cuts of tubular parts (axle beams)
- Steels & non-ferrous metals
- Typical cutting thickness: up to 15 mm (for steel)
- Customized machine feeding: gantry, robot, manipulator, ...
- Range of laser power: 1 to 10 kW

Complementary Fives modules are integrated into the laser cutting cells for achieving the upstream and downstream operations.

**5-AXIS LASER CENTERS**

Ideally suited to laser surfacing for the accurate repair of used parts and 3-D manufacturing of complex geometry products
- 5 axis available: 3 axes (X Y Z) + 2 axes (B C)
- Powdered metal feeder and nozzle(s) for laser cladding applications & laser assisted additive manufacturing
- Laser surfacing for the accurate repair of used parts (turbine blades) & 3-D manufacturing of complex geometry products (near net shape production for aerospace, mining, energy, medical industries)
- Adaptable working volume (1,500 x 800 x 800 mm and more)
- Bi-material or multi-material manufacturing
- Laser cladding applications (laser metal deposition)

This system can be also used for 5-Axis laser welding, cutting, drilling and hardening operations.

**BENEFITS**

**Laser**
- Energy delivered to the workpiece is minimized (minimal heat affected zone)
- High speed processing
- The beam can be guided into hard-to-reach areas
- Operations are performed under normal atmospheric pressure
- Unrivaled repeatability
- Excellent quality finish

**Industrialization**
- Automation for high-volume production
- Industrial mastery of laser process quality
- Highly reliable systems with low maintenance cost
- Laser safety expertise

**CUSTOMER SUPPORT**
- Global Support Network
- Preventive maintenance, Remote maintenance
- Process support: training, trials, ...
- Spare parts

**SCOPE OF USE**

<table>
<thead>
<tr>
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Laser welding cell for transmission shafts