

iLaser

FIBER LASER

1. COMPANY PROFILE



1950	1971	1974	1981	1994	2001	2003	2011
MVD ilk makinasını imal etmiştir.	İlk sac işleme makinası olan sac delme presini imal etmiştir.	Ana üretim konusu olan ağır tip alkant presler ve gyotin makasların seri üretimine başlayarak konusunda şuanda Türkiye'de en eski üretici konumundadır.	1981 yılında yeni fabrikasına taşınmış ve sonraki yıllarda sac bülme silindri ve genişletilmiş metal preslerini de standart üretime sokarak sac işleme makinaları konusunda müşterilerine büyük çeşitlilik sunmuştur.	MVD, Türkiye'nin ilk Tandem Presi'ni imal etmiştir.	Makinelerini CE standartlarına uyumlu hale getirmiştir.	Taretti CNC Hidrolik Panç Makinesini pazara sunmuştur.	Fiber Lazer Kesim Makinası'nı pazara sunmuştur.



Quality High Technology

Quality and service support is accepted as principle. Designing and manufacturing are based on reliability, durability and precision. Machines are easy to use and are built to be ready for user errors. Machines are designed and analyzed with 3-D supported computer aided programs, precisely machined in moving column CNC machining centres, equipped with world-known equipments and presented to the customers' use after quality control.

MVD INAN TAKIM TEZGAHLARI SANAYİ A.Ş.

Machinery production of the company goes back to 1950. After several other productions the first perforation press was introduced in 1971. Heavy-duty press brakes and guillotine shears became the main scope of the company after the first press brake manufactured in 1974. In 1981, the company moved to its new premises and added three-roll bending machines and expanded metal presses into the production line.



Then, with the customer who wanted to produce octagonal electric poles, MVD INAN produced and exported its first hydraulic machine which is a tandem press brake with 10 m. bending length. In 2001, CNC and conventional press brakes and guillotine shears were fully complied with machinery directives conformity assessment regulations on the newest CE standards and machines are affixed CE mark on. Finally, at the beginning of 2003 CNC turret punch press was presented to the market.

Quality oriented production and good customer support have always been the basic rule of the company. Machines are designed to be reliable, durable and precise. The easy to use characteristics are ready for operator faults. Designs carried out on computers



including software support for drawing and strength analysis. Precise machining of every construction on moving column CNC machining centre and every part on CNC lathes are accompanied with detailed quality control. Equipments attached are world known brands like Bosch Rexroth, Hoerbiger, Cybelec, Delem, Elgo, Telemecanique, Siemens, Heidenhein, Givi Misure, Wila, Wilson, Unimec.

2. iLaser

Fiber lasers delivers their energy through an integrated flexible optical fiber. Fiber lasers have a monolithic, entirely solid state, fiber to fiber design that does not require mirrors or optics to align or adjust. These features make fiber lasers easier to integrate and operate in production and provides less maintenance and operation costs. Fiber lasers are typically smaller lighter in weight than traditional lasers, saving valuable floor space. While conventional lasers can be delicate due to the precise alignment of mirrors, fiber lasers are more rugged and able to perform in variable working environments. These qualities permit fiber laser systems to be transported easily.

The fiber laser cutting method is becoming the best and most experienced method in the industry in the production of sheet metal processing.

Rack/Pinion system is used for machining flat sheet plates in 2-D (X and Y) with sizes of 3030 x 1530 to 6030 x 2030mm with high speeds and accelerations. Laser head is moving on two axis X and Y on the fixed sheet metal lying on the cutting table. This system is also called *FLYING OPTICS*. iLaser is designed with high precision criteria, rigid and powerfully body that allows high cutting speed and accelerations.

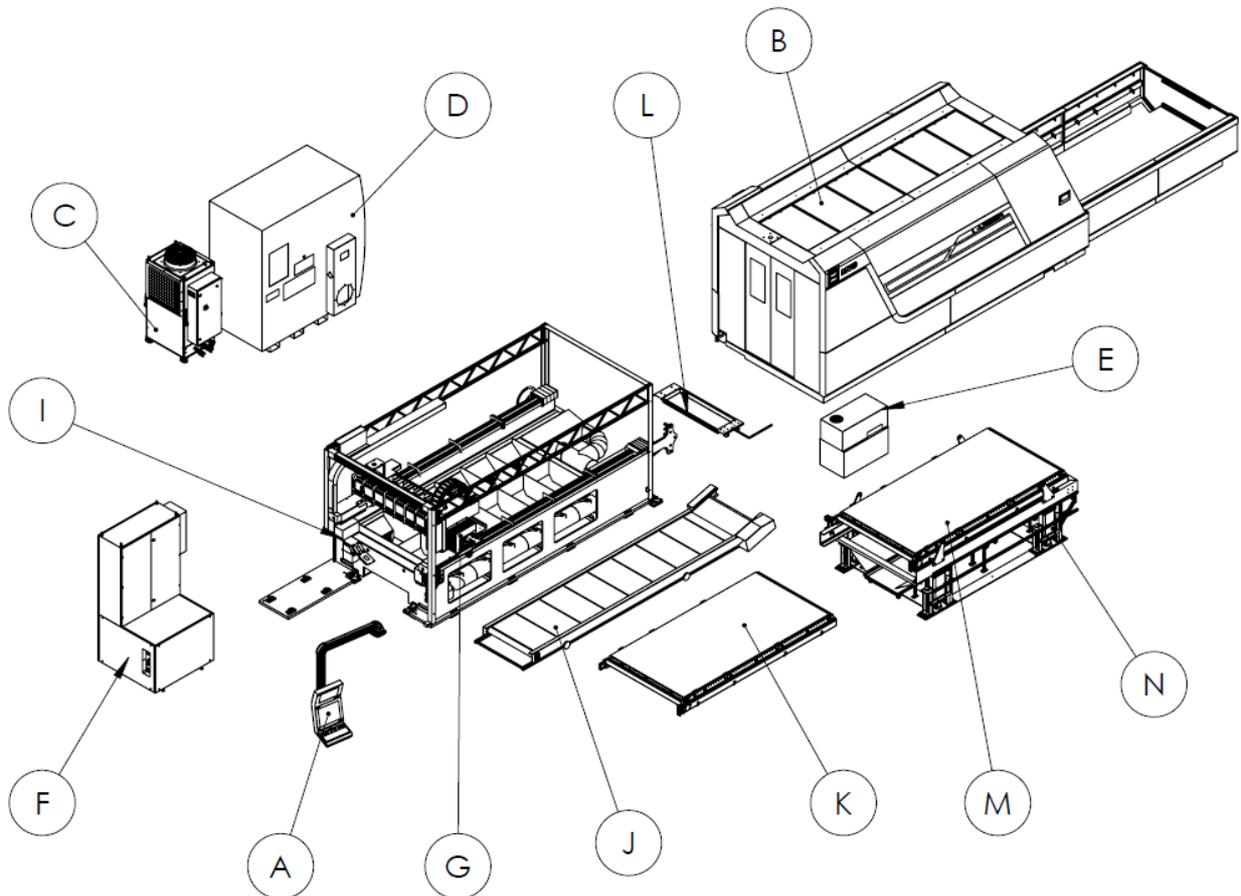
AC servo motors and backlash free reducers are used for getting high performance with minimum power usage and any precision losses. Hardened helical racks with high quality are also used in all needed axes. iLasers are also including low weighted bridge in Y-axis that allows high speeds and accelerations with usage of low power AC servo motors. The bridge is applied stress relieving treatment to prevent deviations in machine geometry and stresses that may result during welding.

A filter with high vacuum system and a conveyor system are also integrated to the machine for dust and scraps.

Laser cutting machine also have automatic loading and unloading shuttle table system that allows loading and unloading during cutting operation. This system also allows using the time efficiently. Because MVD use servo motors for fast and precise table changing operation. It has also a hydraulic system which is used to move up and down the table.



3. MACHINE PROPERTIES



CODE	IDENTIFICATION
A	CONTROL PANEL
B	MACHINE CABIN
C	COOLER UNIT
D	FILTER UNIT
E	HYDRAULIC OIL PUMP
F	RESONATOR
G	BRIDGE
I	MAIN BODY
J	CONVEYOR
K	MOVABLE TABLE 1
L	SCRAP COLLECTION BOX
M	MOVABLE TABLE 2
N	HYDRAULIC SYSTEM

3.1 CONTROL PANEL

CNC control system which works on laser cutting systems for and used in IPG laser systems widely.

The widest touch screen available on press brake CNC. 19" multi touch A totally renewed interface, specifically designed for multi touch screen, is available as an alternative to the well-known Esa interface used on S650W. Make the best of any 3D cad cam you would like to install in the CNC. Finger-tip work piece design. Direct import of tools shapes (.dxf files) and management of tool library. Tool and die holders' management. Angle measurement and correction with all existing devices is available.



MODEL	CNC S660 W
Assembly	Rack + PC
Display	19"
Display Resolution	SXGA - 1280x1024
Multi Touch	Si
Processor	AMD LX-800 500MHz (RACK)
CPU / Dynamic RAM	128MBytes (RACK) 4GBytes (PC)
Graphic controller	Integrated AMD Radeon™ HD 8400E (PC)
Solid State Disk	128MBytes (RACK)
Hard Disk	>20GB (PC)
Battery backedup RAM	1MBytes
FLASH memory	NO
Ethernet ports	1 x 10/100Mbit (RACK) 2 x 1 Gbit (PC)
Serial Ports	2 x RS-232 (RACK) 2 x RS232 (PC)
External VGA output	YES
Additional QWERTY keyboard and mouse	wifi o usb
USB Ports	2 x USB 2.0 (RACK) 4 x USB 2.0 (PC)
Operative System	ETS real time (RACK) Windows 7 (PC)
Axes number Max/std	Max 156/4
Analog axes management	Onboard 4 x 14Bit, +/-10V analog outputs 4 x NPN/Push Pull Line Dive 5V Encodes
Can-Open axes	1 x CANopen DS3101
Analog Inputs	2 x 12Bit risoluzione (0-5V, 0-10V) 2 x 12Bit risoluzione (0-5V, 0-10V, 0-12V)
Analog outputs	2 x risoluzione: 12Bit (0-10V)
Fast Inputs	NO
Local digital Inputs Max / standard	32

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Test Gas

Proportional Valve control

Proportional valve max pressure [bar] 30.00	<input type="checkbox"/> TEST <small>Prop. Valve Enable</small>	<input type="checkbox"/> YV24 <small>EV Cut Assist</small>	Alarm GAS tolerance [%] 10
Oxygen max pressure [bar] 13.00		<input type="checkbox"/> YV23 <small>EV Nozzle Air</small>	Alarm GAS delay time [s] 2.0
Nitrogen max pressure [bar] 28.00		<input type="checkbox"/> YV0 <small>EV Cutting Air</small>	Maximum difference input pressure [bar] 4.50
Air max pressure [bar] 13.00		<input type="checkbox"/> YV2 <small>EV Oxygen</small>	Delay feedback input gas control [s] 3.0
Gas Test/Purge pressure [bar] 11.00		<input type="checkbox"/> YV3 <small>EV Nitrogen</small>	Time Retrace Back for AutoRestart [s] 0.8
Purging time during program [s] 5.00			Safe head position for axes motion [mm] 30.00
Current Pressure [bar] 0.00			X Service Position quote (mm) 5.0
Laser source max power [W] 2000			Y Service Position quote (mm) 745.0
			Z Service Position quote (mm) 60.0

ASPIRATION ZONES Enable Auto Auto

ASPIRATOR FILTER Manual ON / OFF OFF

Start / Stop OFF

Lubrication

Minute for lubrication 0

Number of pump cycles 0

0.0 : 30.0

NUM

Test Gas Assist

Test Nozzle Air

Test Cutting Air

Test Oxygen

Test Nitrogen

Hoerbiger Calibration

Aspirator ON/OFF

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Shoot On

<input type="checkbox"/> Laser Shot	<input type="text" value="0"/> Power (W)	<input type="text" value="0"/> Duty (%)	<input type="text" value="0"/> Frequency (Hz)	<input type="text" value="0.0"/> Time (s)	<input type="text" value="0.0"/> Focal distance [mm]
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Laser Output

- B7. Laser Assigned
- B8. Laser Switch On
- B6. Analog Control
- B3. Internal Control
- B5. Guide Laser
- B1. Laser Ready
- B2. Emission On
- B13. Laser Warning
- B4. Laser Error

Laser Output

- A1 Laser Request A1
- C1 Laser Switch On C1
- A6 Analog Control A6
- A3 Internal Control A3
- A4 Laser Reset A4
- A5 Guide Laser A5
- A2 Laser_On

Precitec Output

- LENS TYPE 0
- LENS TYPE 1
- ERROR (Led=1 Error)
- Position Reached
- SW1 Exchangeable cartridge available
- SW4 Protective window cartridge available
- READY
- FAR

Sensor Precitec

Capacitive

Inputs Precitec

Reference Travel RT

Automatic Aut

CONTROL VOLTAGE [V] 4.145

0.0 : 30.0

NUM

Shoot Off

Dry Run

Laser Net

Technical specifications

Industrial PCs

	Panel PC 19"	Panel PC 15" Plus
Display	19" TFT LCD colors	15" TFT LCD colors
Display resolution	SXGA - 1280 x 1024	XGA - 1024 x 768
Touch Screen	Capacitive Multi Touch	Resistive - 5 strands
CPU	AMD Embedded GX-420CA - 2GHz	AMD Embedded GX-420CA - 2GHz
CPU frequency	2 GHz	2 GHz
Dynamic RAM	4 GBytes	4 GBytes
Graphic controller	AMD Radeon HD 8400E	AMD Radeon HD 8400E
Hard Disk	> 20GB HDD (Sata)	> 20GB HDD (Sata)
Ethernet ports	1 x 10/100Mbit 1 x Gigabit Ethernet	1 x 10/100Mbit 1 x Gigabit Ethernet
Serial port	2 x RS-232	2 x RS-232
VGA video output	YES	YES
PS2 mouse and keyboard	YES	YES
USB ports	4 x 2.0	4 x 2.0
Operative system	Windows® 7 Ultimate	Windows® 7 Ultimate
Power supply	24Vdd +/- 20% - 100W	24Vdd +/- 20% - 100W
Dimensions (H x L x P) [mm]	466,4 x 391,0 x 71,1	466,4 x 391,0 x 66,6
Temperature working range	+5/+40° C	+5/+40° C
Marcature	CE	CE

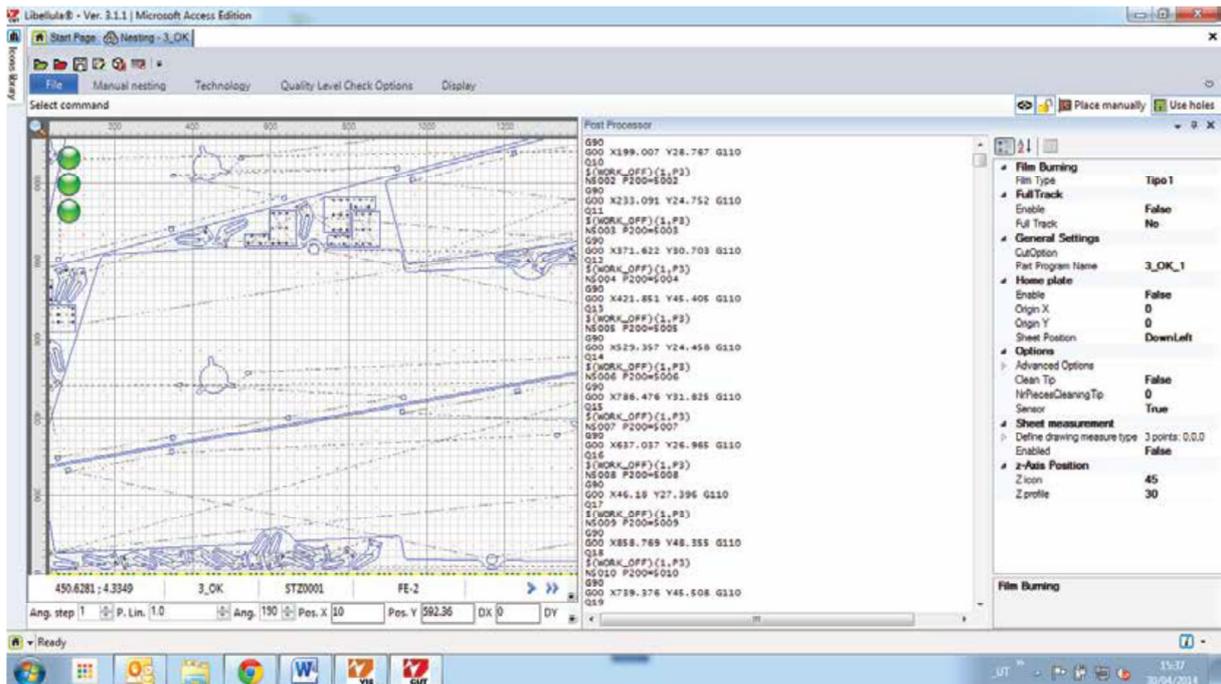
3.2 CAD/CAM SOFTWARE (LIBELLULA)



Libellula.CUT offers automatic handling and programming for every kind of laser machine, ensuring perfect nesting efficiency. All necessary algorithms for working either with assisted or non-assisted machines are included; the software successfully pilots machines equipped with automatic load/unload systems, pallet change systems, cells, as well as machines connected to FMS systems.

No matter which system is used, Libellula.CUT simplifies and improves both the programming and the machining process.

Libellula.CUT



Maximum efficiency

Libellula.CUT matches specific technological parameters during each step of the programming stage, from Project to NC code, ensuring highly accurate nesting operations and machining paths.

Minimum scrap

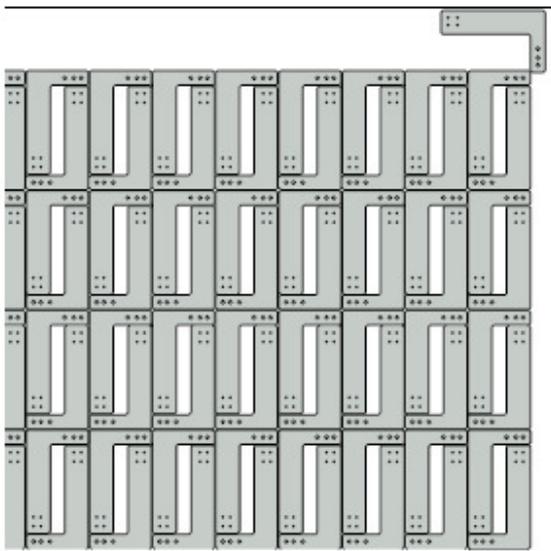
Libellula.CUT nesting algorithm optimizes the use of material, minimizing scrap.

Optimization

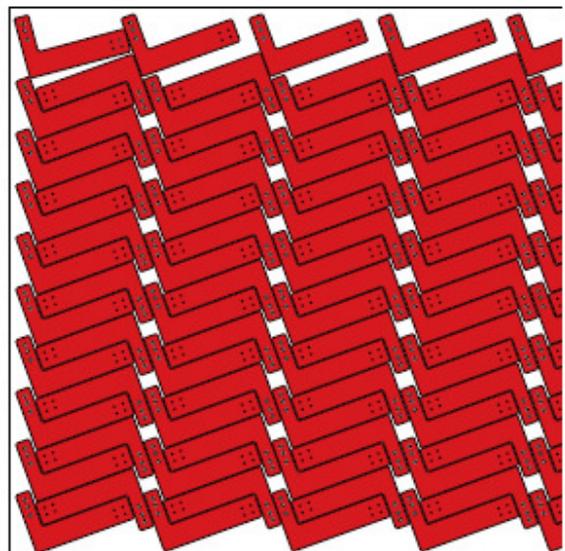
Saving material

The nesting algorithm of Libellula.CUT allows to save a considerable amount of scrap. Libellula nesting is very easy and doesn't need extra settings to get the best result: mod.ISA (Intelligent Shape Analyser) automatically calculates the correct parameters for any parts to be nested. Libellula nesting can work with standard sheets stocked in the warehouse and/or with scraps obtained from previous processing.

Without mod.ISA
Scrap percentage: 31.7%



With mod.ISA
Scrap percentage: 22.2%



Reduce your costs of consumable components

Libellula.CUT offers the possibility to optimize machine piercings whenever possible; advanced options as chaining by means of bridge cutting or chained cutting of parts are available, as well as cutting of common sides.

Accurate and complete reports

Libellula.CUT is equipped with a modern and powerful engine for report building and editing, suitable to produce and track all necessary information for production, also in case of bar code systems. Reports can be easily saved as PDF or Excel files to Access and share through the network.

3.2.1 Libellula Optional Features

a. Optia



OPTIA

OPTIA is the new software designed by Libellula for the reduction and the digitisation of scraps.

Linked to the cutting software Libellula.WIZARD, it allows an extraordinary simplification of metal sheet scraps recovery process, optimising the time as well as working profit. After many years of research by Libellula Engineers, OPTIA is the perfect solution to reduce scraps created from metal sheet cutting in a simple and intuitive way; this software in fact can be used autonomously by the cutting machine operator without any interventions from Technical dept.

The digital acquisition of scraps profile is done by a webcam optical system, which is able to acquire and to convert a real scrap scenario into a virtual 2D schematic representation.

Through the positioning of a webcam in proximity of a workbench (machine or an external acquisition station), OPTIA acquires a video streaming which is elaborated in real-time and used to get the image of metal sheet scraps.

The process elaborates and discretizes the acquired images in order to recognise the geometrical shape of metal sheet and also to save it for his representation in full-scale on nesting cutting software Libellula.WIZARD.

OPTIA offers two operative ways for the nesting elaboration:

Creation of an automatic nesting on the discretized metal sheet KeyShot: photo-realistic rendering

Use of manual nesting on real photographic representation of metal sheet

Once the nesting is finished, the system will create automatically the NC program which could be or not immediately executed.

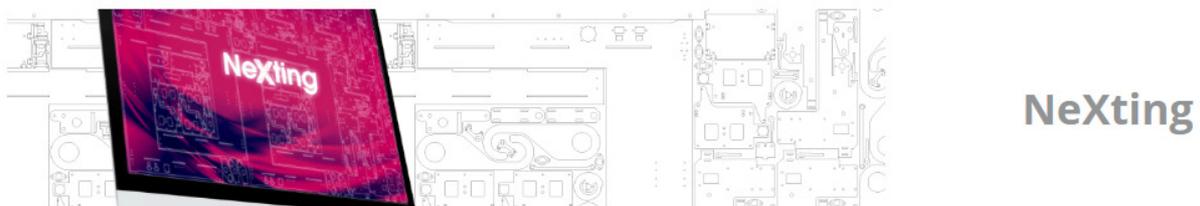
The scraps digitalisation with OPTIA is possible in any workshop context

If the metal sheet is acquired directly on board machine, the NC program will be directly used by the machine to make the cutting.

Instead if the metal sheet is acquired on a station external the machine, the system will be equipped by a second webcam able to get the position and the guideline of metal sheet positioned on board machine

The system automatically will elaborate again the NC program in order to adapt it to the new metal sheet position and it will be sent to the machine for cutting. It's possible to avoid the machine uprodutivity related to the downtime of acquisition and preparation of NC program.

b. Nexting



Libellula NeXting is the new, advanced nesting system within which key features such as accuracy, innovation and speed meet as never before to create a software capable of improving the performance of each cutting machine and, consequently to push the results produced to the maximum levels.

The structure underpinning this advanced software is designed to address the nesting path in order to achieve an unrivalled level of perfection. The excellence guaranteed by NeXting involves different areas of the industrial production process, among which the geometry of the models: with NeXting layouts and more complex details will be brought under the best nesting path, that's to say the one which will conclude with the creation of a perfect product from a functional point of view and, at the same time, which will allow the company to save time and money.

Excellence and quality

Libellula NeXting places itself on the market as an absolute protagonist of nesting process.

Its ability to excel is evident in obtaining tangible improvements; compared to the nesting procedures commonly used in industrial processes, NeXting improves the results of a percentage up to 15%, as confirmed by the analysts.

A jump of this kind, made from the nesting process, results in terms of savings and precision within each of the industrial production system.

The efficiency is in the details

The precision in NeXting corresponds to the effective use of the raw material:

These two features, along with the ability to describe the nesting paths on different formats, make this module a high performance one that is delivered into the hands of a company.

These features are added to the ability of importing existing nesting paths, with immediate economic benefits.

Up-to-date technology

For NeXting, Libellula has focused on the latest technologies known in the field of informatics, i.e. those of the 64-bit software, which act on a multicore platform that accelerates the execution of the nesting path, transforming the production in a procedure that has unattainable schedule demands.

The future of nesting is today

- Using high-performance material
- Management of complex parts
- Advanced nesting on any form
- Nesting on different formats
- Master plate which minimizes the number of different layouts
- Optimization of resulting scrap

c. mod.ORDER



mod.ORDER

Management and production monitoring is essential to optimize the timing of processes, identified by the sheet metal laser cutting software.

Perfectly integrated with Libellula.CUT, the mod.ORDER laser cutting software provides an outstanding support to the most efficient production scheduling of nesting, allowing the company to have an overall, realtime picture about the pieces to be produced or validated.

Creating an intelligent schedule

The task entrusted by programmers to mod.Order is to allow the user to have intuitive compiling lists that are essential to identify the semi-finished products or the ones to be delivered into laser cutting production, whether performed with manual or automatic nesting, programming the work for cutting.

Updated supervision

Mod.Order is an efficient supervisory assistant: always updated on the sheet parts completed by manual and automatic nesting, on the quantity of parts to be produced by cutting software, providing reports on materials, thickness, number of orders, contracts and customers.

Human error is eliminated

Mod.Order was designed to allow you to generate bar codes even before putting the product itself into production. The user has, therefore, a reference in the nesting production planning before the finalization of the product geometry. The management and monitoring of production, as well as nesting programming, will no longer be subject to human error in transcription and the sending of the codes to the cutting of metal sheets software.

Programming of accelerated production nesting

In line with the philosophy of interaction and maximum control, Libellula programmers transformed the programming of the nesting production, whether manual or automatic nesting, in a time when everything is simplified: the mod.Order identifies the presence of similar jobs by providing the necessary input to the cutting of sheet metal software, but also allows you to identify the parts made with manual or automatic nesting, as well as those that must be produced.

d. mod.STORAGE



mod.**STORAGE**

An integrated part of Libellula Univers, mod.STORAGE is the management software for sheet metal warehouse that enables you to check and maintain constantly updated the amount of sheets present in the company. The ability to interface with other modules of Libellula Univers, makes this software capable of automatically update itself, working as a unique control system of its kind.

Remnant Management: reducing scrap

In keeping with Libellula philosophy, devoted to excellence, efficiency and maximum optimization, the mod. STORAGE is designed and developed based on the optimal control in the warehouse management, as well as remnant management.

Knowing the amount of scrap, the results from the working processes suggested by the Libellula.CUT software, minimize sheet metal consumption, with an economic return in terms of maximum high savings.

Real-time reports

mod.STORAGE is the overall view, in real time, on the stock situation. The constant connection between the Libellula modules and the synchronic upgrade ability,

transform mod.Storage in the best manager a payroll company can have: attentive, updated and capable of providing, at any time, a detailed report in PDF or Excel file format on the quantity of the materials on the machines in use, on the percentage of scraps available and even a list of raw materials present in the warehouse and in ordering products of those ready to be packed.

mod.STORAGE and Libellula.CUT: a winning combination

The synergy that unites mod.STORAGE to Libellula.CUT is evident in the sheet metal Remnant Management :

while Libellula.CUT provides the amount of sheet metal scrap resulting from each individual machining, mod.STORAGE stores each data in real time allowing the user to have full knowledge of warehouse situation. Productivity is driven to the peak with simple and distinctive results.

The controlling process on which the mod.STORAGE is based in integration with the ERP for supplementing the supervision of all company resources, thus being immediate and always detectable.

Maximum synchronization

- Sheet management synchronized with CAM
- Integration with ERP production management

Maximum performance and control

- Material location control
- Supervision of movements affecting each order
- Management of each kind of scrap
- Reporting inventory breakdown and minimum stock management

e. mod.MANAGER



Thanks to the connection with the production department, mod. Manager works in close connection with the workshop, which is fully integrated with the technical department of the company.

The system allows to manage and monitor in real time the workload set for each single machine, routing dynamically the various processes, and to manage in a flexible and intuitive way each machine.

Management of processing queues for each machine: extreme optimization

Among the main features of the mod.MANAGER there is its ability to manage all the load flows which make reference to the processing queues in the workshop.

The software is designed to optimize the flow of production of every single machine tool, maximizing results and optimizing the cost management.

Technical office and Mod.MANAGER: a successful integration

In integration between Manager and Libellula.Visio also allows the technical office to constantly monitor the productive paths; by virtue of that synergy it is possible to automatically retrieve data on individual machines and transferring real-time data to the operator.

Through the integrated system generated by mod.MANAGER, the software is able to suggest productive and alternative routes available.

Thus, the technical office can evaluate whether to feed single workshop or a single machine, or select all work centers that are compatible with the production of the same detail and only at the moment of execution, select the machine from among those available.

Mod.MANAGER was created to streamline procedures for the implementation in the production.

Among its features are found:

- Change at any moment and in real time the processing queue
- Organizing the sorting of the queues between the available work centers
- View in real time the work in progress and those in the queue
- Manage the launch of production of multiple tasks on multiple compatible machines
- Filter and organize the successive processing
- Balance the resources due to the overall vision of the machines available for a given job
- Functionality and automation integrated to the management service planned for your company: that is mod.MANAGER, Libellula.

f. Libellula.VISIO



Libellula.VISIO

Automated planning at the highest levels

Integration, control, automation: Libellula.Visio is the suite's Libellula Univers software designed for the planning of all sheet metal working process that focuses, in an intuitive graphical interface, access to all the essential details of the procedures that take place in the company: from the validation of the production to the management of the stock up to the Numerical Control of loading and unloading, order status and deadlines.

With Libellula.VISIO it is possible to obtain the total planning processes thanks to a system perfectly integrated with the mod.MANAGER, which sends to the software

the queue of programming to be performed allowing the operator to leave the execution order unchanged, or to change the output priorities.

Through the graphical interface the operator can obtain all the information about the nesting process:

- Nesting graphic and the required time for its completion;
- The drawings of each particular nesting or icon;
- Information such as the weight, quantity, order number and customer with respect to each particular program;

Software allows the user to generate stickers for individual product and the material used for its realization.

Production Validation: maximum automation, minimum intervention

In the context of time optimization, Libellula.VISIO arises as great supervisor also in the time of production and validation. At the end of the cycle, the operator must do no more than provide the system with information about the presence or absence of defective parts and data, concerning the quality of the products realized: in the first case it will be Libellula.Visio to manage automatically the implementation of new icons, and in the second, the software will store the data that are going to implement the historical indispensable to ensure the improvement of the quality of production.

Warehouse management: real-time monitoring

The sheet metal present in the warehouse and necessary to the execution of the nesting processes is monitored by Libellula.Visio that, by virtue of its integrated system, accesses to the warehouse and moves the sheet in real time, recording immediately and constantly this procedure.

In this way it is always possible to have the precise calculation of the actual stocks of metal sheets available, as well as the quantity of scrap usable for subsequent working.

Numerical Control: the essence of automation

The software may automatically interface to the Numerical Control without user interaction, and detect in autonomy which is the program in execution and the work

schedules as well as the specific conditions of each machine. Once detected, the data are sent to the central system.

g. Libellula.STOCKER



Libellula.**STOCKER**

Warehouse management in “real time”

Manage the warehouse sheets in a completely automated manner and in real time thanks to a channel that communicates with the rest of the management system: this is Libellula.STOCKER, one of the software of the Libellula Universe suite.

Among the tasks that a user can manage through the Libellula.STOCKER system there are:

- Automatic handling of sheets;
- Programming of towers and stock movements;
- Starting cuts at night;
- Controlling several machines simultaneously and provide update material stocks.

Warehouse management: automated handling

Libellula.STOCKER represents the direct connection between the job queue and the warehouse, ensuring automated supply of sheets that are loaded and unloaded on the fleet. The database, which constitutes the true core of the system as it contains the full plates locations within the warehouse, enables Libellula.STOCKER to promptly find the site where the materials indispensable to start processing are located and send them to the cutting machines. This procedure can be finalised without any garrison at the machine.

Shelf towers and fully programmable movements

Each operator can manually invoke the shelves on the different configurable towers. In addition, to intuitively select the necessary shelves, the operator can change their

location and update, in a few clicks, the new position of the warehouse within the database, to have maximum control of materials and stocks.

Integration with Storage and Technical Office

Like any Libellula software, mod.STOCKER also integrates and interacts with the operating systems in other areas, making an updated service in real time.

Each time a process has been completed or a batch of sheets has been taken over by Libellula.VISIO to be sent to the cutting stations, STOCKER will automatically update the situation of the centralized inventory, which in turn will share the data with Libellula's mod.STORAGE.

Thanks to this continuous flow of information, the workshop and the technical department are always connected and can provide optimal, efficient and realistic planning.

h. Libellula.UNFOLD



Libellula.**UNFOLD**

The transfer of 3D models from any CAD software within Libellula Univers carries the signature of Libellula.UNFOLD. Users, more or less skilled, can produce a plan development of the 3D object sending it to the CAM software to schedule the nesting. The use of Libellula.UNFOLD is simple and intuitive, even for people who are not accustomed to the plan development of a 3D object.

The operator has a partner in Libellula.UNFOLD: from importing the CAD file to the plan unfolding, the system allows you to open it as a single piece, already setting the cut to be taken during the nesting process. The software is also able to run the unfolding of a 3D object that represents an assembly and then considers composition of each part.

Reprocessing at the highest levels

Design and reprocess models imported from 3D CAD to plan development with Libellula.UNFOLD, turned into a simple operation. The ease of implementation corresponds to excellent results: each model undergoing Libellula.UNFOLD is a concentration of precision, quality and power. The work environment allows you to carry out the unfolding plan of the 3D object, whose geometry can be exported to CAM software that describe the cuts, folds, sealing and marking.

Working on Models with Zero Training

Using Libellula.UNFOLD means having the possibility to interfere on the models in any manner: with just a few clicks, the user will modify the curvature of the model, will increase or decrease the thickness, and will be able to insert cuts and details. The changes are always processed by LibellulaUNFOLD that complies with the product to meet the qualitative standards of the company. No training is needed to convert a file from CAD to plan development because it is Libellula.UNFOLD to produce calculations, parameters and conversions.

Minimum execution time

The multiple functions of the Libellula.UNFOLD do not require long and complicated training: it is a Zero Product Training.

The optimization of the times is also in steps: UNFOLD is compatible with the CAD module, in addition to being able to communicate the unfolding of the 3D object to plan for Libellula.CUT cutting software.

Development methods: a range of possibilities

The operator has multiple preconfigured methodologies that can be used to accomplish his project:

- Theoretical method (neutral axis)
- Experience tables method (K-factor)
- Geometrical method
- Conical position method

Powerful editing, maximum flexibility

The transfer of the CAD model unfolded plan of Libellula.UNFOLD allows you to add multiple required automatic operations, including:

- Ability to edit and add notches, drains, splits
- Editing for bend radius, to collect material and the size of the hollow of the used matrix
- Editing bending angle. Ability to assign a set of different parameters (radius, withdrawal, hollow, etc.) for each different folding line.

3.3 RESONATOR AND COOLER UNIT

IPG Photonics is one of the world's leading manufacturers of high fiber lasers for thermal cutting and marking of materials. IPG laser unite is the industry patented fiber optic laser. 100 μ m diameter fiber cable, chiller cooling unit and parametric cutting values.



Standard Features

The YLS series fiber laser, with output powers **up to 100 kW**, was developed as a complete system for industrial applications. They have garnered wide acceptance in the very demanding automotive, aerospace and oil and gas industries. All YLS systems are housed in a NEMA 12, air-conditioned and sealed cabinets adding to the robustness of the unit. These systems are controlled by either digital I/O, analog control or IPG's own LaserNet software with the additional option to add either DeviceNet, Profibus or Ethernet interfaces. Developed as a complete system, this design features the widest range of fiber diameters, as well as the option to terminate to up to 6 ports from one power source.

YLS low-order-mode Ytterbium fiber lasers range up to hundreds of kW output power, operating in CW/modulated modes up to 5 kHz with wall-plug efficiencies >40%. The dynamic range is from 10% to full power with no change in beam divergence or beam profile, allowing a single laser to be used for both high and low-power applications such as welding, drilling and cutting, a previously unheard of capability. The high brightness allows the use of long focal length processing lenses for vastly improved depth of field and minimal damage to optical components. The units can be supplied with fiber lengths up to 100 meters, different fiber diameters and variety of multi-port beam switches, beam couplers, termination optics and scanners.

IPG Multi Mode Fiber Laser YLS (Resonator)

- ▶▶ Perfectly Beam Quality for best cutting
- ▶▶ Optimum focal diameter for high accuracy laser cutting
- ▶▶ Maintenance free technology, 100.000 hours diode life time

- ▶▶ Optical consumable cost free, affected by working conditions, continuously perfect beam quality with laser beam is transmitted by fiber core
- ▶▶ Lowest running cost
- ▶▶ Cutting possibilities Cooper, titanium, brass
- ▶▶ High Efficiency, low consumptions of electricity fiber laser technology, 5-6 times lower running cost.
- ▶▶ Energy efficiency with Low capacity chiller necessary
- ▶▶ High speed fiber laser cutting, 4 times speedy compare other laser cutting applications
- ▶▶ Free Laser Resanator cost
- ▶▶ Perfectly cutting countour with high density laser beam
- ▶▶ High Accurate geometric performance
- ▶▶ Not needed calibrations or adjusting optical component, advantage of time and cost



IPG Laser Chiller Unit (Cooler Unit)

The Modern Industrial Chiller is basically a cooling system that removes heat from one element (water/glycol/air) and deposits into another (ambient air or water). This chilling technology is used by various industries to cool down the process machinery and the process using a freon chiller to cool a medium like air or water.



- Reliable efficiency for IPG laser source cutting head and lenses.
- Digital micro processing controlled industrial chiller.

Technical Data

General data:

Type: LC 71.01-A.4.5/6

Refrigerant circuit:

Type of refrigerant: R407C

Refrigerant filling: kg 2,0

Maximum pressure: bar 28

Design point:

Cooling capacity: kW 5,5

Air inlet temperature: °C + 33

Operating limits:

Max. ambient temperature: °C + 40

Min. ambient temperature: °C + 5

Max. storage temperature: °C + 64

Min. storage temperature: °C - 40 (without water filling)

Electrical data:

Power consumption @ 33°C: kW 6,7

Power consumption @ 40°C: kW 7,1

Max. power consumption: kW 7,7

Connecting voltage: 400 V / 3 Ph / PE

Voltage tolerance: % +/- 10

Frequency: Hz 50

Control voltage: V DC 24

Laser cooling circuit:

Cooling capacity: kW 5,0

Cooling water outlet temperature: °C + 21

Cooling water inlet temperature: °C + 26

Stability of cooling water temperature: °C +/- 1,0

Water content: Litre 140

Water flow: l/min 40

Free available water pressure: bar 2,7

Optic cooling circuit:

Cooling capacity: kW 0,5

Cooling water outlet temperature: °C + 38

Cooling water inlet temperature:	°C	+ 38,5
Stability of cooling water temperature:	°C	+/- 0,5
Water flow:	l/min	2
Free available water pressure:	bar	2,7

Dimension and weight water module:

Footprint:

Depth:	mm	815
Width:	mm	630
High:	mm	1362

Additional depth electrical cabinet:

Depth:	mm	210
Width:	mm	500

Weight:

Without water filling:	kg	330
With water filling:	kg	470



3.4 LASER CUTTING HEAD

Dynamic laser cutting machines require lightweight, intelligent cutting heads. Even installed in the smallest possible space, the ProCutter offers a fully-integrated sensor system that monitors the cutting process and provides the user with relevant information. The head ensures that each component can be reproducibly manufactured at a high standard of quality.

The ProCutter offers a complete solution for the laser-based fusion cutting of thin and medium material thicknesses in the wavelength range around 1 μm . In flame cutting, greater material thicknesses can also be processed while maintaining high standards of quality. The potential of the cutting head is optimally converted into productivity, especially in the case of flatbed and pipe cutting machines, where innovative technologies are combined with proven concepts, providing the best possible performance, range of flexibility and degree of reliability.

The ProCutter APP is used to visualize the state of the laser cutting head and the query of error messages.



Performance confirmed in field tests

The new generation of cutting heads performed very well when used in flat bed and pipe cutting machines for material thicknesses in the 1 µm wavelength range. In flame cutting, the ProCutter has been shown to machine greater material thicknesses without a problem and without compromising quality. It has been carried out extensive field tests with the ProCutter under industrial conditions and the results show that the combination of tried and proven concepts, innovative technologies and an optimized design offer precisely the performance and reliability. When it comes to the production and assembly of the new cutting heads, Precitec sees high-quality optics and consistent quality control as paramount.

Efficient, controlled cutting operation

The product design of the ProCutter range permits material machining with laser power of up to 6 kW in the near-infrared range, with small installation space and low weight at the same time. The housings of the ProCutter are set apart by a lightweight, slender design and are optimized for high external axis accelerations of up to 4,5 g. The motorized focal position adjustment allows a high degree of automation, through unattended, automatic retooling and piercing, for example. At the same time, the integrated distance sensors ensure accurate and drift-free distance measurements even at high accelerations and at all operating temperatures. The robust and dust-tight housing promotes a long service life and permits short maintenance cycles through the integrated safety glass cartridge.

Modern sensor systems and safety equipment

To make the ProCutter safe and easy to use and to detect malfunctions before a possible loss event, the machining head is provided with comprehensive protection and control elements. The beam path, for example, is protected completely dust and pressure tight by protective windows. Temperature and diffused light sensors check

the state of the entire cutting head, as well as the condition of the individual components. In the cutting gas nozzle area, and also in the head of each ProCutter, pressure is automatically monitored. This allows possible leaks, such as after a safety glass change, to be registered and resolved without delay. All relevant operating states, including pressure, temperature, drive and contamination, are shown by the ProCutter via a highly-visible LED display on the outside of the housing.

Decentralized control via Bluetooth

Via an integrated Bluetooth interface, the current system state of the Precitec ProCutter can be controlled decentrally using a smartphone or tablet. At the same time, the sensor information can be individually visualized and the state of all monitored components in the cutting head is shown. The displays include the temperature of the focal or collimator lens, the cutting gas and purge air pressures, as well as information for the lens, the current configuration or the target and actual focal positions. Depending on user rights, either the sensor values can be read off or the threshold values can be set. This way, users are able to detect early possible fault sources remotely in good time and take the appropriate measures.



3.5 F4-1530 MACHINE STANDARD SPECIFICATIONS

MACHINE MODEL	F4-1530
Laser Power	4 Kw
Type	Fly Optic
Maximum Sheet Size	1530 mm x 3030 mm
Maximum Cutting Thickness	Mild Steel 20 mm
Maximum Cutting Thickness	Stainless steel 12 mm
Maximum Cutting Thickness	Aluminium 10 mm
Maximum Loading Capacity	1000 Kg
Axes	
X Axes	3040 mm
Y Axes	1535 mm
Z Axes	120 mm
Average Electricity Consumption kw/h	35 kw/h
Acceleration	X, Y, Z : 2.25 G
Axes Speed	X, Y : 120 meter / min.
Axes	X and U Parallel, Y and Z 4 axes
Positioning Accuracy	X, U, Y and Z +/- 0.02 mm
Repability	+/- 0.01 mm for 4 axes
Cutting Head	5'' and 7.5'' Focus length
Z Axes Height Control	Precitec Height Control
Lighting	4 pieces Light
Cutting Gas Type	Compressed Air,Oxygen (O2), Nitrogen (N2)
Cutting Gas Pressure	Oxygen 0,4 – 13 bar & Air 0,4 - 25 bar Nitrogen 0,4 - 25 bar
Machine Weight	Approx. 15000 Kg (Chiller, Cutting table Filter dust collector included)

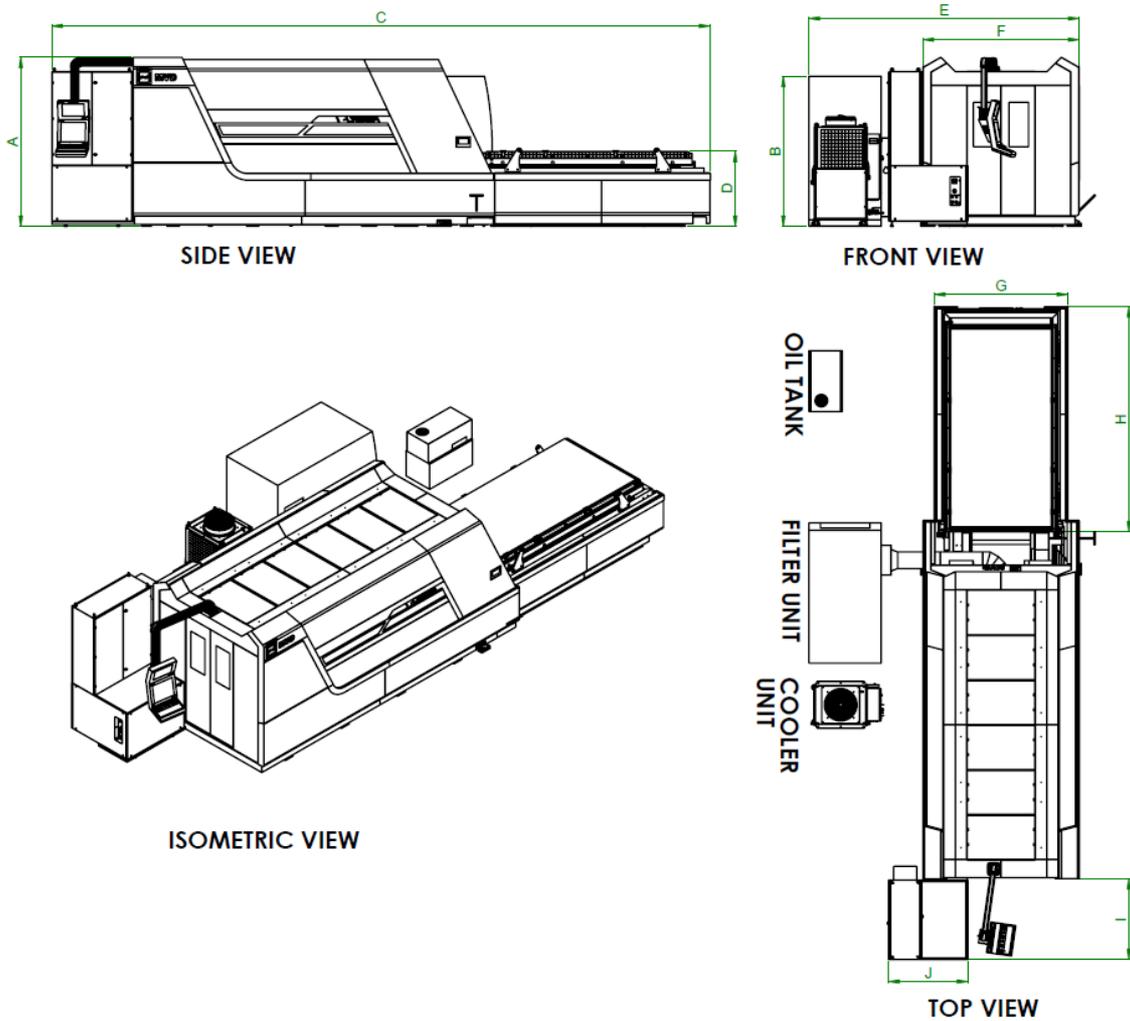
3.6 MAIN COMPONENTS

To Guarantee the best performance and quality machine is equipped with the best components available on the market:

- | | |
|------------------------|--------------------|
| ○ Gearbox | WITTENSTEIN |
| ○ Rack an Pinion | WITTENSTEIN |
| ○ Proportional Valve | LANNY or HOERBIGER |
| ○ CNC, MOTOR & DRIVER | ESAUTOMOTION |
| ○ Resonator | IPG or NLIGHT |
| ○ Cutting head | PRECITEC |
| ○ LUBRICATION | ILC |
| ○ RAILS & BLOCKS | INA |
| ○ CABLE CARRIER CANALS | IGUS |



3.7 MACHINE DIMENSIONS & LAYOUT PLAN



MACHINE	A	B	C	D	E	F	G	H	I	J
F... 1530	2600	2300	10000	1150	4150	2370	2030	3450	1240	1200
F... 2040	2600	2300	12475	1150	5020	2870	2530	4670	1240	1200
F... 2060	2600	2300	16725	1150	5020	2870	2530	6920	1240	1200

**** All measurements are given in mm.**

Note: Measurements are based on the design and also components of the machine, so that can change due to subject of design and components of the machine!

3.8 MACHINE OPTIONAL FEATURES

3.8.1 Libellula Wizard

The software for programming cutting machines, structured to become the best CAD/CAM application for the programming of the Laser cutting machine.

The Libellula.WIZARD can be considered as the input configuration of your environment wizard. The software for the programming of the laser cutting machine allows you to import DXF/DWG files and arrange them in order on individual sheet to minimize scrap. The software helps the user to optimize the installation times: the operator has the task of indicating the form of the attack and its placement only for the first detailed sheet, the others will be performed in an automatic manner.

Libellula wizard is placed as a shortcut into the Esa interface. The operator has also the task of pointing out the parameters during the cutting path, as well as all the basic parameters for the creation of the product.

Technical specifications:

- Touch screen interface for the management of touch monitor.
- Zero Training philosophy which provides immediate and intuitive learning
- One Click philosophy that minimizes the time spent in sheet part creation. The software will suggest the machine programming procedure.
- Simulation in realistic environment is essential to ensure that the generated production process is perfectly correct.
- Library of parametric figures that has a large number of models commonly used on the sheet metal cutting machines for maximum acceleration of the production cycle.

3.8.2 Libellula OPTIA

Linked to the cutting software Libellula.WIZARD, it allows an extraordinary simplification of metal sheet scraps recovery process, optimising the time as well as working profit. OPTIA is the perfect solution to reduce scraps created from metal sheet cutting in a simple and intuitive way; this software in fact can be used autonomously by the cutting machine operator without any interventions from technical department.

OPTIA offers two operative ways for the nesting elaboration:

- Creation of an automatic nesting on the segregated metal sheet: photo-realistic rendering
- Use of manual nesting on real photographic representation of metal sheet

Once the nesting is finished, the system will create the NC program which could be load to interface and immediately executed

3.8.3 15 bar Dry Air System

With this option, it is possible to cut with dry air up to 13 bar. Many types of materials and thicknesses are cut using dry air instead of nitrogen or oxygen, which is the preferred cutting gas.

3.8.4 40 bar Dry Air System

With this system it is possible to cut with maximum 25 bar dry air. Cutting head allows max 25 bar air inside for cutting gas. Due to the high cutting pressure, cutting thicknesses are also increased compared to the 15 bar system.

3.8.5 Loading System with Using Jib Crane

This system consists of a vacuum system integrated on the jib crane. Thanks to a maximum angle of rotation of 270 degrees, it provides easy loading positions. Thanks to the integrated vacuum system, the sheets are removed and placed on the table easily.

3.8.6 Conveyor System

This system provides removal of scrap or workpieces from the machine by means of a conveyor that is falling down from the sheet metal. The system is controlled by the CNC interface. The conveyor can be moved forward and backward in both directions, so that parts can be taken from both sides of the machine, either by the back of the machine or by the operator side.

3.8.7 UPS (Uninterrupted Power Supply)

Uninterruptible power supplies are a redundant power source, as well as continuously regulated voltage, frequency and stable energy for your critical loads, which are continuously online, free of adverse effects of mains power. The momentary power interruption stops the laser cutting stand momentarily and the cutting remains on the cutting edge. Thanks to the battery packs used with UPS, up to 15 minutes more energy can be supplied. During this time the cutting can be stopped in a controlled manner and the machine can be shut down controlled.

Electrical failures can damage all computer and computer based software as well as damage to the computer and software installed in the laser PC.

In addition, if the energy comes back again, especially the first energy is not stable. This can damage the modules in the power unit and even disable the modules inside the power supply where the imbalance is maximum.

Laser power unit manufacturers also insist on the use of UPS.

3.9.8 Automatic Fume Extraction Filter System

This system automatically sucks the smoke coming out during cutting and passes it through the filter strainer to the air again.

The system automatically switches on when it is cut and stops automatically after a while after cutting is finished. This feature prevents the smoke extraction filter from operating at unneeded times.

Manually control over the machine is also provided.

3.9.9 Camera and Monitoring System

This system has been developed to allow the operator to instantly control the cutting and sheet loading/unloading area.

Thanks to this system, the operator will not look directly at the laser beam.

Before changing the table, operator will be able to check the sheet loading/unloading section from the screen and also instantly see if second pallet sheeted or not.

Thanks to the camera system, both the cutting and the rear panel will be recorded continuously. Thanks to these records, the fault detection process will be even easier.

3.9.10 Automatic Cutting System

This system is an easy way to make a serial cutting without stopping the machine.

Thanks to the automatic sheet cutting system, a cutting list of the programs to be prepared only once will be created and the machine will automatically complete these cuts.

This system recovers time lost due to machine stoppage.

Calibration and sheet origin point detection will be done automatically.

The pallet change will occur automatically between these cuts too.

Operator will only follow the cutting and send a signal to the CNC after completing loading of the new sheet on the back side pallet which will be cut after current cutting has finished.

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