

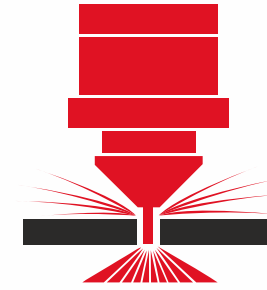


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CNC FIBERLASER



DENER MAKİNA, was established in 1974, in Kayseri / TURKEY. It has been manufacturing sheet metal working machines like Fiber Laser Cutting, Servo Electric Press Brake, Ball Screw Press Brake, Hydraulic Press Brakes, Hybrid Press Brake, NC - CNC Hydraulic Shears and Plasma Cutting machines.

Dener Makina's production facilities are located in the industrial and Freezone Area in Kayseri. Since it's beginning, Dener has the philosophy of production with the best quality and latest technology. It crowns this with the ISO 9001 Quality Management System and following European Safety Standards. Dener Makina is a leading Turkish Brand in Sheet Metal Working Machinery. It has qualified workmanship and a complete machinery manufacturing facility in it's 30.000 m2 closed area. Today, Dener machines are working all around the world.



04	DESIGN
08	CNC CONTROLLER & SOFTWARE
	- FANUC CNC CONTROLLERS
	- METALIX CAD/CAM SOFTWARE
10	LASER CUTTING HEAD
12	TECHNOLOGIES
16	EQUIPMENTS
	- IPG Laser Unit
	- Chiller
	- Automatic Lubrication
	- Brush & Table
	- Cable Chains
	- Cooling
	- New Style Design
	- Body Structure
	- 6 Vacuum Cells
	- Pallet Loading
	- Slag Trolley
22	TECHNICAL SPECIFICATIONS





## DESIGN ADVANTAGES

### OUR NEW APPROACH TO LASER CUTTING MACHINES

Our new design model is far better than the conventional design. The Y bridge hangs from the X bridge. This implementation allows the laser head to be more dynamic with much higher acceleration. In this way we eliminated the requirement of double motors to drive the Y bridge. A big X axis motor is placed in the middle of Y bridge thus allowing X axis motion to be driven by a single servo motor.

### ADVANTAGE OF SMALL PLACEMENT AREA

The new design has a considerable narrower width. The palette changer unit is placed near the machine and the laser unit is placed inside the machine, thus allowing the machine to fit into a far smaller area in comparison to conventional machines.

### SHORT INSTALLATION DURATION AND EASILY TRANSPORTABLE IN A SINGLE CONTAINER

Installation and implementation duration is fairly short since the electric board, laser unit, pneumatic board and all connections are implemented on the main unit. This new approach has considerably decreased the length of the machine and allows easy transportation of all machine parts including palette in a single rigid container

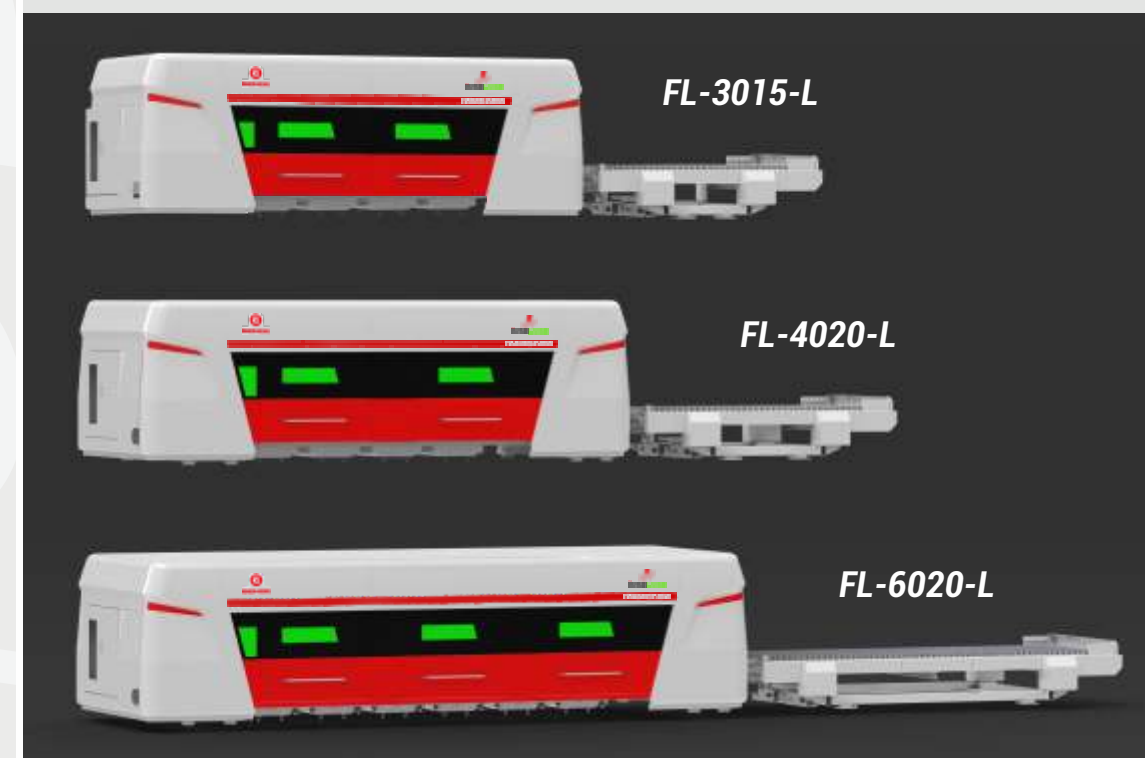
### SERVICE AND MAINTENANCE ADVANTAGE

Wide doors on both sides of the machine allow easy access to all parts of the machine. Thus, service and maintenance work can be easily performed. Automatic oiling is performed in rack and linear rail system. The automatic oiling system eliminates the need for manual oiling procedure which was supposed to be performed by the operator.

### HIGHER EFFICIENCY AND LOWER ENERGY CONSUMPTION

Thanks to the design, the X axis motion is performed with a single servo motor which reduces frictional losses and the mass of the Y axis is fairly reduced. The new machine is 35% more efficient than its conventional counterpart

## The Laser Solution That Matters For You.





## ADVANTAGES OF FIBER LASER

- Fiber laser requires less maintenance
- Fiber laser can precisely cut various metal sheets including AL(Aluminium), CU(Copper), Bronze. The speed of cutting is higher for thin metal sheets.
- The beam intensity is high.
- Fiber laser requires less cooling operation.
- Laser beam is directed to the laser head from the resonator via fiber optic cable.
- Fiber laser energy efficiency is 40%. CO2 energy efficiency is 10%.
- Fiber laser cuts faster in comparison to CO2 laser of same power.
- Less gas consumption.
- Lower cycle time.
- 100,000 hours of diode life.
- No maintenance cost for laser resonator
- Cutting with compressed air is possible.



Better Environment  
Better Tomorrow

**LEGEND FL-SERIES**

1KW - 2KW - 3KW - 4KW - 5KW - 6KW - 8KW



## FANUC CNC CONTROLLER



Fanuc 31i-LB CNC Controller series is utilized in our Dener FL Fiber laser cutting machines. Fast communication due to higher number of data lines, Fanuc is much faster than the rival CNC units. The number of parts that can be processed is much higher with Fanuc.

The CNC control unit has a maximum of 24 axes that can be integrated into the system to control replacement automations, pipe cutting mechanism etc. Other optional functions can be accessed from a single CNC controller.



### Manual Handwheel

Manual handwheel makes the work easier for the operator.

## ADVANTAGES

### Advanced Hardware

Sophisticated hardware system is thin, fast and highly reliable combined with ultra-fast processor. Fiber cables are used in the CNC internal data bus system for high speed data transfer.

### High Speed, High Sensitivity and Advanced Processing Technologies

High speed and high precision machining technology as well as servo drives. Convenient axis positioning and precision.

### Advanced Remote Access and Control System

Easy access to CNC control and machine via internet from personal computers.

### High Security and Maintenance Ease

Reliable hardware system ensures stable operation even in harsh factory environment.

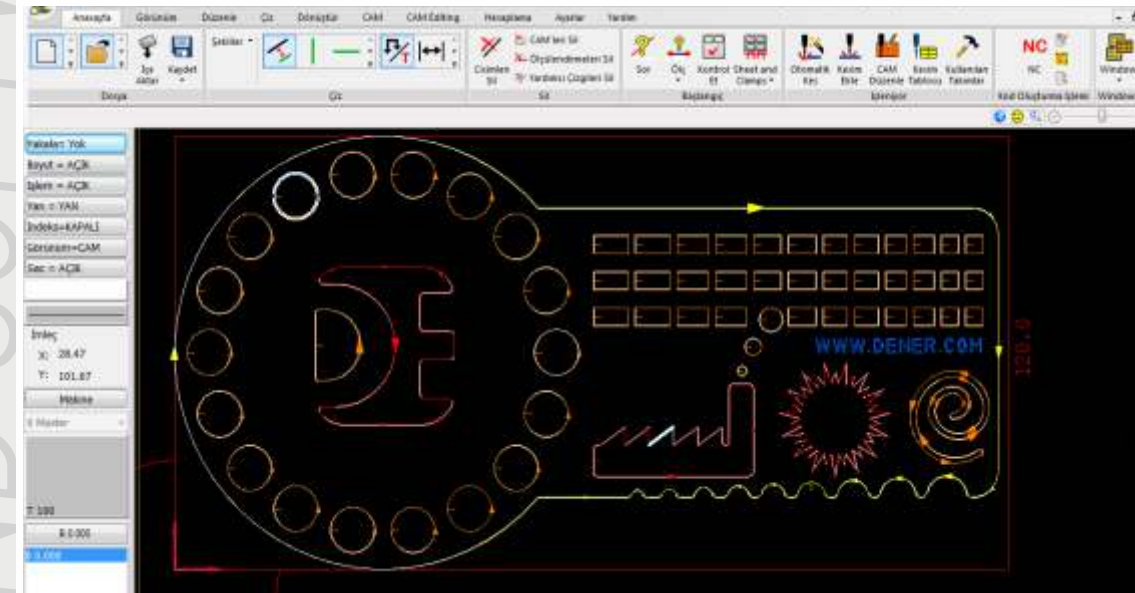
### Windows Based Operating System

An advanced CNC and PC combination thanks to the Fanuc panel high-speed interface

### Cutting with Compressed Air

Dener FL Series Laser machines cuts with oxygen and nitrogen along with air. Due to different possible cutting options. The gas system has pressure sensors and sump holders for all gas inputs. Cutting thin sheets with compressed air provides a cost advantage compared to cutting with oxygen and nitrogen, it also provides speed advantage compared to oxygen cutting. Air drying system to dry the pressurized air is included as a standard machine part, it is necessary for cutting with air.

## SOFTWARE METALIX CAD/CAM



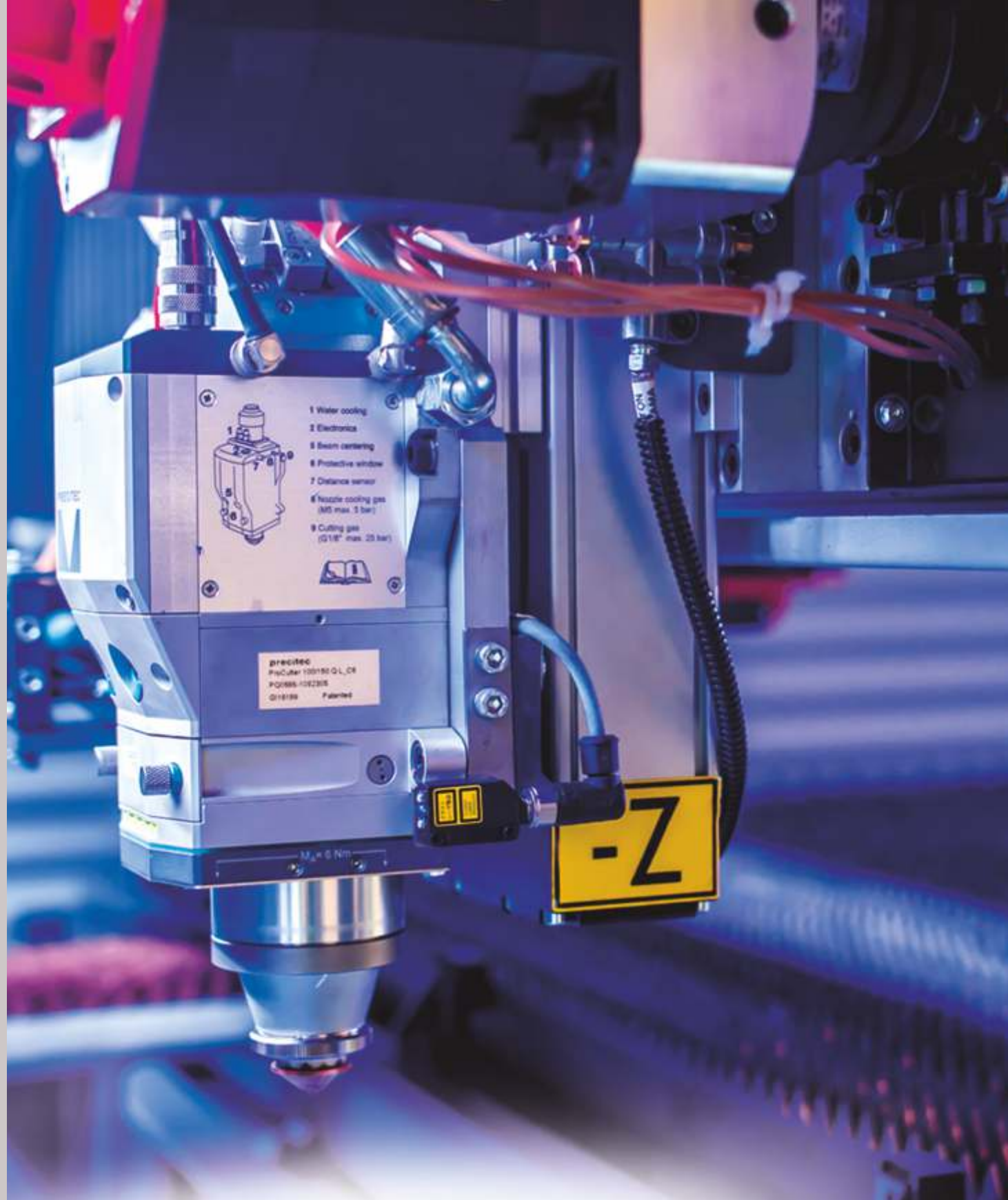
Combined advanced technology with design, automatic and manual processing, automatic positioning, NC code generation, graphic simulation and machine connection (DNC) features, Metalix "cncKad" for sheet metal industry provides precise solutions.

## Dener & Metalix Joint Work

- Laser input-output management, fast piercing (blasting), laser motion control, edge binding, marking, film burning, fly cutting, cool cutting and many different functions have been implemented.
- With the AutoNest Pro feature, you get the best possible placement of sheet metal in a few seconds (optional)
- Flexible and highly controlled operation is possible with the placement (AutoNest), cutting (Cnckad) and simulation (NC) of parts which can work independently in 3 different sections.
- In addition to the advanced automatic layout feature, you can copy, move, rotate, duplicate, align etc. You can also effectively use powerful manual layout commands that keep you one step forward.
- You can automatically place your parts of differing dimensions and achieve a minimum layout for a high placement efficiency.
- With its powerful drawing infrastructure, you can draw 2D-dimensional drawings in short, practical ways.
- Metalix has an effective import feature for DXF, SWG, IGES, CADL, GEO and other standard file formats. It also includes support for mm / inc based files and layers.
- The CAD link module makes it possible to transfer parts via single-click to 3D CAD, CNCKAD. (optional)
- It allows you to export your parts and layouts, or to copy layouts to another product tree, and to stay one step ahead with the fast transition feature between layouts.
- You can see the exact cut times in the placement report as well as the size and weight information of the used sheet and settled parts.
- With comprehensive documentation, every stage from settlement to production is supported.
- It allows you to use all the features of your machine.
- With Metalix you can get the best performance from your machine, you can easily turn the designs of your dreams into reality.





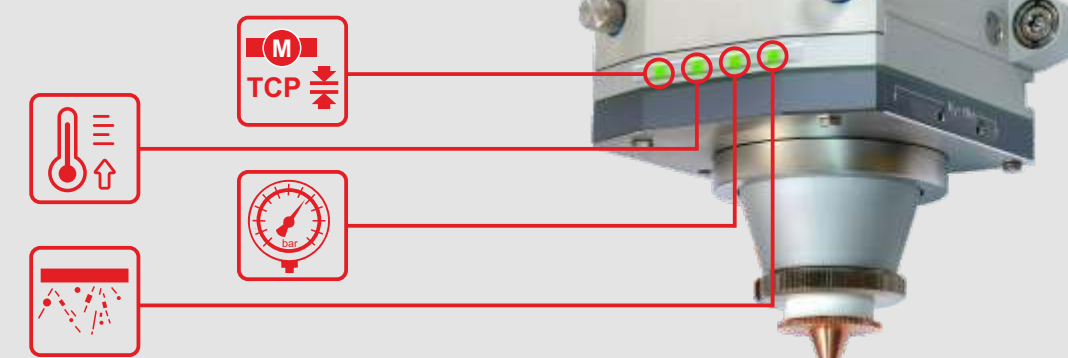


## LASER CUTTING HEAD

The Precitec cutting head is the world leader in fiber laser heads. Our dynamic laser cutting machine uses ProCutter, a lightweight and intelligent cutting head. Thanks to integrated distance sensors, it provides controlled cutting even at high speeds. The lens in the automatic cutting head is protected by the protective glass so that it is not affected by the particles formed during cutting. The robust and dust-proof body structure provides a long working life to the head.

### LED INDICATORS

Indicates the system status.  
Focus lens status, collimator lens temperature, pressure and protective glass temperature and pollution status

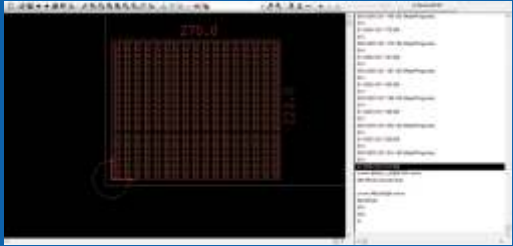
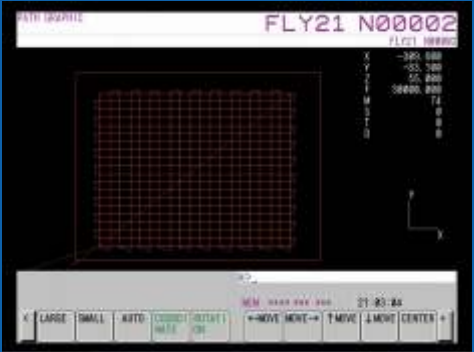


### EFFICIENT, FLEXIBLE, ECONOMIC CUTTING HEAD

- Vibration-free motion and high precision cutting quality even at high speeds.
- Lightweight and slim design for high acceleration and cutting speed.
- High quality cuts are achieved by keeping the cutting height constantly maintained by the capacitive sensor in the head.
- Thanks to the protective glass placed in the head, the focusing lenses are protected.
- Thin and thick sheets can be cut at the best quality thanks to the automatically adjusted focus distance.
- With the application installed on mobile devices, lens temperature, protective glass temperature, intracranial pressure, cutting gas pressure value and focal distance values can be monitored by wireless connection.
- Thanks to the LED status indicator, various statuses of the head can be monitored according to the colors of the LEDs.

# TECHNOLOGY

## FLYCUT



The fast and intelligent communication system between laser head and control unit enables the laser head to make very rapid moves. In Fanuc fly-cut system, laser head can cut in a particular axis without the need to lift the head. That means the laser head can cut all the holes on a single axis by opening and closing the laser at a very high speed without lifting the laser head. This reduces the production time.



## FROG JUMP

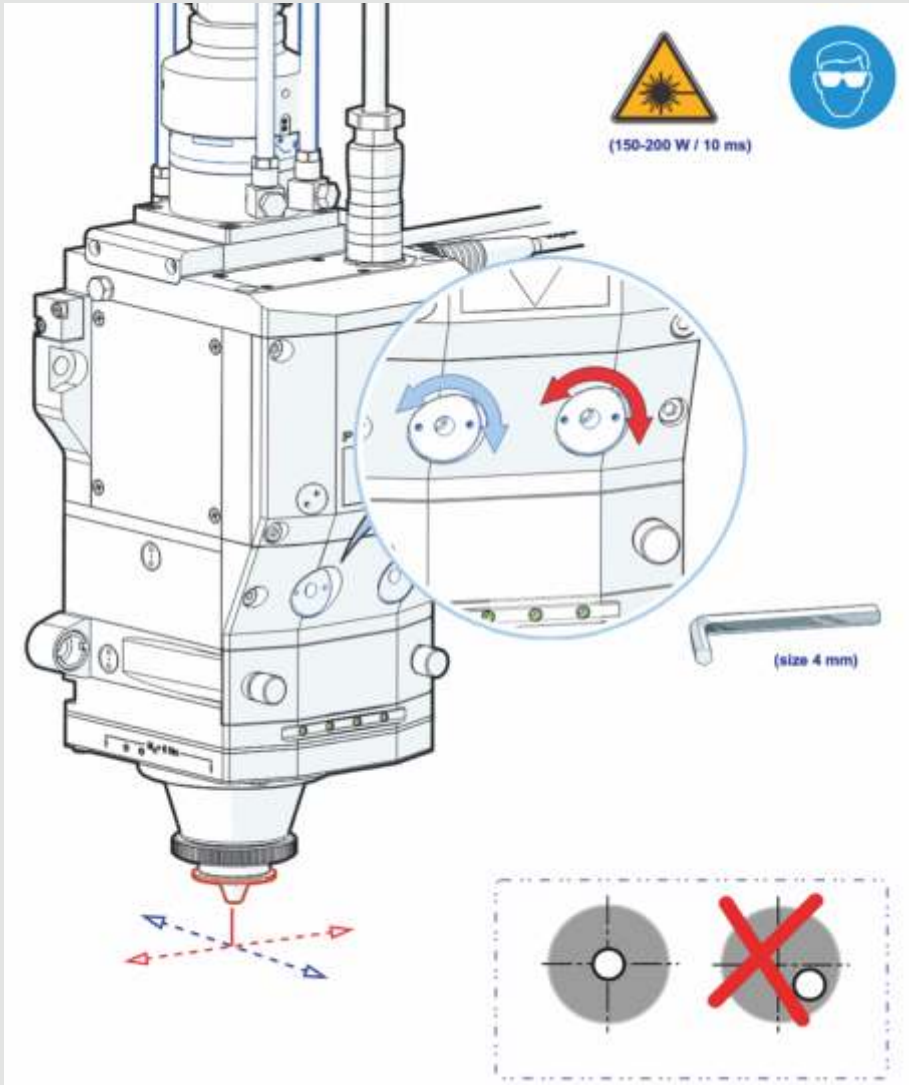
When going from one to another cutting part, the head makes the fastest move with the shortest and softest move.

## CORNER BRAKE AND DRAIN CONTROL

In our Dener FL Series machine, corner control is used to avoid corner deformation during the transition from the X axis to the Y axis in thick materials.

## RESTART FROM THE LAST POSTION

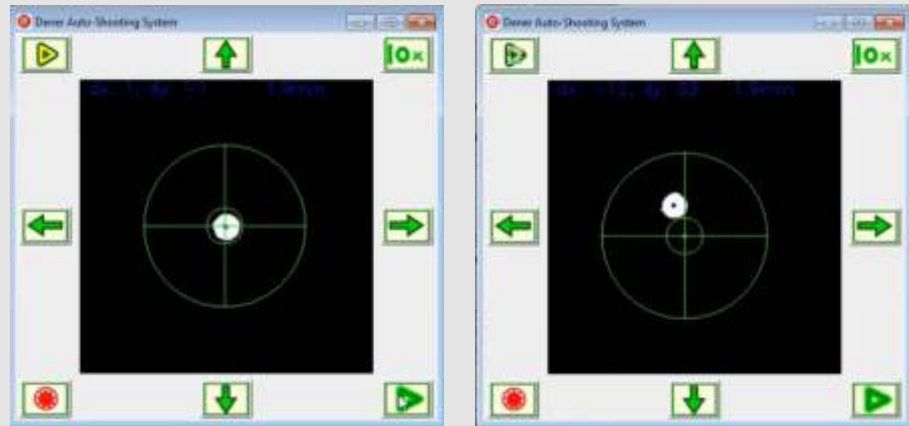
If the alarm condition is remedied after the machine is stopped or the cutting operation is paused by the operator in case of any alarm, and it is desired to continue the remaining operation, the machine can be resumed from where it was left.



## AUTOMATIC BEAM CENTERING

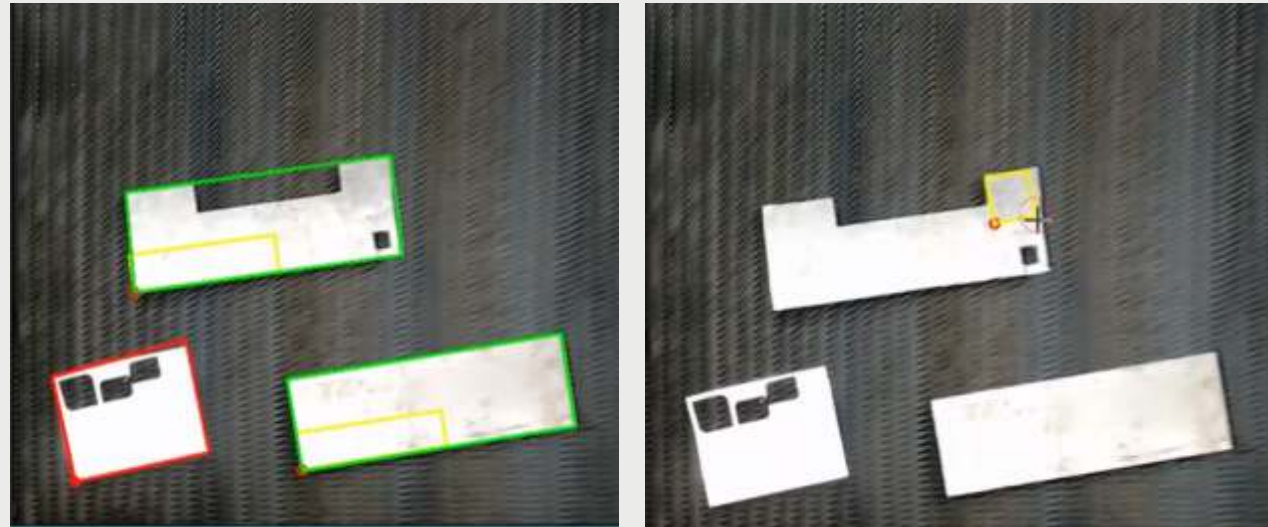
Traditional method of laser centering. The method involves the operator to paste a cello tape over the nozzle head and then press the shooting button. This results in a pattern on the cello tape which is read by the operator using a lens. The diameter of the pattern lies between 1 - 3 mm which is so small to be easily read by human eye. Thus it leads to errors and makes this job quite tedious and difficult. Sometimes it can take few hours to perform this operation.

New method involving computer vision, in the new method a camera is utilized to monitor the position of the laser beam in the real time. And laser centering is performed via motors. Thus makes the job very easy and free of human interference. The result of the new method are far more accurate. Automatic beam centering system is developed by Dener R&D department and is patented by Dener, hence is not available with any other fiber laser machine. (Optional)





## TECHNOLOGY



### CAMERA BASED AUTOMATIC SHEET MEASUREMENT SYSTEM

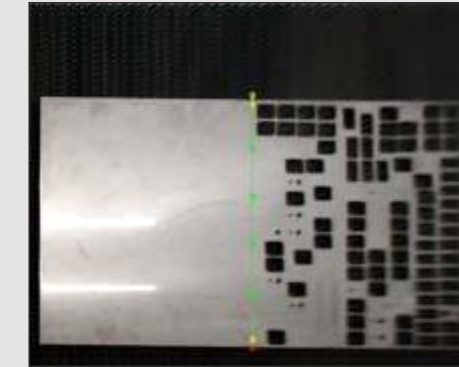
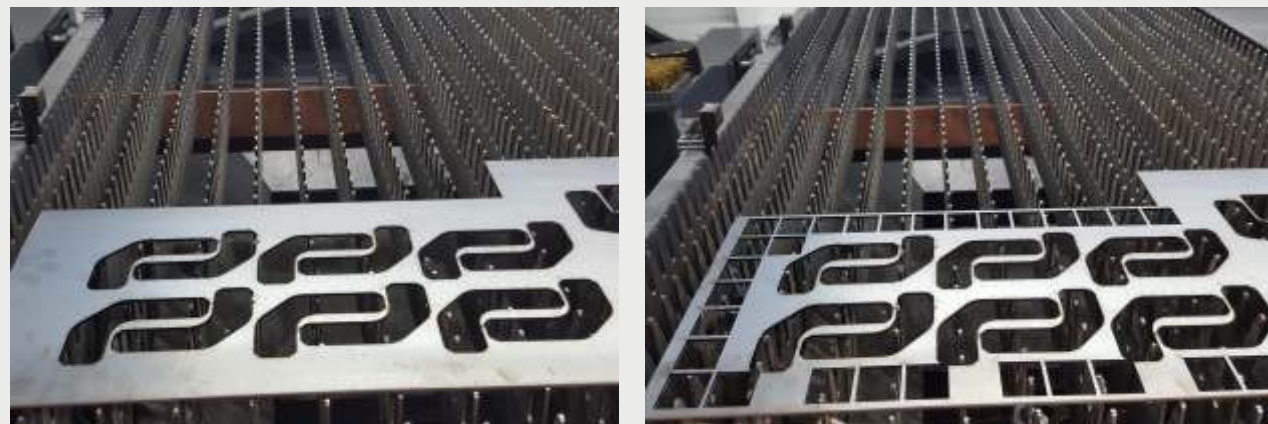
Automatic sheet measurement system is a standard system in this machine. The system automatically finds the location and orientation of the sheet, also it finds the size of the sheet so that the user can be sure if the desired cutting part will fit the sheet or not. As shown in the picture above, if the part size is smaller than the sheet, it is indicated by green color stating that the part can fit in that particular sheet. If the part is bigger than the sheet, it is indicated by red color border and cutting cannot be performed on that sheet. The yellow colored rectangle defines the size of the cutting part.

The computer vision based system can find the length and breadth of the sheet along with the starting point in few seconds. Also the shape of the sheet is not important. The sheets can be reused without the need for a proper rectangular shape, also it can be located at any part of the cutting vicinity

Also the part can be placed manually at any desired angle at any part of the sheet. This system is a unique system developed by Dener R&D department.

### REAL TIME AUTO NESTING

Auto nesting can be performed directly from the screen. Also undesired parts can be deleted. As shown below, small pieces can be nested on pre used sheets and cut directly from the operator screen.



### Waste Sheet Separation System

Separating used part from main sheet was never so easy. With Dener Camera System you can separate waste part directly from screen.

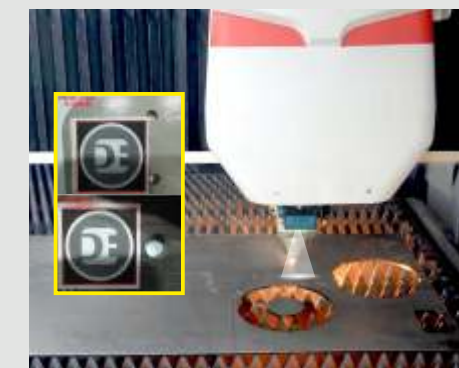


### Real Time Nozzle Status

Nozzle status is displayed on the screen. If the nozzle loses its circular shape change nozzle message is displayed on the screen.

### Remote Machine Monitoring

The machine can be accessed remotely, cutting can be monitored and problems solved. Thanks to 4 cameras available on the machine.



### Vision Sensor

The vision sensor on laser head can detect the material of metal sheet, it can monitor the cutting quality, find the starting point in minimum time and check the piercing in real time. Currently available in Turkey only.

### QR Code System

This system is used to select the parameters and cutting file automatically via the front camera on the main panel.



## EQUIPMENT



### ■ IPG LASER SOURCE

The Power range of resonator source is between 500W and 6 kW. As the power increases so does the cutting speed and capacity respectively.



### ■ IPG CHILLER

The chiller maintains optimal temperature of the cutting head required to achieve maximum productivity.



### ■ REFRIGERATED TYPE AIR DRYER

The air dryer is a standard equipment in the machine. Necessary for long and efficient working of filter and machine.



### ■ FANUC REZONATOR (Advantages)

- 1-Fanuc Serial Servo Bus (FSSB) enables direct and high-speed oscillator control (communication speed 32,25  $\mu$ s)
- 2-Edge cutting function, gap control, minute laser output control function.
- 3-Beam reflection protection function.
- 4-High quality and long life laser module.



### ■ FILTER

It provides a healthy working environment by absorbing smoke, dust and small particles formed during cutting. The vibrating dust collection filter is fully automatic. It runs automatically when cutting is started.



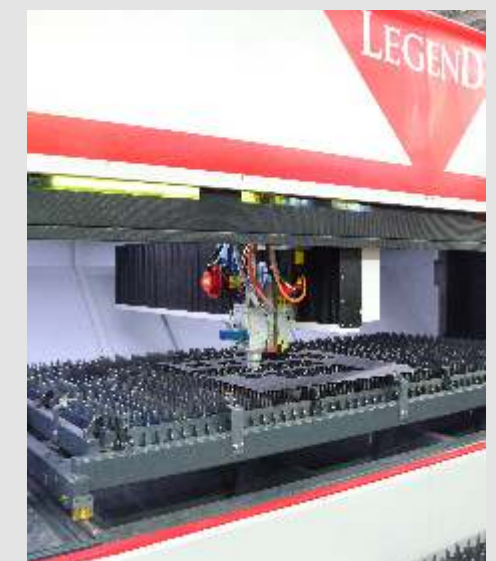
### ■ AUTOMATIC LUBRICATION

Thanks to this system, the need for lubrication is eliminated without stopping the machine at any time, the system performs automatic lubrication depending on the running time.



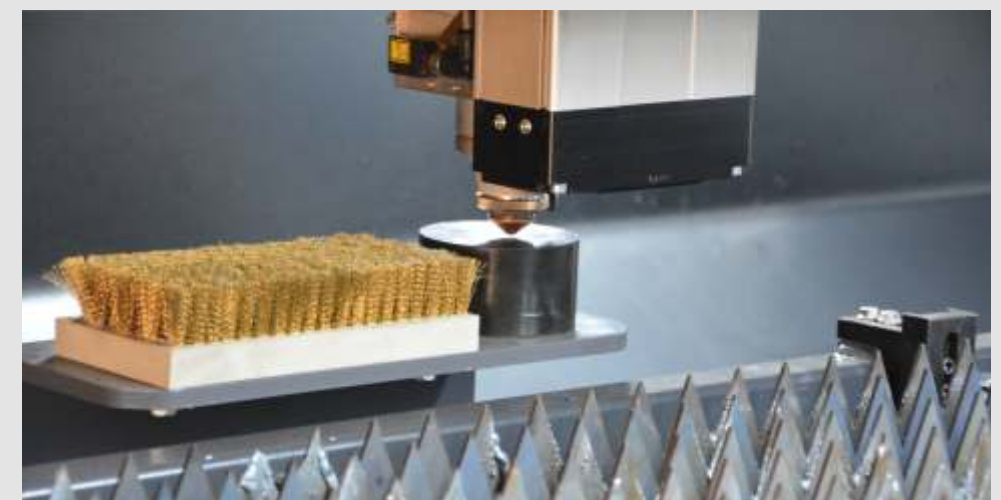
### ■ LASER SAFETY WINDOWS

The machine has latest technology guard windows. It allows the operator to monitor the cutting process safely.



### ■ EASY ACCESS SIDE DOOR

A user friendly and fast door is always helpful for emptying and loading the palette. Service and maintenance work can be easily performed.



### ■ NOZZLE CLEANING AND CALIBRATION

Automatic cleaning of sheet metal parts adhering to the nozzle during cutting is necessary for good quality and rapid cutting. Dener FL Series Fiber Lasers has a programmed automatic nozzle cleaning that is performed after a certain number of piercing (blasting).



## EQUIPMENT



### SUPERSTOCK SYSTEM

- Bridge Y is at the top of the machine.
- Low weight, high acceleration and speed capability.
- Unique high-tech motors are used, with 35% electricity saving.



### BODY STRUCTURE

After all static and dynamic analysis welded construction and welding operations, stress relieving process is applied to create one piece and strong body structure. In the main body, the x-axis movement is provided by a single motor. This allows the machine to go faster.

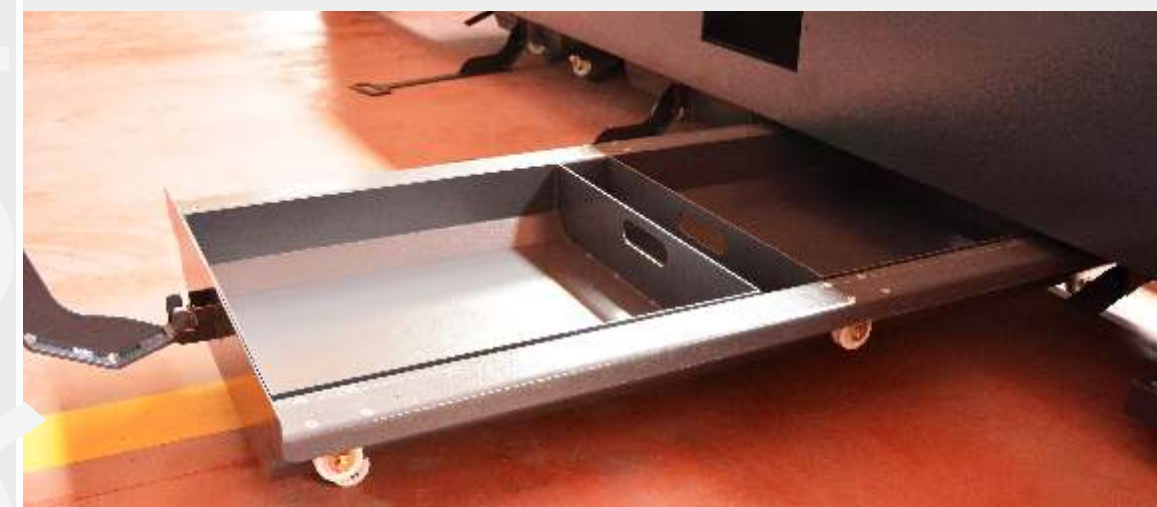
### 6 CELL VACUUM & FILTER SYSTEM

Vacuum and filter system in laser cutting systems are of great importance in terms of cutting quality, human and environmental health and machine cleaning. For an efficient vacuum system, the cutting area is divided into cells. Depending on the position of the head, the pneumatic clasp of the relevant cell is opened immediately and a rapid suction is initiated. When the head moves to the new vacuum cell, the closure of the new vacuum cell opens and the closure of the old vacuum cell closes slowly.



### PALLET LOADING & CHANGE

Up to 25mm thick material can be placed. Loading and unloading at high speeds can be achieved, thanks to servo motors and hydraulic system. The total duration of the change is less than 25 seconds.



### SLAG TROLLEY

There are slag trolleys to collect small pieces that fall easily during the cutting process. CNC controlled conveyor can be included as an option.



## PRODUCTIVITY

### DESIGNED FOR LOW ENERGY CONSUMPTION

Thanks to the advantages coming from the FL3015 design, it provides up to 35% energy savings compared to its peers.

### LED LIGHTING

The internal and external lights that are continuously open on the machine are made with low consumption and long life LEDs. Another measure taken to reduce overall electricity consumption.

### GAS SAVING WITH ECONOMIC MODE OPTION

There are two modes in the program, economical and fast mode. The fast mode focuses on the shortest cutting time, while the economical mode closes the cutting gas to avoid unnecessary gas delivery in idle movements. Thus, the most economical cutting can be achieved.

### EASY TO USE GUI

Machine use is facilitated by the use of batch commands, which significantly shortens the time spent on the program. It is quite easy to adapt the program to many languages and switch between them..

### 6 CELL EFFECTIVE VACUUM SYSTEM

Cutting table is divided into 6 cell vacuum regions and the cell near the laser head is opened producing a strong suction in the required region. The vacuum cells are opened immediately when the head reaches the relevant cell, and the vacuum of the passing cell is closed with some delay.

## EASE OF USE

### WIDE LANGUAGE SUPPORT

Many languages are supported in the program and language can be switched between.

### HANDWHEEL

There is a hand wheel for precise axis motion settings on the machine. It is very useful when precise positioning is required to remove small cuts from remaining portions of used metal sheets.

### AUTOMATIC CUTTING PARTS RECOGNITION, FIND, AND DRAWING

With the help of the sensors on the cutting head, the starting point, angle of the placed part on the pallet are found easily and quickly.

### RESTART CUTTING FROM LAST POINT

If the machine is stopped or paused due to any reason, the cutting from the desired point can be started again.

### OPERATION WITH THE DESIGNED CAD / CAM PROGRAM

The machine can be easily integrated into one of the CAD / CAM programs Metalix, Lantek, Radan or similar that the customer can choose according to the request.

## SECURITY

### PROTECTING THE CUTTING HEAD

If the cutting head is struck by a piece or palette, or if it is about to struck, the machine is paused immediately and the cutting head is prevented from being damaged by impact. After the machine stops, once the hampering conditions have been cleared by the operator the cutting process can be resumed by pressing the start button.

### PROTECTIVE GLASSES

To prevent damage due to laser beam reflection, the windows on the front doors are made of laser obstructing material.

### EMERGENCY STOPS

There are 7 emergency stop buttons on the machine, 1 on the pallet changer, 1 on the laser unit and 1 on the hand wheel. If any of these are pressed, the current movement and the laser light will pause. After the reset process, operations can resume where they were left.

### LASER SAFETY BARRIERS

Protective laser barriers are used to prevent injury in case someone enters the restricted area during pallet change. The pallet stops immediately if someone crosses the laser barriers. The pallet change operation can be continued in the desired direction either inside or outside the machine once the obstruction is removed and reset button is pressed.

## MAINTENANCE AND SERVICE

### REMOTE CONNECTION ON THE INTERNET

If the machine is connected to the internet in an emergency or necessary situations, all kinds of information related with malfunction can be viewed remotely. Remote service engineers can find the cause of error, alarm history and change parameters if necessary. Any kind of program update on the system can be performed via internet.

### FAST SERVICE TEAM

Qualified service engineers solve any problem in shortest possible time.

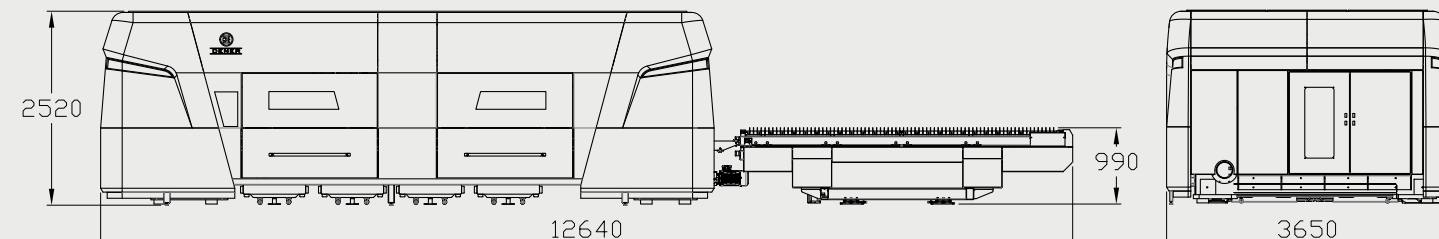
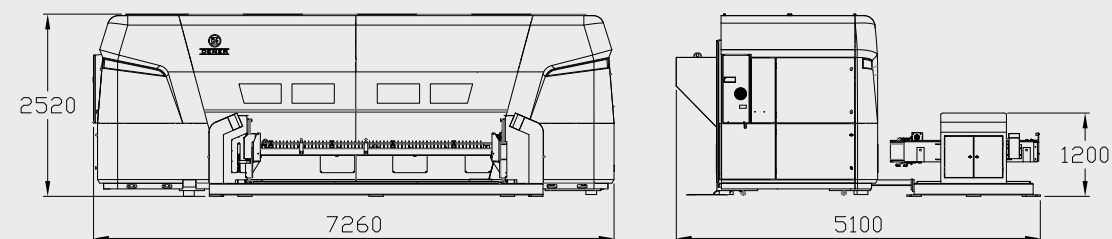
### EASY ACCESS TO THE MACHINE IN DESIGN

The fact that the front and rear doors of the machine can be opened makes it possible to service the machine quickly and easily. This design also allows the operator to easily perform cleaning and maintenance operations.

### AMPLE SPARE PARTS

Due to the ongoing mass production, spare parts are always available.





FIBER LASER			FL-3015-S								FL-4020-L							FL-6020-L						
Total Electric Power Consumption		kw	28,95	31,85	41,30	44,50	47	49,50	60		28,95	31,85	41,30	44,50	47	49,50	60	28,95	31,85	41,30	44,50	47	49,50	60
Resonator Power		w	1000	2000	3000	4000	5000	6000	8000		1000	2000	3000	4000	5000	6000	8000	1000	2000	3000	4000	5000	6000	8000
Fiber Core Diameter		µm	50	100							50	100						50	100					
Maximum Cutting Thicknesses	Mild Steel	mm	8	15	18	20	22	24	30		8	15	18	20	22	24	30	8	15	18	20	22	24	30
	Stainless Steel	mm	4	8	10	12	15	16	20		4	8	10	12	15	16	20	4	8	10	12	15	16	20
	Aluminium	mm	3	6	8	10	12	14	16		3	6	8	10	12	14	16	3	6	8	10	12	14	16
	Copper	mm	2	4	5	6	8	10	12		2	4	5	6	8	10	12	2	4	5	6	8	10	12
	Brass	mm	3	4	5	6	8	8	10		3	4	5	6	8	8	10	3	4	5	6	8	8	10
Net Cutting Dimensions		mm	1530 X 3050								2040 X 4050							2040 X 6050						
X,Y Axis Drive System			Rack and Pinion								Rack and Pinion							Rack and Pinion						
Z Axis Drive System			Ball Screw								Ball Screw							Ball Screw						
Z Axis Drive Stroke		mm	130								130							130						
Maximum Simultaneous X,Y Axis Speed		m/dk	170								170							170						
Maximum Z Axis Speed		m/dk	50								50							50						
Maximum Acceleration X,Y Axis		G	2								1,7							1,7						
Maximum Acceleration Z Axis		G	3								3							3						
Positioning Accuracy		mm	0,05								0,05							0,05						
Repeatability Accuracy		mm	0,02								0,02							0,02						
Palette to Palette Change Time		sn	20								30							45						
Assist Gases			Oxygen, Nitrogen, Compressed Air								Oxygen, Nitrogen, Compressed Air							Oxygen, Nitrogen, Compressed Air						
Total Weight		kg	16000								21500							26000						

DENER HAS THE RIGHT TO MAKE MODIFICATIONS IN TECHNICAL PROPERTIES WITHOUT GIVING ANY NOTIFICATION

\* FILTER WEIGHT AND RESONATOR WEIGHT INCLUDED IN TOTAL WEIGHT.