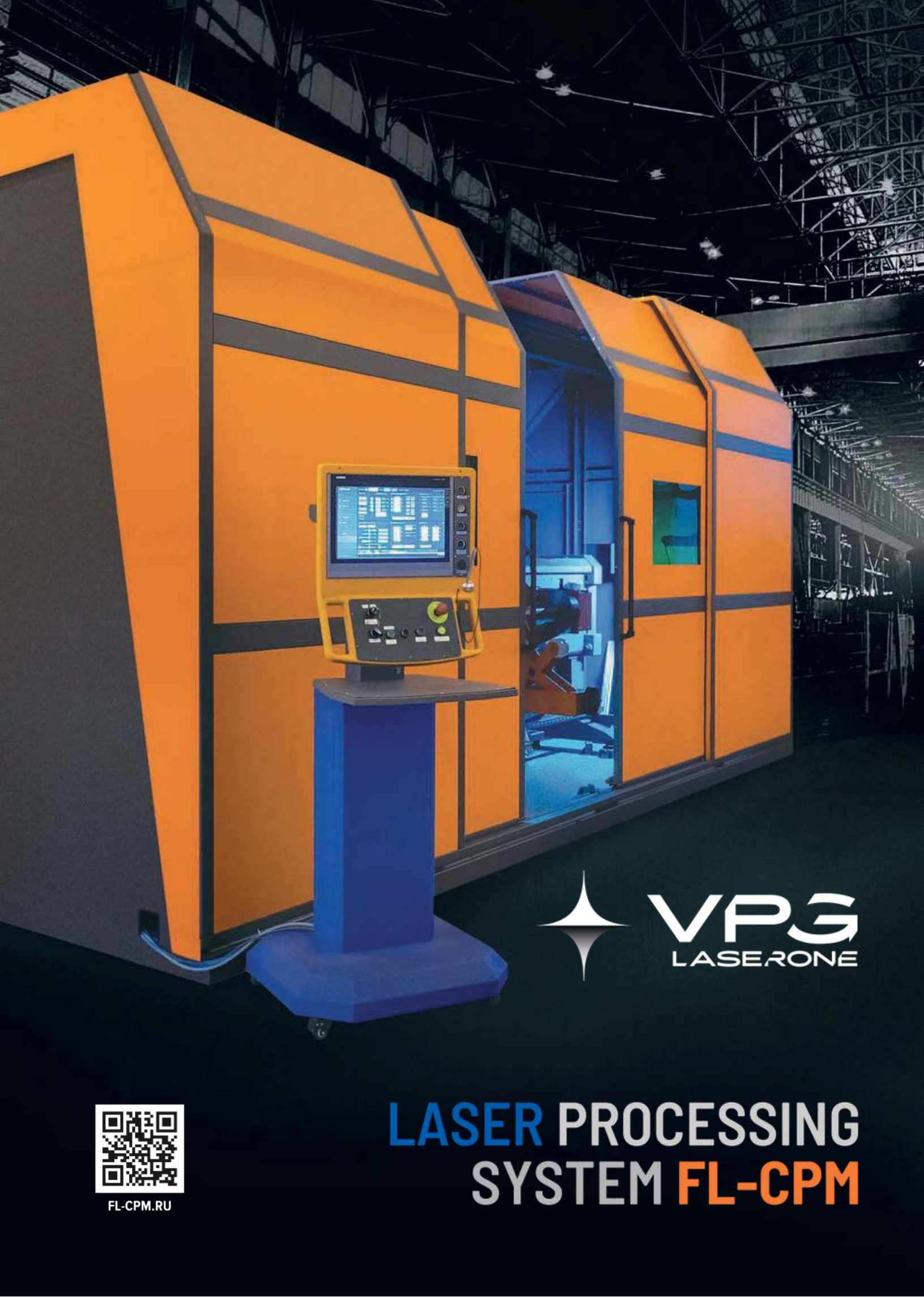




FL-CPM.RU

LASER PROCESSING
SYSTEM FL-CPM

SYSTEM OVERVIEW

FL-CPM

FL-CPM from **VPG LaserONE** is a versatile machine-type system for processing parts – bodies of revolution and more. Any configuration is available for laser welding, cladding or heat treatment.

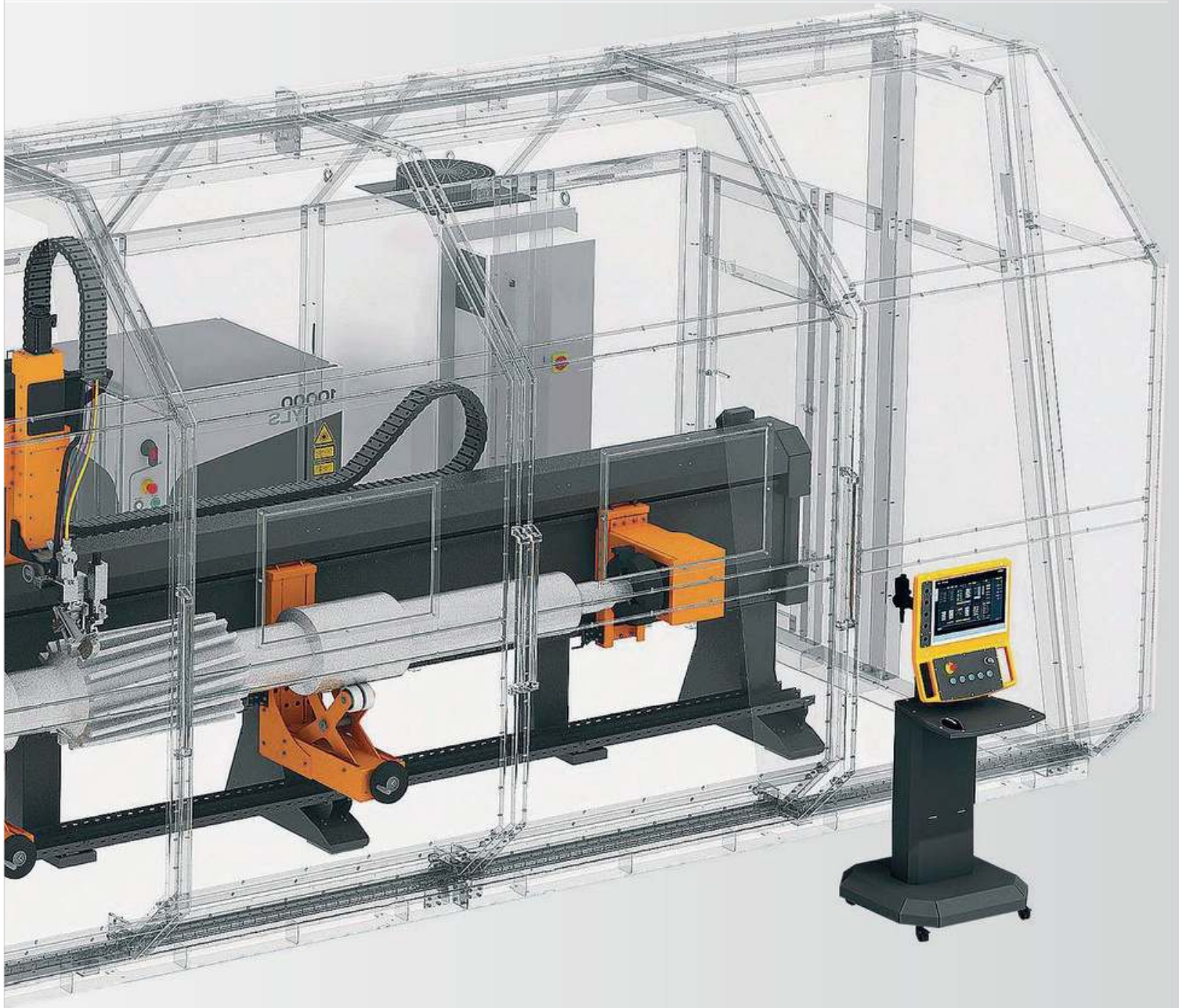
The modular design of the coordinate system and a wide choice of removable workpiece-clamping attachments make it possible to create **your unique machine configuration**, while the high-efficiency VPG LaserONE fiber laser needs no maintenance and reduces operating costs, which in turn **delivers high economic and technological efficiency**.



APPLICATION EXAMPLES

Welding of profiles, shells, shaped and special products





Powder cladding of flat and curved parts and of bodies of revolution



Hardening of threads, shafts and gears



SYSTEM COMPONENTS

1. YTTERBIUM FIBER LASER YLS

- Power 2–10 kW
- Maintenance-free
- Efficiency over 40%

2. CHILLER

- Cooling of the laser and the optical head

3. CONTROL CONSOLE

- Developed in-house by VPG LaserONE
- Touch panel and mobile pendant

4. MOTION SYSTEM

- Modular design of the coordinate system – longitudinal tool travel up to 10 m
- A single load-bearing element for the tool drive and for part clamping
- 4 synchronised motion axes: 3 linear tool axes (X, Y, Z) and 1 part/workpiece rotation axis (A axis). Two additional axes for manual or automatic tilt/rotation adjustment of the optical head (B and C axes)



1

LASER

Generation of high-quality laser radiation



2

CHILLER

Laser cooling



3

CONTROL CONSOLE

Central interface for controlling the whole machine



4

MOTION SYSTEM

Positioning of the optical head and workpiece rotation



5. OPTICAL HEAD, FL(W) D30/50 SERIES

- Wobble (W) – beam oscillation module
- A seam tracking system can be installed as an option

6. ADDITIONAL COMPONENTS

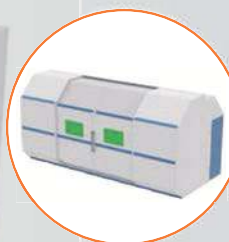
- Filler wire feed mechanism
- Removable workpiece-clamping attachments

7. CONTROL CABINET

- Electrical and pneumatic components
- Controller-based control system

8. PROTECTIVE ENCLOSURE

- A special Class 1 protective enclosure shields the operator from laser radiation
- Multi-level safety system



8

PROTECTIVE ENCLOSURE

Protection against laser radiation



7

CONTROL CABINET

Provides control of the machine



6

ADDITIONAL COMPONENTS

Provide auxiliary functions



5

OPTICAL HEAD

Delivery and fine adjustment of the laser radiation

LASER WELDING

The chemical composition of the material, the design of the product and the stress state are only a few of the factors that determine the joining method. Laser welding is often **the ideal solution for joining metals**, which require high processing speed, low heat input, low distortion and low residual stresses.

Time and energy savings: laser welding speed of 1-10 m/min, the weld needs no additional processing, the heat-affected zone of laser welding is no more than 0.5 mm, full automation is possible.

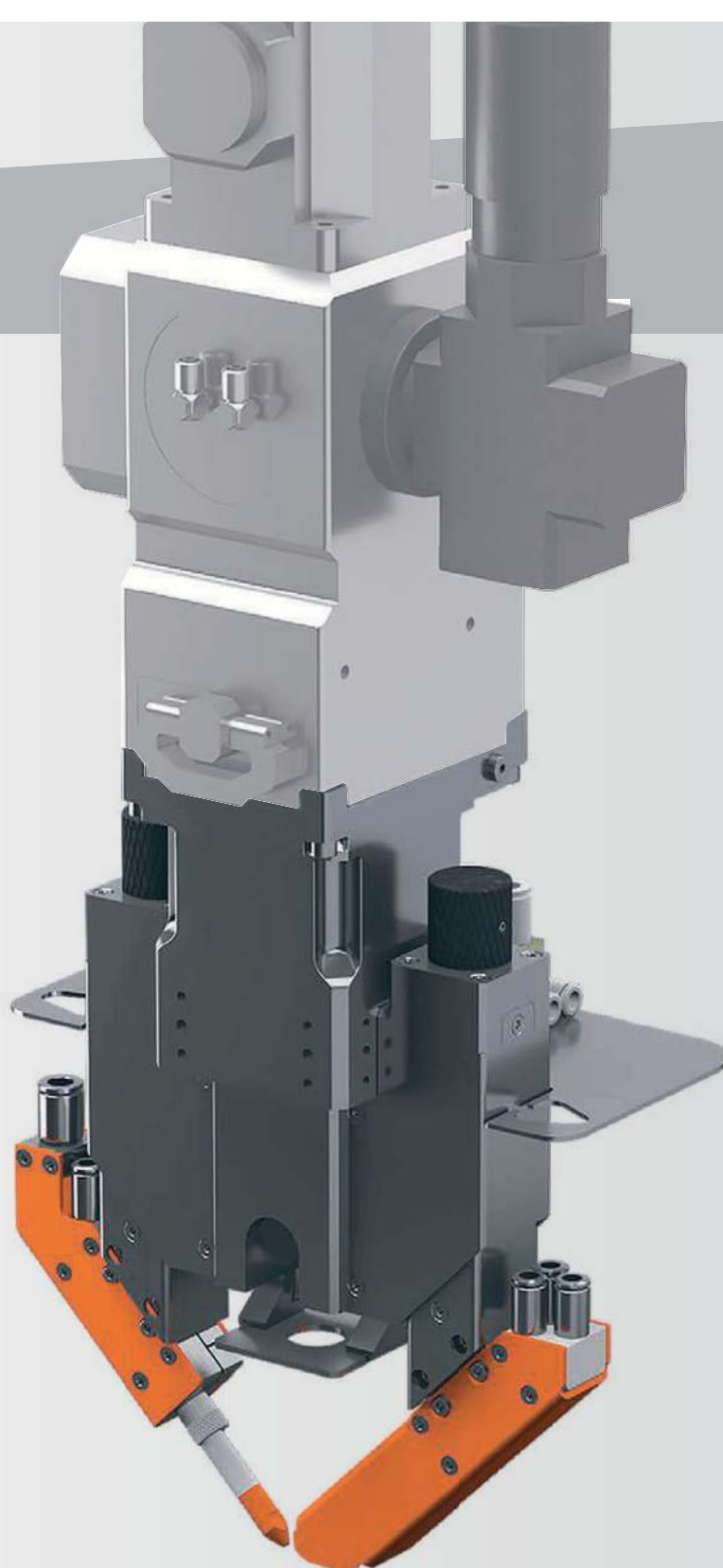
Efficiency and flexibility in use: the smallest weld and heat-affected zone, high process repeatability, fast changeover when switching to a new product.

Welding of railway industry parts



Welding of oil & gas and automotive industry parts





The laser welding unit with wire is specially designed compact multifunctional tooling for industrial laser welding optical heads. The attachment is fully compatible with FLW D50 heads.

It provides filler wire feeding and adjustment of the wire position relative to the laser beam, shielding gas supply to the processing zone, tracking of the welded joint or of the processed surface, and more.

LASER CLADDING

Used for applying corrosion-resistant, anti-friction or wear-resistant coatings and for restoring worn expensive parts. **High hardness and wear resistance** of the clad layer is achieved by selecting the composition of the powder mixture and the processing parameters.

High material utilisation: 100% for wire cladding (up to 90% for powder cladding). Local surface treatment, minimal post-processing, stable clad layer height, minimal mixing of the base and the clad materials. No distortion of the product during processing.

Restoration of shafts



Restoration of power industry parts



The **4-axis nozzle attachment** is designed for four-sided feeding of the cladding material and shielding gas into the laser beam focusing area. The attachment is fully compatible with **FLW D50 heads**.

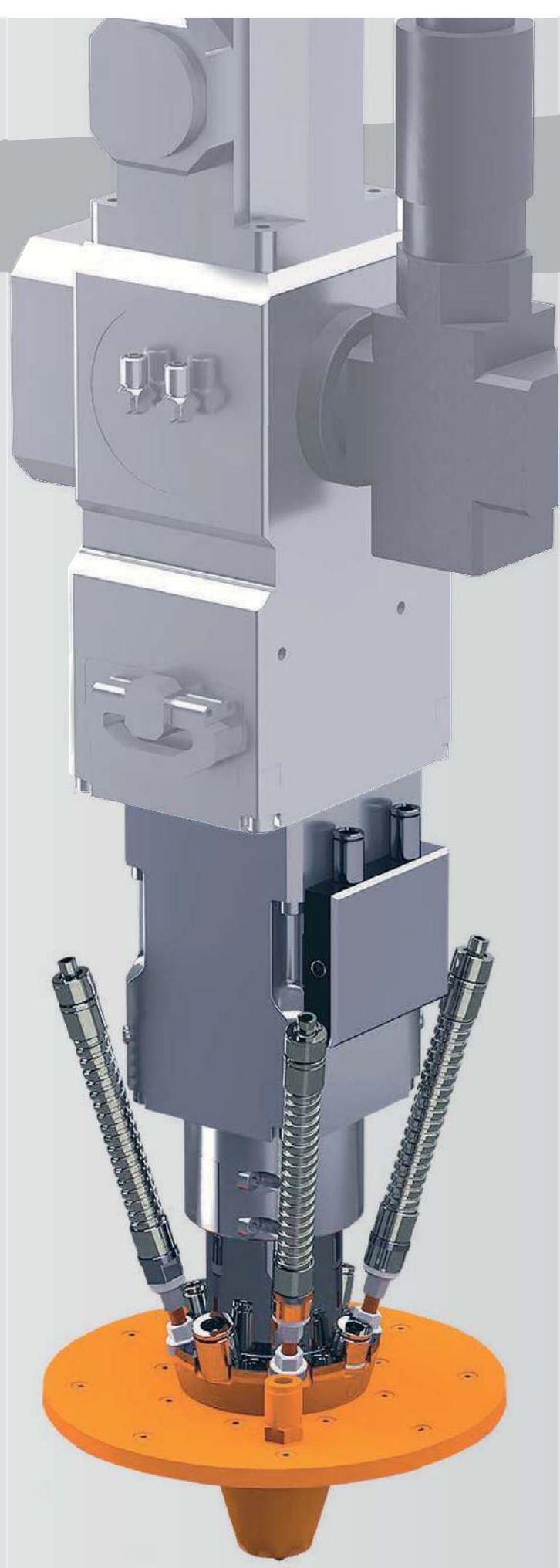
The **4-axis nozzle attachment** is an accurate and reliable tool **with additional protection against reflected radiation**. The permissible laser power is 10 kW. The 4-axis nozzle attachment is adapted to work with various optical systems. Its modular design covers **a wide range of focal lengths of laser heads**.

The **off-axis nozzle attachment** is designed to feed powder material into the area where the laser radiation acts on the surface of the workpiece. The attachment is an integral part of the **FLW D50 optical head**.

The **off-axis attachment** – a simple and versatile tool that makes it possible to process hard-to-reach surfaces of workpieces. **The attachment is equipped with a laser radiation shield**, as well as with air protection that keeps the tool free from contamination, spatter and soot.

The water cooling circuit allows the tool to be used with a maximum permissible **laser power of up to 4-6 kW**. The attachment is designed to work with various optical systems.

The components and interchangeable nozzles make it possible to work with **a wide range of laser spot diameters**, while achieving increased filler material utilisation.



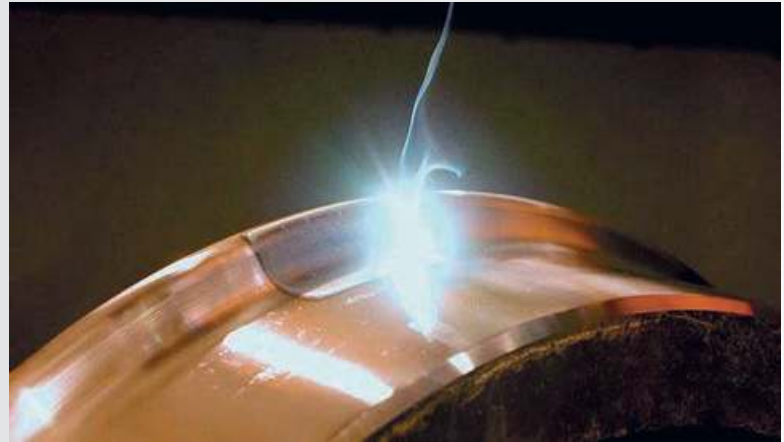
LASER HEAT HARDENING

Laser heat treatment, also known as laser surface hardening, is a surface modification process used **to increase wear resistance or extend the service life of components**, from household appliances to parts for vehicle assembly and equipment for heavy industry and transport.

Local surface heating – heat treatment of only the local areas subject to wear rather than of the whole part.

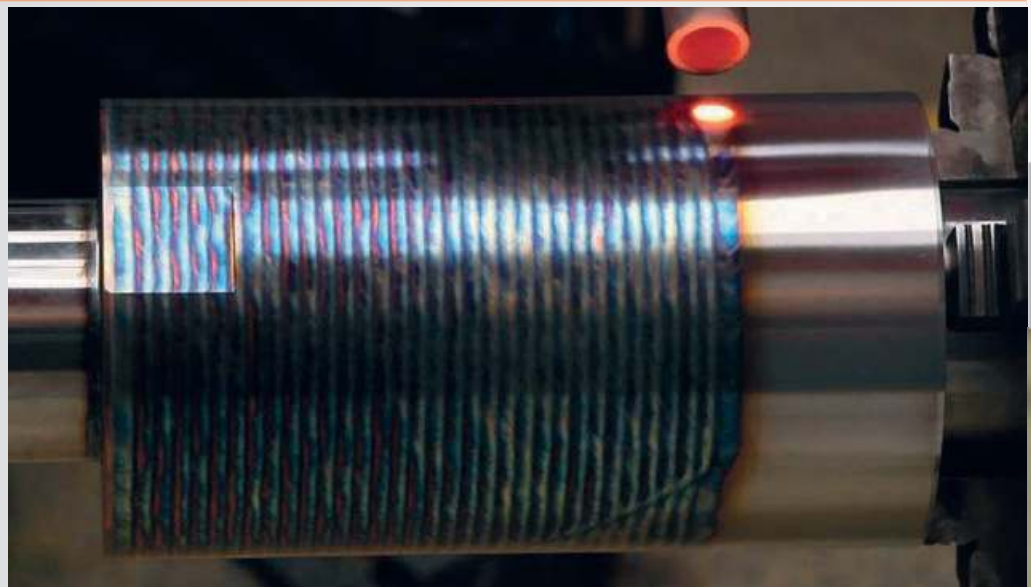
Fast thermal cycle – a high heating and cooling rate of the processed surfaces reduces the grain size of the material. **High surface hardness and structural uniformity.**

Hardening of wheelset tyres



Hardening of shafts and threads

The hardness of the processed products/areas **increases more than twofold** (layer thickness 0.5–1.8 mm). Distortion during laser hardening is **an order of magnitude lower** than with traditional hardening methods.





The FLW D50 LS line spot shaper and the FLW D50 SS square spot shaper make it possible to obtain a rectangular or square laser spot on the processed surface. The optical head is developed **on the basis of the standard FLW D50 L head.**

The line spot shaper – a unique optical head that produces a rectangular laser spot profile **with a line length of up to 80 mm**. The head is equipped with additional water cooling and air protection, which allow processing with a laser **power of up to 10 kW**.

The square spot shaper – a unique optical head that produces a square laser spot profile with a **square side of up to 20 mm**. The head is equipped with additional water cooling and air protection, which allow processing with a laser **power of up to 10 kW**.



SYSTEM LAYOUT

Two coordinate system versions are available to create **your unique machine configuration**



Tool motion unit, "Standard" version
Vertical axis working travel - 300 mm
Horizontal axis working travel - 400 mm



Tool motion unit, "Extended" version
Vertical axis working travel - 1300 mm
Horizontal axis working travel - 500 mm

SYSTEM SPECIFICATION

	FL-CPM-1	FL-CPM-2	FL-CPM-3	FL-CPM-4
Fiber laser	YLS series up to 10 kW			
X-axis travel (movement along the beam), mm	1700	4550	7400	10250
Y-axis travel (perpendicular to the beam), mm	400 (500)*			
Z-axis travel (vertical), mm	300 (1300)*			
X-axis travel speed, mm/s (rapid / working)	500/150			
Positioning repeatability, mm	±0.05			
Load capacity (distributed), kg	1000	2000	3000	4000
Maximum workpiece diameter, mm	500			
C-axis rotation speed (rotation axis of the processed product), rpm, for parts up to 100 mm in diameter	0–20			
Maximum rotation axis error, mm (for a product 400 mm in diameter)	±0.1			
Control system	Developed by NTO IRE-Polus			
Display	Touchscreen with 19" HMI			
Overall length**, mm	3600	6500	9400	12300
Overall width x height**, mm	2500 x 3400			

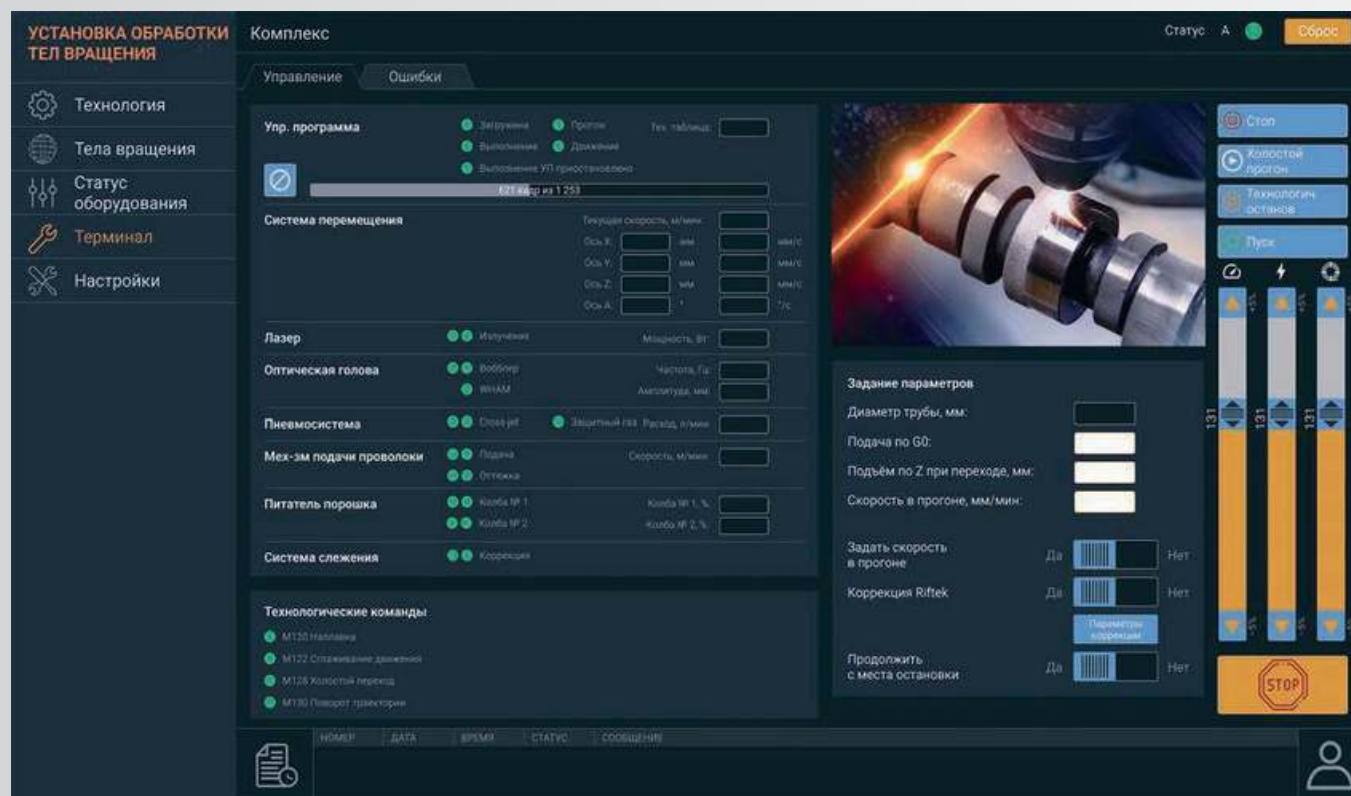
* Version with the extended tool motion unit.

** Excluding the protective enclosure and peripheral equipment.



THE FL-CPM SYSTEM WILL GIVE YOUR PRODUCTION
A HIGHLY EFFICIENT AUTOMATED
PROCESS FOR MACHINING A VARIETY OF PARTS

SOFTWARE



In-house developed software with a convenient and intuitive Russian-language user interface. All processing modes are flexibly configured for the required technological task.

FUNCTIONAL CAPABILITIES

- Setting the toolpath from the **HMI panel**, the handheld pendant or from a file
- Setting process tables from the **HMI panel** or loading tables from a file
- Motion with automatic seam tracking using a triangulation sensor
- Linking a process table with processing parameters to **every toolpath block**
- Control of peripheral equipment

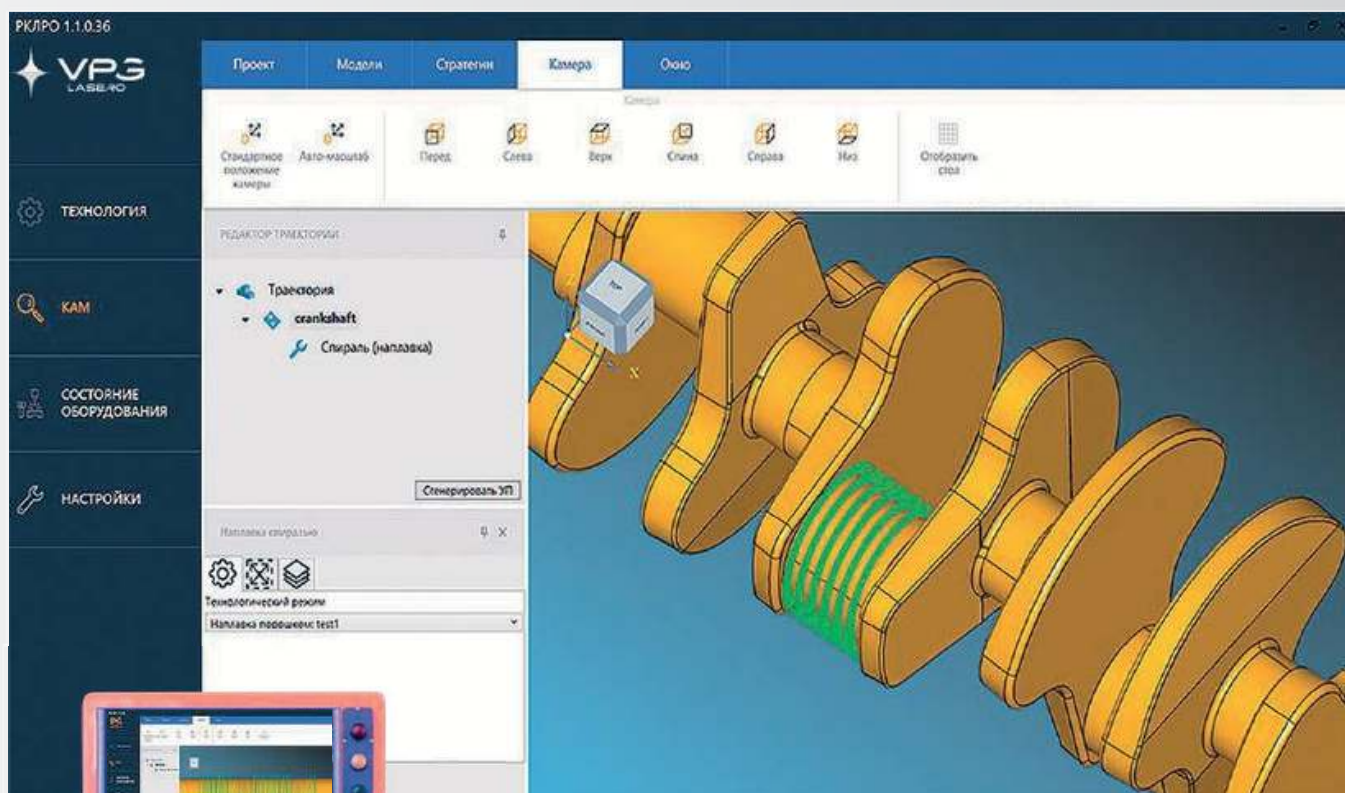
The control system supplied with the machine makes it easy to build the required workpiece processing path and to transfer it seamlessly for execution. To build the path, the system features a flexible visual editor that allows the parameters of a path with complex spatial geometry to be configured.

Paths are built both on the basis of standard surfaces – a plane, a cylindrical or a conical surface – and on the basis of 3D models of the workpieces.

If workpieces with complex geometry have to be processed, the machine can additionally be equipped with a tracking system that corrects the tool path taking into account the actual geometric dimensions of the workpiece.

The path-building strategies included in the control system make it possible to process workpieces taking their features into account. **The control system can build a path based on one of the preset standard cladding patterns:**

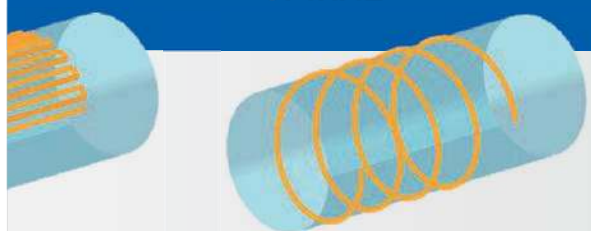




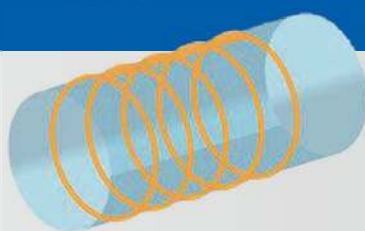
The machine control system is supplied together with a database of process modes developed for the tasks of the specific customer, which makes it possible **to solve the tasks set with a guaranteed result.**

The control system makes it possible to save workpiece processing projects for later use. A project stores information not only about the processing path but also about the process mode used. This makes it possible **to quickly reconfigure the machine** for processing different types of workpieces.

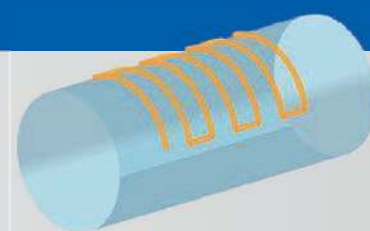
SPIRAL



RINGS



HALF-RINGS





GLOBAL LEADER IN THE LASER INDUSTRY

VPG LaserONE is a Russian company founded by the outstanding Soviet scientist Valentin Pavlovich Gapontsev, founder of the international science and technology corporation.

VPG LaserONE develops and serially produces high-efficiency fibre lasers and amplifiers, optical components, assemblies, modules, instruments, subsystems and systems for:

- Industrial laser cutting, welding, cladding, alloying, heat treatment, marking and cleaning systems.
- Scientific research.
- Fibre-optic, atmospheric and satellite optical communications, cable television.
- Surgery and biomedicine.
- Optical ranging and remote monitoring of industrial facilities and the atmosphere.
- Measurement and control systems, sensors.

In order to introduce innovative laser technologies into production, VPG LaserONE has for many years worked closely with leading domestic machine-building, metallurgical, railway and motor transport enterprises and supplies its customers with more than 600 types of ultra-high-technology laser equipment. Many devices and systems have no equivalents on the world high-tech market. All key components of fibre laser technology are manufactured in-house, which delivers:

- Fast product development.
- Efficient production methods.
- The industry's best product delivery times.
- More advanced and higher-quality solutions.
- The highest wall-plug efficiency, which reduces overall energy consumption and costs.



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1992

Foundation date



1,500+

employees



500+

R&D
specialists



>60 000 m²

facilities



100+

patents



90%

component
localization