



Metal cutting division

# **TUBE SYSTEMS**



CUTLITE PENTA

HIGH-TECH **TUBE CUTTING**  
LASER MACHINES

INDUSTRIAL DIVISION OF

**ELEN**  
GROUP

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# THE COMPANY

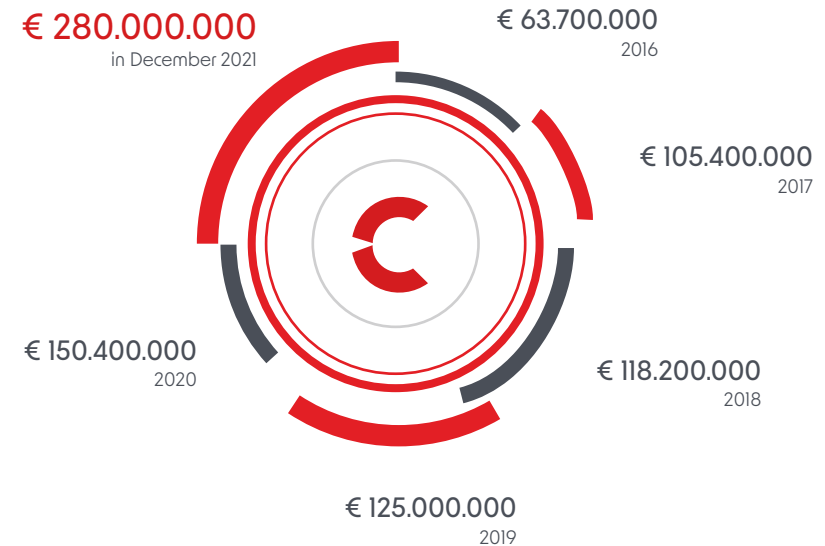
Cutlite Penta was founded in 1992 as a division of the El.En. group, and began construction of the first machines to cut wood and plastic materials using resources that were **designed and constructed at El.En.** The group grew steadily over the years, expanding both in the industrial and medical sectors. El.En. Group is a well-established Italian company, listed on both the Italian and US stock exchanges, with a market capitalisation of almost €1.34 billion. Cutlite Penta forms part of the industrial division of the El.En. Group, and has manufacturing and sales facilities around the world: Italy, France, China, and Brazil.

**To date, it employs over 850 people as direct employees of the industrial group, includes over 5,500 laser machines equipped with fibre laser sources installed worldwide, and over 80,000 m<sup>2</sup> of manufacturing space.**

Long-running, well developed experience combined with a profound knowledge of the dynamics of metal cutting have allowed us to become a standard for our customers. The industrial group, which had a total turnover of €63 million in 2016, has been growing at a dynamic pace, reaching a turnover of €150 million by the end of 2020. **In December 2021, the industrial group closed the year with a total turnover of €280,000,000.**

Despite the difficulties caused by the international emergency, the group's growth has been steady and exponential. In 2021, the turnover in the first six months of operation already exceeded the previous year's figure. With hard work and dedication, Cutlite Penta is consolidating its position as a global player in metal laser cutting, developing, designing and manufacturing each and every part of the cutting systems in-house.

## INDUSTRIAL GROUP TURNOVER



## MISSION

Cutlite Penta's objective has always been to create systems that guarantee high levels of productivity and quality with low running costs, enabling its customers to be extraordinarily competitive.

Cutlite Penta's **R&D department**, which is continually developing its cutting head, proprietary CNC and front-end software, ensures that Cutlite Penta systems are always state-of-the-art.

Flexibility, speed, simplicity of use and ease of familiarisation, are the distinctive features of this new family of systems that will place our customers in a position of being market leaders.

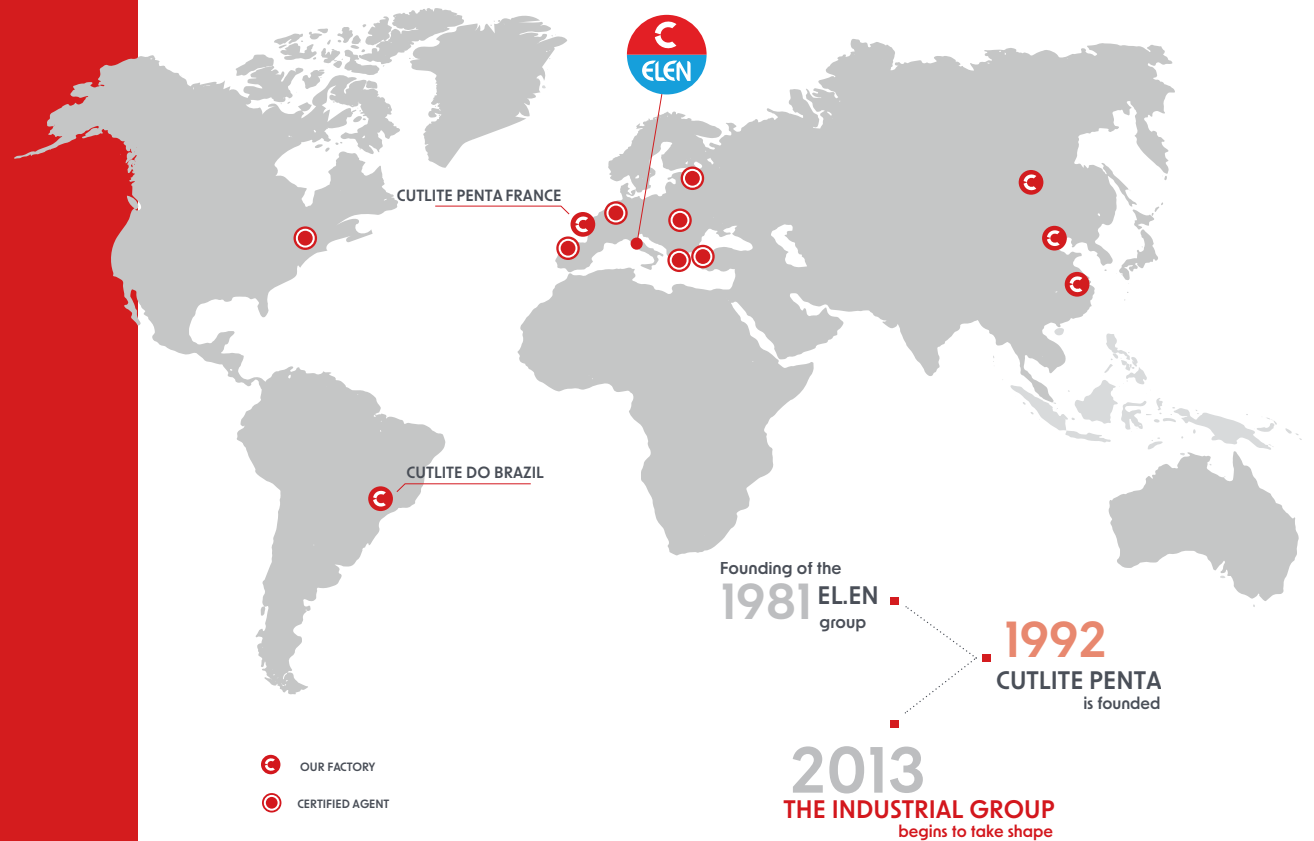
# OUR FIGURES

850  
employees

80.000 m<sup>2</sup>  
manufacturing areas



## YEARS OF EXPERIENCE AND KNOW-HOW AT YOUR DISPOSAL



Based on El.En. Group's decades of experience with CO<sub>2</sub> laser sources, we have transferred and perfected this advanced, multi-disciplinary know-how from the field of CO<sub>2</sub> laser technology to the field of **FIBER LASER TECHNOLOGY**.

*By partnering with the world's largest manufacturer of laser sources, IPG Photonics, we have access to the best fibre laser sources to develop fast, high-power machines.*

THE FIRST IN EUROPE TO INSTALL HIGH-POWER  
**LASER SOURCES ON CUTTING MACHINES**



# TRANSVERSAL TECHNOLOGY

## ON ALL OUR MODELS

### **FLY CUT**

Proprietary on-the-fly cutting technology

### **FLY PIERCING**

Piercing of moving material

### **LINEAR MOTOR**

Quick and accurate work on stationary tubes

### **ABSOLUTE ENCODERS**

Guaranteed axis positioning with no need for machine zeroing

### **CUTTING HEAD**

In-house designed and manufactured for all models, enabling high-power handling and significant savings in terms of gas (-20%)

### **SMART MANAGER 6**

Software machine management is identical on all models

### **SMART COMPOSER**

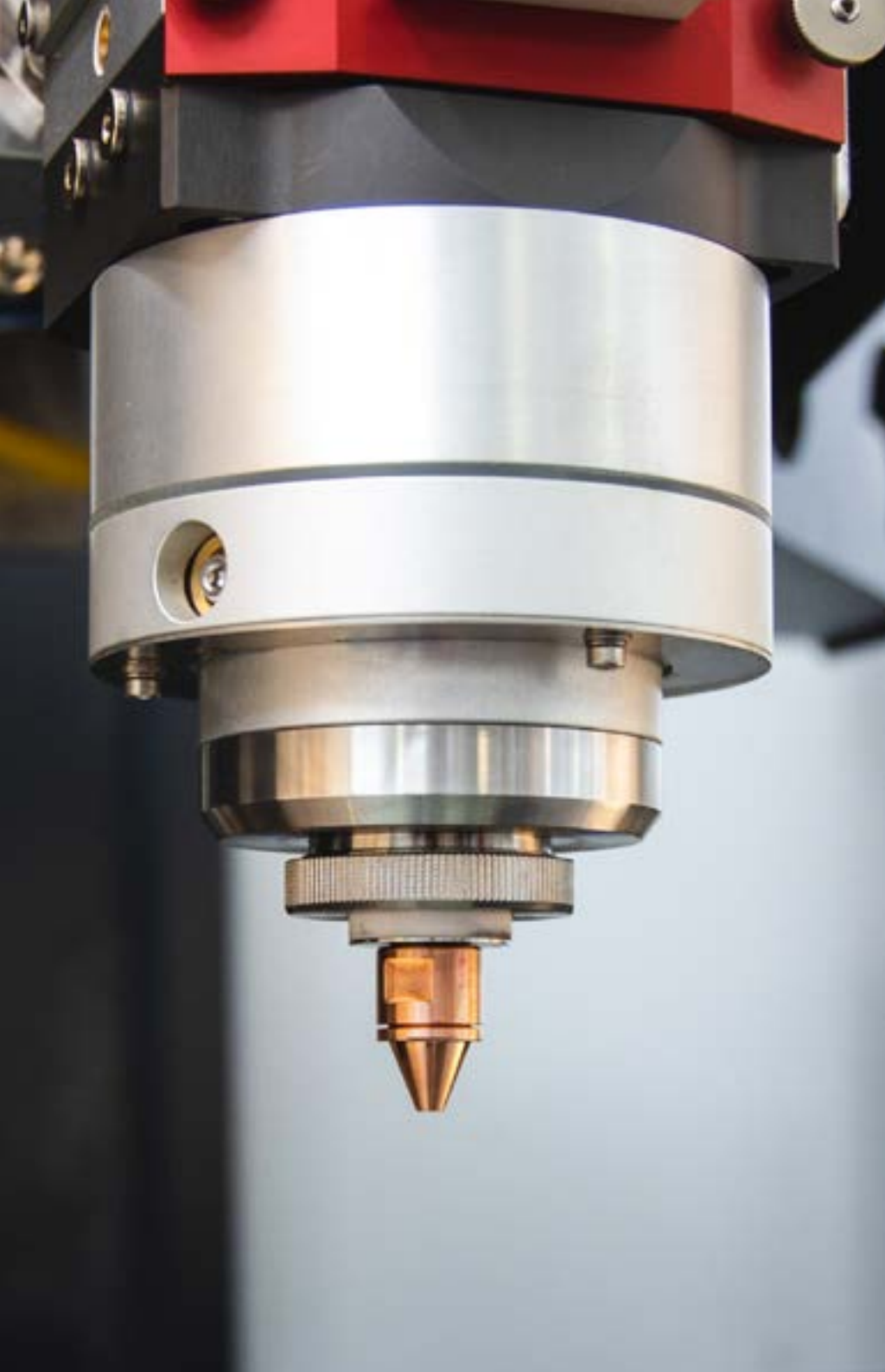
Integrated CAD/CAM on all installed systems

### **RASTER MODULE**

Software and hardware module for image reproduction on flat surfaces







## EVO 3 HEAD

The EVO3 cutting head is equipped with a capacitive sensor. The FIBER PLUS and LME systems use the **EVO 3** autofocus cutting head, entirely designed by our research and development department and built using cutting edge precision mechanics from Cutlite Penta; the head is equipped with a contactless capacitive sensor.

The head itself and the focusing lenses can be used with a laser power of up to **30 kW** at a pressure of 25 bar; several focal configurations are possible. The assist gas is automatically selected from the 3 different connectable gases - air, nitrogen and oxygen: gas service pressures are automatically determined according to the cutting parameters and materials. The head has a removable cartridge to facilitate replacement of the protective glass.

### CAPACITIVE HEAD

- Integrated contactless capacitive sensor
- High pressure gas management
- Focal-changeover cartridge
- All connections placed one top
- Contact and impact errors management
- Focal lengths: 150 mm - 300 mm
- Maximum pressure 25 bar

# TUBE CUTTING BEVEL HEAD

**Bevel cutting** is the process of cutting a piece with an edge not perpendicular to the top of the piece. This is carried out to increase the surface area of the edge for a stronger and more secure weld.

There are a number of different types of bevel edges. Edges are specified throughout the industry by a letter of the alphabet that most closely resembles the shape of the cut as seen in cross-section. The head **designed by Cutlite Penta** allows performing these operations without penalizing the classic flat cut. The mechanically innovative head is very small, lightweight and allows rotating by +/- 45° in both cutting directions.

## STRENGTHS

- 365 mm Z-axis
- Autofocus cutting head with contactless capacitive sensor.
- Automatic system for adjusting the focal length and 6 sensors for fast piercing
- Double protective glass
- Sealed lens cartridge



A close-up, high-angle shot of a laser cutting nozzle. The nozzle is made of polished metal and has a conical tip. It is positioned above a blue tube that is being cut. The background is dark and out of focus, showing parts of the industrial machine.

**LASER CUTTING SYSTEMS**

# **TUBE CUTTING** SYSTEMS

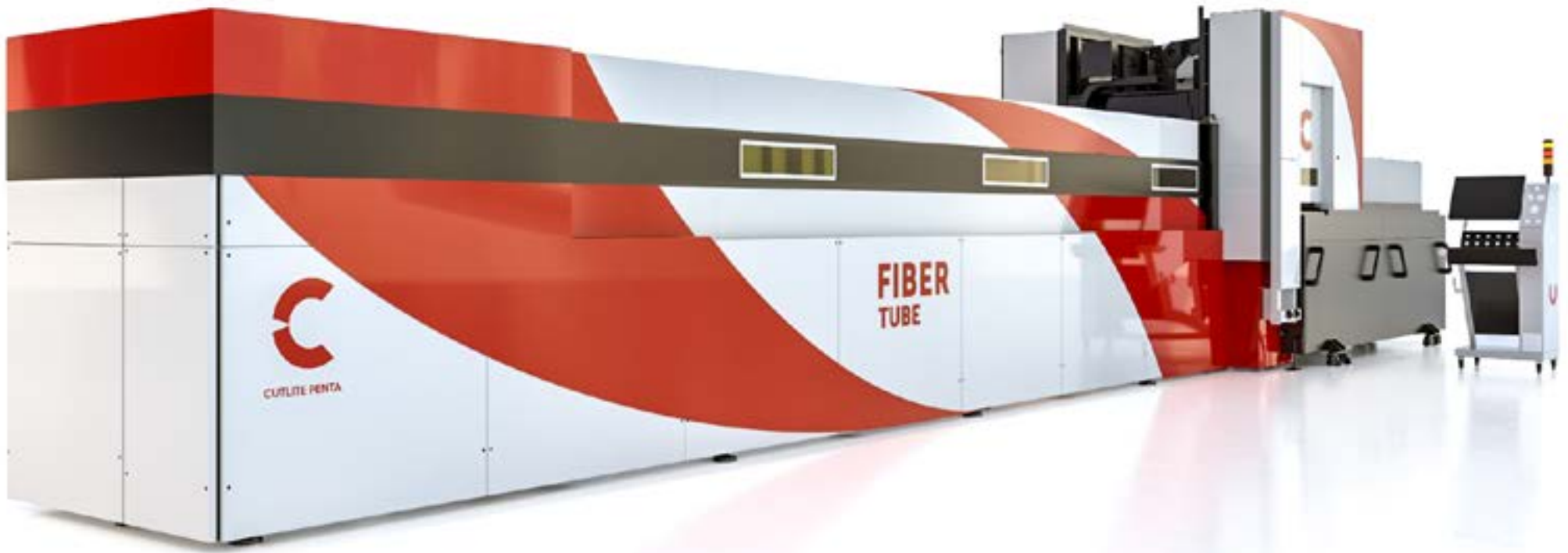
- **FIBER TUBE**

Uncompromising performance



Our systems are entirely  
**MADE** IN **ITALY**

# TUBE



FIBER TUBE is the result of CUTLITE PENTA's long and consolidated experience in the field of laser machines and represents the future of laser technology applied to metal tube cutting. The FIBER TUBE system is an automatic processing system that allows obtaining a finished part, complete with all the cutting operations required, in a single machining cycle.

This approach represents a technological and productive leap compared to traditional methods, which require several steps on different machining centres to subsequently carry out the required cutting, deburring, drilling, end trimming, interlocking and special CNC machining. This is achieved thanks to the speed, quality, accuracy, flexibility and reliability of laser technology. The system allows the automatic machining of round, square, rectangular tubes and open profiles.

## Materials

This system allows machining mild steel pipes, alloy steel, stainless steel, aluminium alloys, brass and copper. Different assist gases can be used according to the type of material to be cut. The machine can handle different types of gases. For example, oxygen is normally used for iron and mild steel, whereas nitrogen is used for stainless steel. The machine's CNC manages all operations: from the loading of the bar, to the cutting and unloading of the finished pieces.

## Applications

The great flexibility of use and the high cutting performance, both in terms of speed and quality, make it possible to successfully use the FIBER TUBE machine in different industrial sectors. Using laser systems proves to be beneficial when high cutting quality and the possibility of creating prototypes and small/medium-size series as quickly, easily, and economically as large

series are required.

The great versatility of the machine, which allows machining tubes of different cross-sections, materials, and thicknesses without the need for expensive specific equipment, is highly appreciated by companies operating in the field of processing on behalf of third parties, and in particular for the execution of processing for the structural sector.

## Benefits

Top productivity and a high degree of automation are very important characteristics for tube manufacturers and/or distributors. The possibility of carrying out long and complex processes in a single machine cycle is particularly appreciated by companies operating in the industrial vehicles and agricultural machinery sector.

The Fiber Tube system allows multiple operations to be carried out in a single machining cycle on a single machine. This allows replacing various machining phases, currently carried out on different machines in sequence, such as custom cutting, deburring, punching and/or moulding, drilling, and removal on the machining center. In particular, laser cutting eliminates the deburring operation, normally required in the case of mechanical cutting.

This fosters a remarkable reduction in the overall cycle time, which is generally greater when the piece to be produced is very complex. In addition, having only once machine to feed means a reduction in stock. Laser cutting eliminates the use of equipment and dies. The cutting geometry can be changed easily and quickly without having to design, manufacture and assemble rigid and specific equipment: this allows reducing costs and production times, eliminating the equipment warehouse, and making the production of small lots economical.

## Laser

The extreme flexibility of the laser tool, combined with the elimination of specific equipment, allows the user to reduce the development time of new products, to quickly, simply and economically produce "special" applications, small series or prototypes. It is possible that what has already happened for the furniture and light carpentry sector, where these potentialities have allowed the industrialization of new product solutions, will be replicated.

The use of laser cutting also reduces costs downstream of the cutting process: the laser approach ensures better uniformity of the pieces, a shorter machine tooling time and therefore greater management savings. Laser cutting guarantees excellent results in terms of cutting quality.

The absence of mechanical actions on the piece, combined with the small size of the laser spot, allows minimizing deformations on the piece, which fosters benefits on the coupling tolerances in the subsequent assembly operations. This is particularly relevant when performing automatic welding operations on the pieces downstream of the cut.

The Fiber Tube system was created to ensure maximum productivity in the processing of tubes (round, rectangular, square or open profiles), meeting a whole range of needs in this sector. Fiber tube, in the 2d head and 3d bevel

versions, has been designed with the aim of achieving maximum modularity in terms of layout. The automatic loading devices may be positioned both at the rear and at the front, ensuring the optimal flow of materials in each direction.

The machine body is made with a robust electro-welded and stabilized structure, on which the tail carriage, which houses the tube gripping rear spindle, is installed. The axis of the tube is equipped with brackets that support the bar, with automatic adjustment of the cross-sections: they rise during the loading phase and progressively lower as the tail spindle moves forward.

The head spindle is in a fixed position to ensure rigidity, while the cutting head is free to move on three axes, also exploiting the additional X-axis with linear motor: this allows accurate and fast machining of stationary tubes, thus reducing the number of spindle rotations to benefit productivity. The unloading of the cut parts takes place automatically and is supported along the entire length to ensure stability and quality in the process. In short, the Fiber Tube system allows obtaining a finished tubular piece, complete with all the cutting processes required, in a single processing cycle.



## STRENGTHS

- Compact and customizable thanks to the maximum configurability of the layout
- High productivity: linear motor on additional X axis to allow fast and precise machining with the tube still
- Automatic adjustments to allow efficient machine set-up at section change
- Possibility to load a single bar without engaging the automatic loader
- Great variety of practicable processes due to the possibility of working also open profiles
- Search for welding seam in masked time (without increasing the cycle time)
- Cutting special profiles to be evaluated with our technical department



# TECHNICAL SPECIFICATIONS

MODEL	ROUND FORMAT	SQUARE / RECTANGULAR FORMAT	TUBE WALL THICKNESS
TL 120	min 12 mm max 120 mm ø	min 12 mm max 120 mm	6 mm
TL 150	min 15 mm* max 152,4 mm ø <small>*reducible on request</small>	min 15 mm* max 152,4 mm <small>*reducible on request</small>	8 mm
TL 220	min 20mm* max 220 mm ø <small>*reducible on request</small>	min 20mm* max 160/220 mm* <small>*reducible on request</small>	10 mm
TL 305	min. 20 mm* max. 305 mm ø <small>*reducible on request</small>	min 20 mm* max 220 mm <small>*reducible on request</small>	10 mm

TUBE FORMAT
Round sections with diameters ranging from 20 to 220 mm (changes on request)
MAXIMUM WEIGHT OF THE MACHINABLE BAR
25/35/50 Kg/m
LOADABLE / UNLOADABLE BAR LENGTH
From 3000 mm to 6000 mm From 6000 mm to 12000 mm
LASER POWER
1000 W 2000 W 3000 W 4000 W <small>(Inceasable on request)</small>



# HARDWARE SOLUTIONS



## CAMERA

It is a position camera that allows remotely controlling and viewing the machine during operation



## SMART WELD

It allows detecting the position of the weld bead (both external and internal) before the bar is loaded into the machine, while the previous bar is being processed



## TUBE SIZE DETECTION

Tube size optical detection sensor



## SMART CLEANING (OPTIONAL)

Device for collecting internal scraps on a round tube



## AUTOMATION

The various automation options allow the optimization of the work phases, without significant idle times for loading and unloading operations



## SMART MANDREL (OPTIONAL)

Electro spindle with a 10-bay automatic tool change device, to execute flow drilling and tapping up to M12

**SOLUTIONS**

# TUBE SYSTEM SOFTWARE

- **SMART MANAGER 6**
- **SMART COMPOSER**



Our systems  
**ARE COMPATIBLE** with  
the main TUBE CAD/Cam  
software on the market

# SMART MANAGER 6

THE **SOFTWARE** FOR STATE-OF-THE-ART CUTTING SYSTEMS.

The exclusively in-house designed control software has been evolving in line with market and customer demands for many years. Smart Manager 6 has been specifically developed to fully exploit the potential of state-of-the-art cutting systems and ensure that all Cutlite Penta products achieve top performances. The new generation of software includes the many innovations introduced in recent years in laser cutting technology.

The interface improves the already remarkable simplicity and immediacy of operations during daily use, as well as facilitating even the most complex of cutting configurations. The new software is thus now even more intuitive and easier to manage.

In the panorama of CNC (Computer Numerical Controlled) machines dedicated to the laser cutting process, the Smart Manager Control offers several improvement and revolutionary solutions always aimed at simplifying and speeding up the operator's task. All this, while ensuring the highest level of safety and quality of work. Some of the most recent innovations introduced by Smart Manager are illustrated here below.

**Scheduling:** this tool provided by the control allows creating a list of programs that will be executed automatically in sequence, according to their order. This function allows carrying out uninterrupted work cycles.

**Cutting Lost:** the system is equipped with photosensitive sensors through which it is possible to recognize a cut-loss and therefore halt the processing. In addition, program execution can be restarted automatically just before a cut-loss and at a lower speed than the one programmed.

**Fast Piercing:** the system is equipped with photosensitive sensors through

which the process of piercing the wall of the tube is optimized in terms of performance and reliability, thus managing to obtain small diameter perforations much more quickly than with traditional piercing system.

**Smart Focus:** an ultra-fast autofocus system used to position the focus during the cutting and the piercing process.

**Auto Power Off:** the machine has an automatic auto-off system.

**Synchronous cutting function:** the machine has a system that optimises interchanges according to the machining distance.

**Raster Module (optional):** Cutlite Penta is one of the few companies that offers a software module for creating images in high and low relief and with a remarkable visual impact. The modularity of the sources, together with the fast accelerations, allow obtaining realistic three-dimensional images with high productivity.

OUR SYSTEMS **ARE COMPATIBLE**  
WITH THE MAIN TUBE CAD/CAM SOFTWARE  
ON THE MARKET

# SMART COMPOSER

THE NEW AND **REVOLUTIONARY SOFTWARE** BY CUTLITE PENTA INTERFACES DIRECTLY WITH THE NUMERICAL CONTROL OF THE MACHINE AND WITH THE FONT-END SMART MANAGER SOFTWARE.

**Geometric entities:** SmartComposer can insert and manage a series of geometric entities and geometric shapes; it allows moving, rotating, scaling, and mirroring objects. Functions are provided to split, interrupt and lengthen/shorten elements. Edges can be created with a simple click.

**Profile verification:** Tools for verifying imported profiles are available. In particular, invalid, duplicate or open elements can be checked. Node optimisation and reduction.

**RASTER images:** A software module for creating high-definition raster images.

**Fiducial markers:** Smart Composer manages the markers for the alignment of the plane by means of a camera.

**Management of orders with different materials/thicknesses:** Each job can handle an order for parts. Parts of different materials and thicknesses can be loaded by changing quantities and descriptions.

**Micro-joints:** Micro-joints can be added, both manually and automatically, also with connections and outputs.

**Couplings and outputs management:** Couplings and outputs can be added, both manually and automatically: the user chooses the type of coupling and output on a model piece, then the software will take care of the automatic insertion, respecting the position of the insertion point.

**Cut sorting:** SmartComposer has an efficient engine for calculating the cut sorting. It recognises internal and external tracks and automatically sorts them.

**Cut sorting with minimum heating:** SmartComposer can manage process sorting to minimize the heating of the material.

**Fly cut:** The fly-cut, with which it is possible to quickly execute tracks containing in-line profiles, can be managed in sync with the executive capabilities of the numerical control device.

**Simulator:** Smart Composer is equipped with an NC file simulator, and with a module to make estimates. It acquires the nominal speeds for each cutting line directly from the machine, and manages parameters such as cost per kg of material and hourly cost.

**Film cutting management:** The cut of the film is managed according to the material.

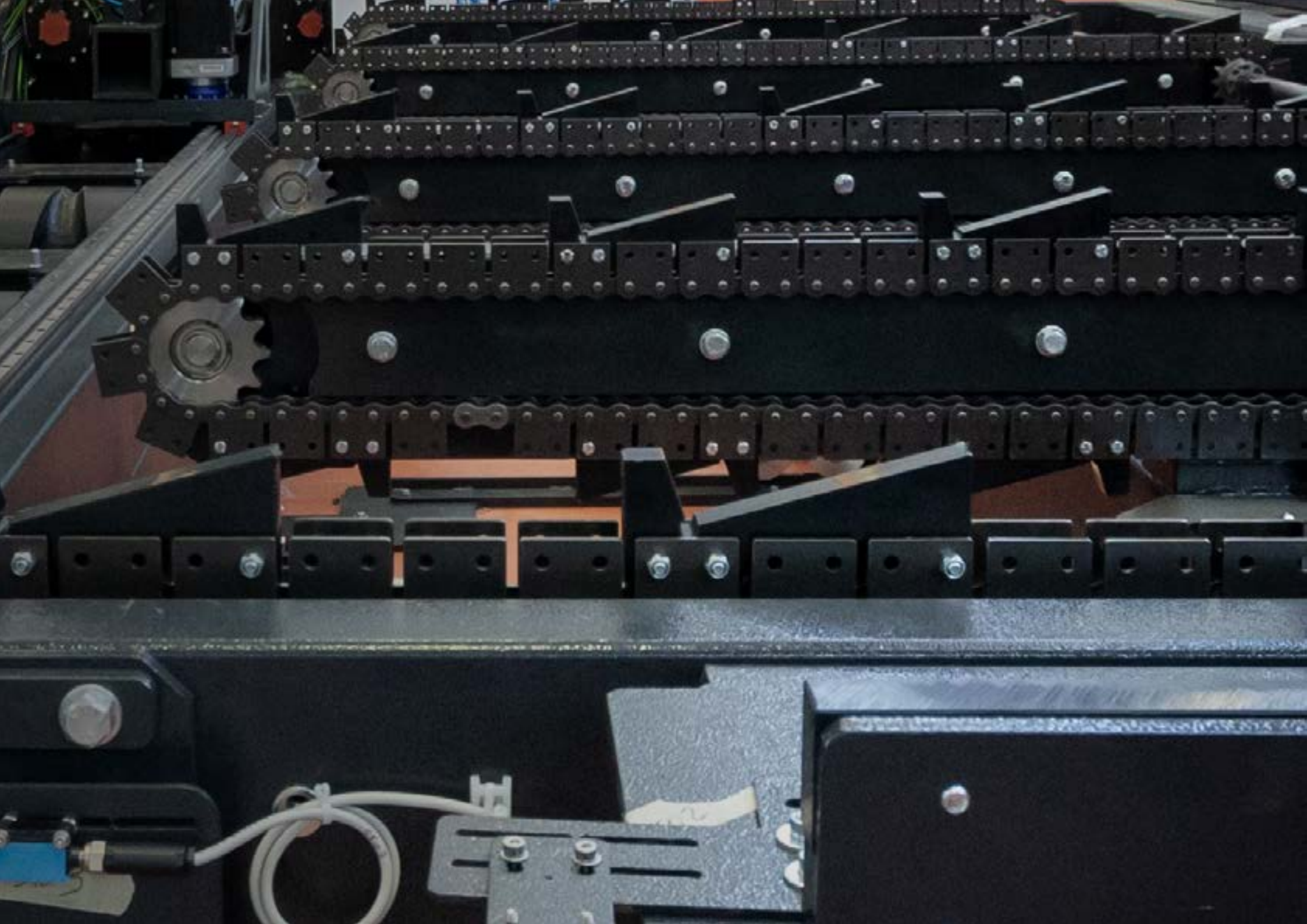
**Image film management:** It is possible to remove the film from the images, both at piece and plane level, and set the machine stop after removal. Piercing management allows setting the execution of the piercings, both at piece and plane level.

The background of the image shows a complex industrial machine, likely a conveyor system or a material handling system. It features multiple parallel tracks, rollers, and structural frames. The lighting is somewhat dim, highlighting the metallic surfaces and the intricate mechanical components. The overall scene conveys a sense of automation and industrial scale.

**LOAD UNLOAD**

# AUTOMATION

- **AUTOMATIC STEP LOADER**
- **AUTOMATIC BUNDLE LOADER**







# AUTOMATIC STEP LOADER

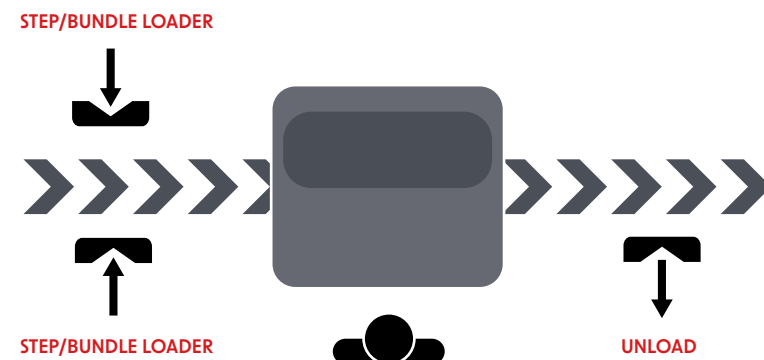
Maximum capacity 6 tubes having a  $\varnothing$  305 mm diameter or maximum side 220 mm.

Automatic loading of tubes from  $\varnothing$  20mm - up to  $\varnothing$  305 mm.

Automatic loading lengths from 1500 mm to 6500 mm, which can be increased on request.

Sliding surfaces entirely covered in plastic material to avoid damaging and scratching delicate tubes.

Possibility of mounting on the operator or rear side





# AUTOMATIC BUNDLE LOADER

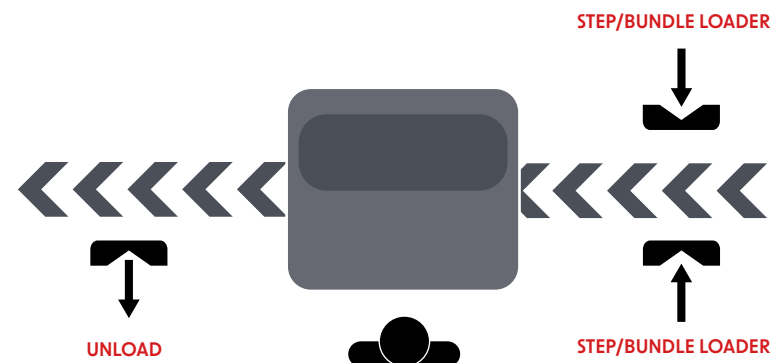
Loading Maximum 2000/4000 Kg

Automatic loading of  $\varnothing$  20mm tubes max.  $\varnothing$  220mm, which be reduced on request

Automatic loading lengths from 1200 mm to 6500 mm, which can be increased on request.

Measurement of tube length before loading into the machine.

Sliding surfaces entirely covered in plastic material to avoid damaging and scratching delicate pipes.





**FIBER LASER**

**LASER SOURCES**



## IPG FIBER LASER

**IPG** was founded in Russia in 1991 by physicist Valentin P. Gapontsev, Ph.D, a pioneer in the fiber laser industry. Since 2006, IPG has been listed on the NASDAQ Global Select Market with the IPGP ticker. In 1992, the company began to focus on the development of high-power fiber lasers and amplifiers and established its worldwide headquarters in the United States in 1998.

In 2000, IPG invested in new high-capacity production facilities in the US for the production of its own diode pumps, an important component of its fiber lasers and amplifiers. IPG is highly vertically integrated and manufactures all the critical components for its lasers and amplifiers. fiber optic technology has had a revolutionary impact on laser manufacturing. The simplicity and elegance of the fiber laser is reflected in its efficiency, compactness, sturdiness and low cost, all of which has led to its tremendous success in the market.



**TECHNOLOGY**

**HARDWARE SOLUTIONS**



# HARDWARE SOLUTIONS

ACCESSORIES



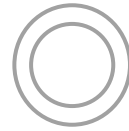
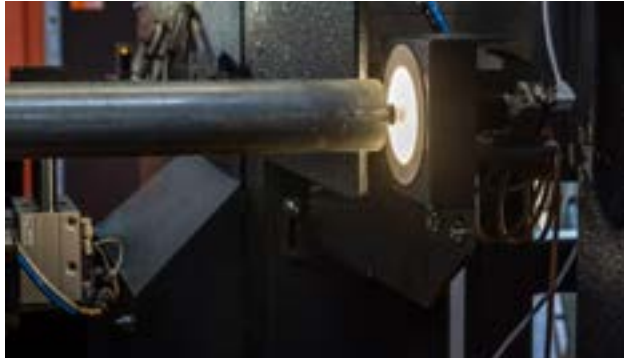
## **TUBE SIZE DETECTION**

Tube size optical detection sensor



## **SMART MANDREL (OPTIONAL)**

Electro spindle with a 10-bay automatic tool change device, to execute flow drilling and tapping up to M12



## **SMART WELD**

It allows detecting the position of the weld bead (both external and internal) before the bar is loaded into the machine, while the previous bar is being processed



## **CAMERA**

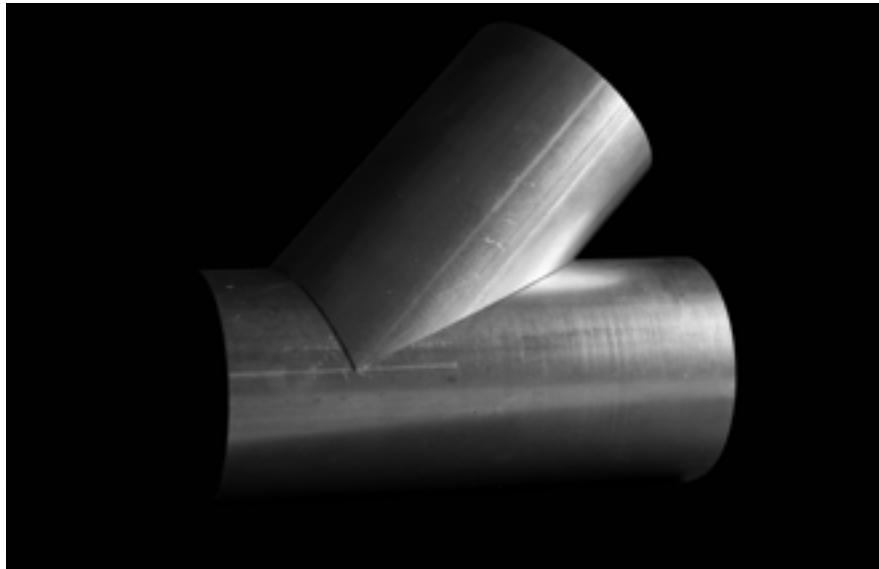
It is a position camera that allows remotely controlling and viewing the machine during operation



## **SMART CLEANING (OPTIONAL)**

Device for collecting internal scraps on a round tube







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