



CRATER-06 AP
HEAVY DUTY 20" AUTOMATIC SLICING UPCUT SAW

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1. GENERAL INFORMATION

1.1. Introduction

The user's manual given by the manufacturer contains information about the machine parts. Each machine operator should read these instructions carefully, and the machine should be operated after fully understanding them.

Safe and efficient long-term use of the machine depends on understanding and following the instructions contained in this manual. The technical drawings and details contained in this manual constitute a guide for the operator.

1.2. Distributor

ATECH MACHINE, INC.

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Ph.: +1-240-505-1967

E-mail : info@ATechMachinery.com

*In case of any technical problem please contact your nearest ATECH dealer or ATECH head office through the above mentioned phone or e-mail address.

*Technical labels with the model description of the machine are attached onto the front side of each machine.

*The machine serial number, motor values, air pressure, air consumption and production date are printed on the technical label.

2. MACHINE'S DESCRIPTION AND TECHNICAL FEATURES

2.1. Machine's Description

It is an automatic 20" straight upcut saw designed for serial cutting of (slicing) of aluminum profiles with a Ø500 mm (20") saw blade.

- The machine has been designed in compliance with UL & CSA Safety Directives.
- With the servo control system, time saving is achieved with profile feed speed and saw cutting height control.
- It is possible to precisely adjust the cutting speed infeed according to the type of material.
- During the cutting process, if the top safety guard is opened, the saw will not start cutting, and returns to start position in case it is opened during the cutting process for safety reasons.
- In manual cutting mode, it cuts the desired size and automatically stops and waits in the ready position.
- In the automatic cutting process, after the number of cutting operations is completed, the machine stops automatically and moves to the next memory and waits in the ready position.

STANDARD ACCESSORIES

- ☐ Ø500 mm (20") Saw Blade
- ☐ KN-M3 Conveyor
- ☐ Screw Shaft Lubrication Unit
- ☐ 3 Qty. Vertical Pneumatic Clamps
- ☐ 3 Qty. Horizontal Pneumatic Clamps
- ☐ Spray Mist Lubrication System
- ☐ Air Gun
- ☐ 2 Qty. Chip Collector Manifolds

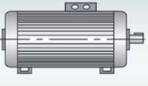
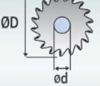




OPTIONAL ACCESSORIES

- ☐ Automatic Opening Top Guard
- ☐ Industrial Type Chip Collector VCE 1570

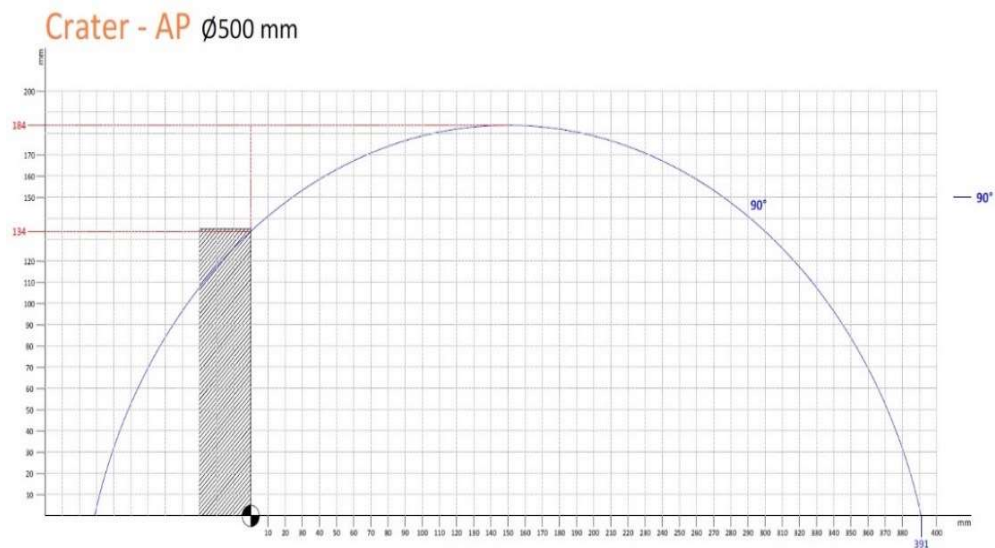
Please stipulate the below mentioned data in all your correspondence regarding the machine with the manufacturer and/or your ATECH dealer.

- ☐ Machine model
- ☐ Machine's serial number
- ☐ Voltage and frequency
- ☐ Name of dealer where machine was purchased
- ☐ Date of purchase
- ☐ Description of the machine fault
- ☐ Average daily operation period

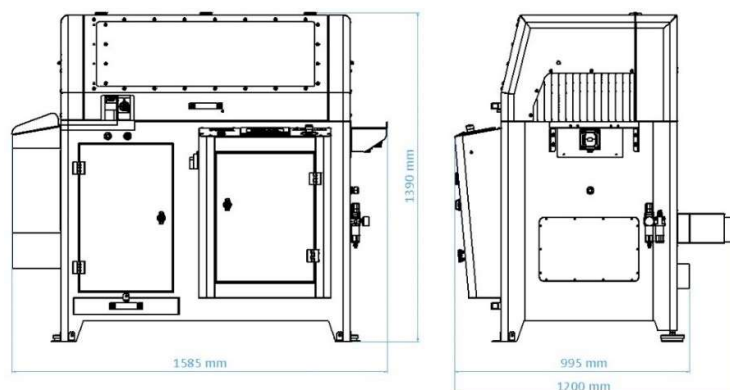
2.2. Technical Features

Crater-AP500								
ALU	PVC	WD	4kW, 5.5 HP 220V AC-3P, 50-60 Hz	D= 500 mm d= 30/32 mm	3000 r.p.m.	BAR AIR CONS. 6-8 Bar 50lt/min	154x121x139 cm	520 kg

2.3. Cutting Diagram



2.4. Dimensions



2.5. Electric And Pneumatic Control Panel

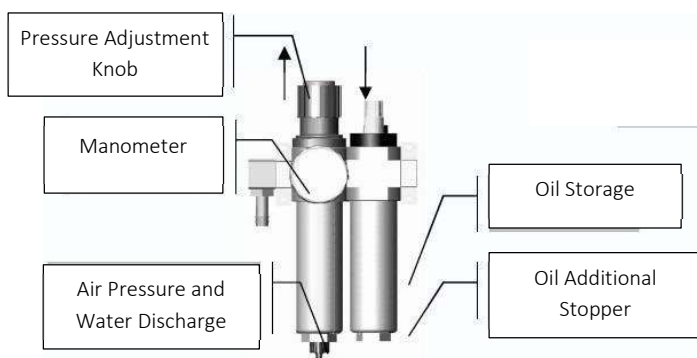
There is an electrical panel at the top, the power supply must be turned off by the authorized electrician and should be checked with the diagram on the cover in case of a problem.

IMPORTANT

In the lower part there is a pneumatic panel and the coolant receptacle. It must be opened by authorized personnel and filled with suitable coolant. The coolant has to be water based.

The panel door must be closed and locked during operation. In the service work carried out for maintenance and possible defects;

CLOSE ELECTRICAL AND PNEUMATIC POWER RESOURCES.



IMPORTANT

Set the air pressure between 6-8 bars. The manometer is read as air pressure bar. If the reading on the pressure gauge is less than or equal to the desired pressure, turn the air pressure adjustment switch to the right or left to adjust the pressure to 6-8 bar.

The conditioner unit collects the water contained in the air system into the collection container so as not to damage the pneumatic system components. Periodically (on the working day) drain the water by pressing or opening the button under the conditioning cylinder deposit to drain the collected water.

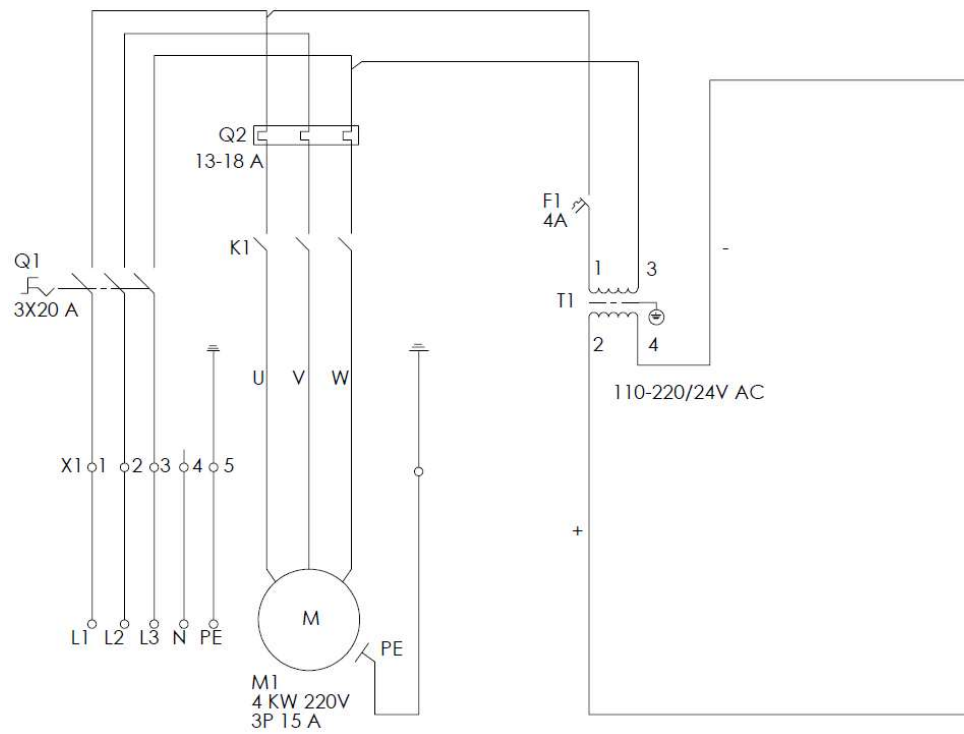
2.6. Electric Circuit Inputs – Outputs

INPUTS		OUTPUTS	
Start_Button	P00000	Servo_1_Pals_Infeed	P00040
Stop_Button	P00001	Servo_2_Pals_Saw	P00041
Emergency_Stop	P00002	Servo_1_Dir	P00042

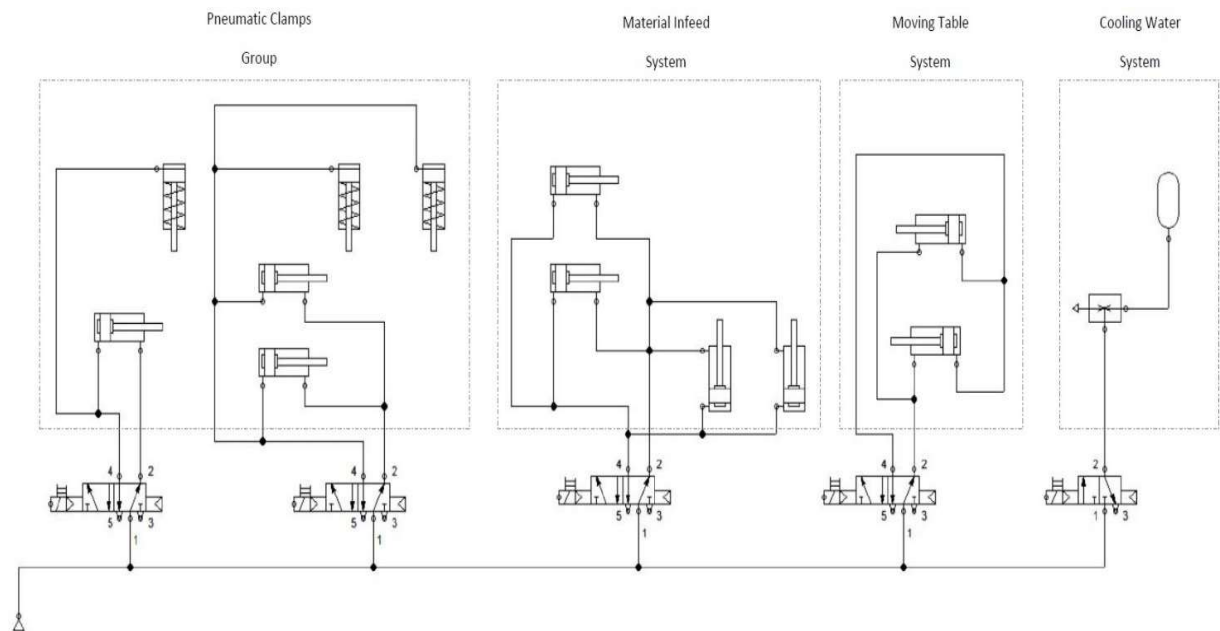
Servo_1_Alarm	P00003
Servo_2_Alarm	P00004
Empty	P00005
Max_Limit_Switch	P00006
Top_Cover_Switch	P00007
Saw_Back_Cover_Switch	P00008
Saw_Front_Cover_Switch	P00009
Empty	P0000A
Motor_Thermic	P0000B
Saw_Below	P0000C
Material_End_Sensor	P0000D
Min_Limit_Switch_Home	P0000E
Empty	P0000F
Empty	P00010
Empty	P00011
Empty	P00012
Empty	P00013
Empty	P00014
Empty	P00015
Empty	P00016
Empty	P00017

Servo_2_Dir	P00043
Servo_1_Alarm_Reset	P00044
Servo_2_Alarm_Reset	P00045
Servo_1_On	P00046
Servo_2_On	P00047
Saw_Motor	P00048
Saw_Clamping_Piston_1	P00049
Saw_Clamping_Piston_2	P0004A
Material_Infeed_Clamping_Piston	P0004B
Table_Piston	P0004C
Conveyor_Piston	P0004D
Coolant	P0004E
Empty	P0004F

2.7. Electric Wiring Scheme



2.8. Pneumatic Wiring Scheme



3. SAFETY

3.1. Safety Information

The symbols shown hereunder are necessary to be read with special attention. Not reading or observing of them may cause damage to the equipment or personal injury.

IMPORTANT

The **IMPORTANT** symbol above is one telling to apply special care and to be careful at carrying out the specified operation.

CAUTION!

The **CAUTION!** symbol above warns you against specific dangers and requires to read the text. Not observing may cause damage to the equipment.



The above symbol **DANGER WARNING**, warns you against specific dangers and you have definitely to read them. Negligence may cause damage to the equipment and bodily injury. Read the user's manual carefully before using the machine or carrying out maintenance works.



3.2. Accident Prevention

3.2.1. Our machines are manufactured in accordance with EN 60204-1 and EN 292-2 CE safety directives, which cover national and international safety directives.

3.2.2. It is the task of the employer to warn his staff against risks, to train them on prevention of accident, to provide for necessary safety equipment and devices for the operator's safety.

3.2.3. Before starting to work with the machine, the operator should check the features of the machine, learn all details of the machine's operation.

3.2.4. Machine should be operated only by staff members, who have read and understood the contents of this manual.

3.2.5. All directives, recommendations and general safety rules contained in this manual have to be observed fully. The machine cannot be operated in any way for purposes other than those described herein. Otherwise, the manufacturer shall not be deemed responsible for any damages or injuries. And such circumstances would lead to the termination of the warranty.

3.3. General Safety Information











1. The power cable should be led in such a way that nobody can step on it or nothing can be placed on it. Special care be taken regarding the inlet and outlet sockets.
2. If the power cable should be damaged during operation, don't touch and unplug it. Never use damaged power cables.
3. Don't overload machines for drilling and cutting. Your machine will operate more safely with power supply in accordance with UL & CSA stipulated values.



4. Don't place your hands between parts in motion.
5. Use protective eye glasses and ear plugs. Don't wear oversize clothes and jewels. These can be caught by moving.
6. Keep your working place always clean, dry and tidy for accident prevention and safe operation.
7. Use correct illumination for the safety of the operator. (ISO 8995-89 Standard The Lighting of Indoor Work System)
8. Don't leave anything on the machine.
9. Don't use any materials other than those recommended by the manufacturer for cutting operations on the machine.
10. Ensure that the work piece is clamped appropriately by the machine's clamp or vice.
11. Ensure safe working position, always keep your balance.
12. Keep your machine always clean for safe operation. Follow the instructions at maintenance and replacement of accessories. Check the plug and cable regularly. If damaged, let it replace by a qualified electrician. Keep handles and grips free of any oil and grease.
13. Unplug first, before conducting and maintenance works.
14. Ensure that any keys or adjustment tools have been removed before operating the machine.
15. If you are required to operate the machine outside, use only appropriate extension cables.
16. Repairs should be carried out by qualified technicians only. Otherwise, accidents may occur.
17. Before starting a new operation, check the appropriate function of protective devices and tools, ensure that they work properly. All conditions have to be fulfilled in order to ensure proper operation of your machine. Damaged protective parts and equipment have to be replaced or repaired properly (by the manufacturer or dealer).
18. Don't use machines with improper functioning buttons and switches.
19. Don't keep flammable, combusive liquids and materials next to the machine and electric connections.

3.4.

3.4. Safety Symbols And Meanings

	Electric warnings.		Use protective goggles.
	If main connection cable is damaged during operation, do not touch it and disconnect the main plug from main socket.		Use protective earmuffs.
	When machine is working, do not make your hand close to saw blade.		Use protective gloves when changing the saw.
	Keep working environment clean, dry and tidy.		Read operating instructions carefully before using or maintaining the machine.

3.5.

4. TRANSPORT OF THE MACHINE

IMPORTANT

* The transport should be done by qualified personnel only.

- 4.1.1. The machine should be transported by lifting with proper equipment (not touching the ground during the transport).
- 4.1.2. Don't lift the machine before ensuring that lifting devices or other equipment is placed properly under the machine.
- 4.1.3. For the weight and dimensions of the machine, 2.2. Technical Features.

5. INSTALLATION OF YOUR MACHINE

The machine should be located at least 50 cm in front of the back wall. The machine is equipped with a burr collection bag connector and power supply socket on the back side.

5.1. Preparation

- 5.1.1. The outer dimensions of the machine are stipulated in the dimensions page. The ground, where the machine will be placed, should be even, solid enough to bear the weight of the machine.
- 5.1.2. At the double head automatic saw machine Crater all parts are delivered by the manufacturer ready for use.
- 5.1.3. Do not make electrical connections without removing the bolt and stop connections used for the detection of running systems before the machine is started and without wiping the protective oil layer in working parts.

5.2. Instructions For Safe Connection Of The Machine To The Power Source

- 5.2.1. The three-phase electrical cable socket must have five inputs to the cable on the machine.
- 5.2.2. Use a connection cable sockets in accordance with the CE Safety Directives.
- 5.2.3. Check the inlet power supply before powering the machine.

CAUTION!

The socket connections have to be made by a qualified electrician, the rotation direction of the saw blade has to be observed by starting the machine. If the saw blade rotates in reverse direction, the socket connections have to be checked and re-connected properly. If the direction of rotation of the saw blade is reversed, it is dangerous to Operator and equipment. It causes the saw teeth to break and cracks.

Plug the machine's electrical power socket into the previously prepared 3-phase socket socket to follow the saw-turn direction and follow the following procedures:

1. Turn on the switch and press the reset button on the screen. The machine will take its starting position.
2. Select manual operation on the screen and press the green button, the clamps will tighten.
3. Press the start button on the screen, then press the emergency stop.
4. Observe the direction of rotation of the saw blade.
5. The direction of rotation of the saw is available on the turn direction label on the table.

If the saw blade rotates in reverse direction: The electric socket connections have to be checked and corrected by a qualified electrician. The direction of rotation of the saw blade must not be run without testing.

5.3. Air Pressure Setting

For the pneumatic system to operate properly, the air pressure must be 6-8 bars (90-120 psi). **Do not operate at lower pressures than 6 bars.** Read the manometer on the conditioner to calibrate and check the air pressure.

Follow the steps below for air pressure settings.

- 5.3.1. Pull up the conditioner adjustment knob.
- 5.3.2. The pressure increases when the knob is turned clockwise, while the pressure decreases when it is turned counter-clockwise.
- 5.3.3. When you read the 6-8 Bar pressure setting on the pressure gauge, lock the conditioner setting knob.
- 5.3.4. The conditioner unit accumulates the water contained in the air system into the collection container so as not to damage the pneumatic system components. Automatically removes water collected when air is supplied to the machine.
- 5.3.5. The oil recommended by the manufacturer in the conditioner is TELLUS C 10 / BP ENERGOL HLP 10 / MOBIL DTE LIGHT / PETROL OFFICE SPINDURA 10.

6. MACHINE SAFETY DATA



- 6.1.1. It is not allowed to operate the machine with the protective cover and other protective equipment removed.
- 6.1.2. Your machine must be operated with the voltage on the technical label. Let the electric installation of your machine carry out by a qualified electrician only. Grounding must be done. There will be irregularities in machine operation if grounding is not done properly.
- 6.1.3. Lifting, installation, electric, pneumatic maintenance of the machine should be carried out by qualified personnel only.
- 6.1.4. Routine maintenance and scheduled maintenance should be carried out by qualified personnel after unplugging the machine and disconnecting the air supply first.
- 6.1.5. Ensure that the machine has been cleaned, tested and maintenance before starting to operate.
- 6.1.6. Check the safety devices, power cable and moving parts regularly. Don't operate the machine before having replaced defective safety devices or faulty parts
- 6.1.7. Never replace the circular saw without disconnecting the air and the electrical and pneumatic power connection.
- 6.1.8. Keep foreign materials away from the working area of the machine, keep away from the machine's moving parts.

IMPORTANT

The saw blade continues its rotation for a while after switching off the motor.

CAUTION!

Don't use the machine for purposes other than it has been designed for (cutting of iron and other ferrous materials).

IMPORTANT

The safety data have been defined above. In order to prevent physical damage or damage to the equipment, please read the safety information carefully and keep the manual always in an easy accessible place.



If the top guard is open, the motor will not start in terms of worker safety. However, you can tighten the clamps with the top guard open so that you can place your profile and adjust and tighten it.

7. OPERATION

In the automatic cutting section, it provides automatic cutting in desired length, equal lengths and desired number from the workpiece. Select how many seconds intervals the coolant will be activated from the settings page, it is between 0.5 seconds and 2 seconds depending on the material thickness. Then, by opening the Recipe page, write the desired length value of the workpiece to be sliced in the "MEASURE TO CUT" section. Write the number of profiles to be processed (how many profiles will be connected at the same time) in the "NUMBER OF PROFILES". For precise and clean cut, write the saw cutting speed to "CUTTING SPEED" (meters / min). Write the total profile height in the "PROFILE HEIGHT" to adjust the saw output height. How many cuts are written in the "CUTTING NUMBER" section. Bring the end of the profile to the middle of the saw channel and fix the profile with clamps by pressing the green button. If the clamps do not tighten the profile, you can open it by pressing the green button once more and adjust your vices according to the profile, do not forget to make the adjustment both in the driver and machine part. If you are sure that you press the green button and tighten the profile, after you press the "START" button on the screen, it will automatically start cutting. The cutting process will start with tip cleaning. In the meantime, check the height and speed of sawing. In the opposite case, your hand will be on the emergency stop button. The cutting process will continue until the specified number is completed or the profile ends until the cutting process starts. When the work piece on the machine is finished, the machine will go to the stop position and wait for you to press the "START" button. If it is desired to stop cutting or exit the page while slicing, press "STOP" button and wait for the machine to stop. When the machine stops, the page can be exited and switched to another page, or the machine can continue slicing from where it left off by pressing the "START" button.

7.1. Presentation of the Panel and Program Entry



CRATER AP500 Automatic cutting machines use of electronic positioning device;



OFF



ON

- Turn the switch to the "1" position. Electronic positioning device is touch screen. Click on the language option that suits you on the screen and pass the introductory page (ATECH).



- Perform the position calibration of the material infeed system before starting the cutting process. To do this, press the "RESET" button.



- The home page is the display page with the operation selections. Operation is initiated by touching the desired operation button. Also, press the page name to exit the page and return to the main page.



7.2. Automatic Cutting



When you want to process in automatic cutting, you can cut with the new cutting values that you will create from "RECIPE" or by choosing the measurements you prepared previously from "CUT LIST".

You can access the desired values by pressing the directional keys next to the cut list line number indicator to go to the existing measurement values in the "CUTTING LIST". When you reach the desired value, press the "CLAMP" button and tighten the clamps. You can then start the process by closing the top cover and pressing the "START" button.

NOTE : If the value written in the quantity section is completed, the machine will automatically switch to the next recipe in the memory and wait for you to put the profile and press the "CLAMP" button.

7.2.1. Recipe



When you press the recipe button, you can create a new recipe, or you can access the values you prepared before and make changes by cutting the values. Use the arrow keys next to the screen to access the existing values. To create a new recipe, fill in the relevant places. Press "AUTOMATIC CUTTING" button to proceed and continue the steps as stated above. (7.2. Automatic Cutting)

To make a recipe, you can also directly access this page by clicking the "RECIPE" button on the main page.

7.2.2. Cutting List



It is the section where the recipes of the created recipes are displayed. Select the operation to be performed in this section, press the "AUTOMATIC CUTTING" button and continue the steps as stated above. (7.2. Automatic Cutting)

7.3. Manual Cutting



When you want to cut with "MANUAL CUTTING", write the desired workpiece size in "CUTTING MEASURE" and "CUTTING HEIGHT". Then, enter the "CUTTING SPEED" value for the ideal cut. After entering the required values, first press the "CLAMP" button and then the "START" button. After the cutting process, the vices will open automatically, you can get your profile.

7.4. Settings



As can be seen in the image above, "SAW THICKNESS" and "COOLING FLOW SPEED ADJUST" can be done in the settings section. In case of unexpected problems, there are technician settings and components entrance and exit test section to be used by the authorized staff.

7.4.1. Technician Settings



CAUTION!

The machine is made ready for use by making the necessary settings by the manufacturer. In case of a malfunction that causes the reference values to change, the authorized staff will log in to this page and make necessary arrangements.

7.4.2. Input and Output Tests



CAUTION!

It will be used by authorized personnel or trained personnel for the necessary procedures. Do not enter this section unless necessary, since there is no section for cutting operations or settings.

8. SAFE INSTALLATION OF THE SAW BLADE

To remove the circular saw blade from the saw mill, apply the following sequence.

- 8.1.1. Cut off the machine's electrical and air connection. Open the front cover lock on the chassis. (Figure 1, 2)
- 8.1.2. Remove the saw casing cover sheet metal. (Figure 3)
- 8.1.3. Remove the M10 screw by turning with a 8 mm allen key (Hold the saw blade shaft at the opposite end with a other 8 mm allen key and prevent so that the shaft turns). (Figure 4, 5)
- 8.1.4. Remove the 30x8x7mm washer and Saw Flange parts regularly. (Figure 6)
- 8.1.5. Carefully remove the saw.
- 8.1.6. Fit the saw you want to change on the shaft, making sure the direction of rotation is correct.
- 8.1.7. **When replacing the saw with the new one, use the portion of the saw blade that corresponds to the saw blade diameter. The outer diameter of the saw ring is two parts according to 30 and 32mm.**
- 8.1.8. Fit the other parts (Washer and Saw Flange) in order, following the reversal of the operations on the shaft.
- 8.1.9. Tighten the M10 screw by turning it clockwise with an 8 mm Allen key (Hold the saw blade shaft at the opposite end with a other 8 mm allen key and prevent so that the shaft turns).
- 8.1.10. Install the saw cover. Close front cover.

NOTE: The saw you use must be sharpened / changed at certain intervals depending on the type of material being cut. When the cut workpiece is burned at the end of cutting or when the cutting is forced, sharpening / changing operation is performed.

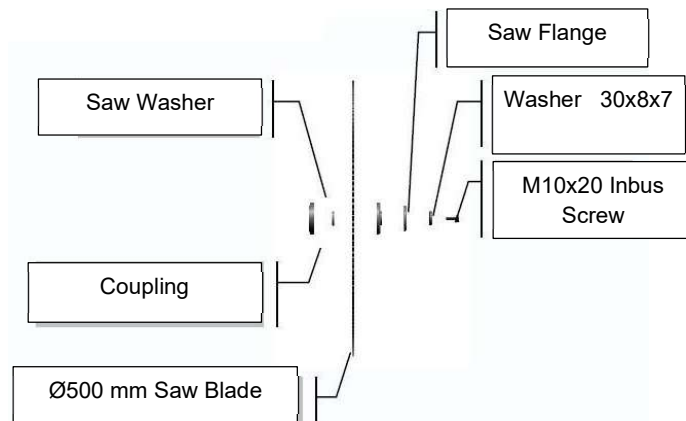


Figure 1: Open The Front Cover.

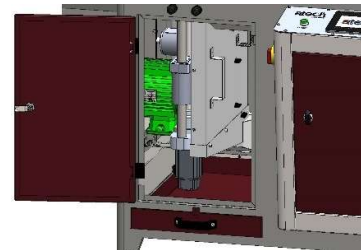


Figure 2

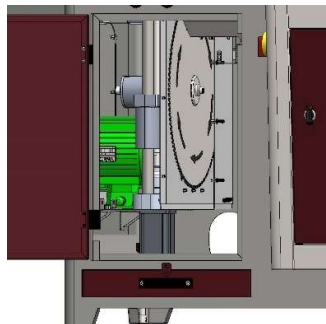


Figure 3

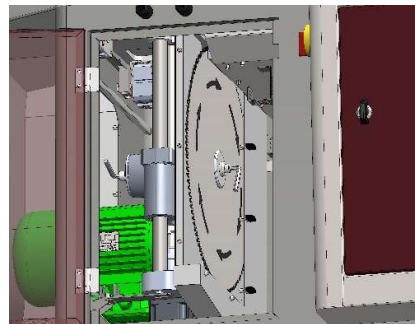


Figure 4

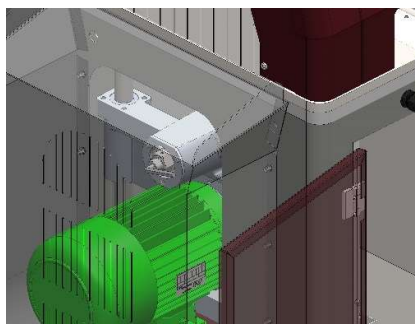


Figure 5

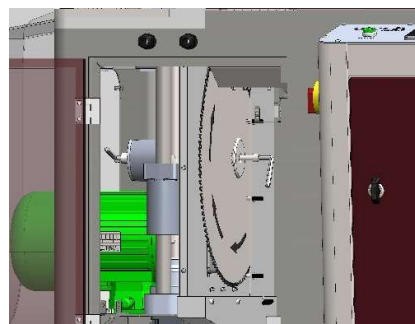
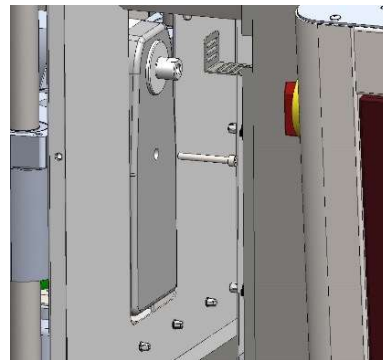
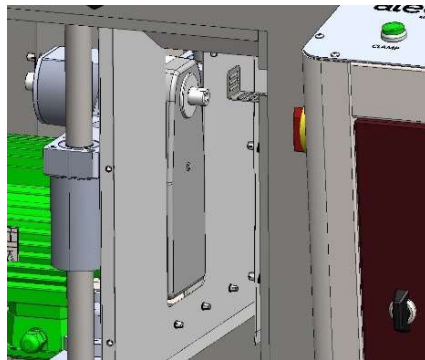


Figure 6

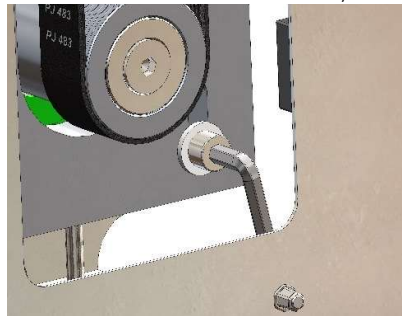
9. **SAFE INSTALLATION OF THE BELT**

Follow the instructions below to safely replace the CRATER AP500 machine belt.

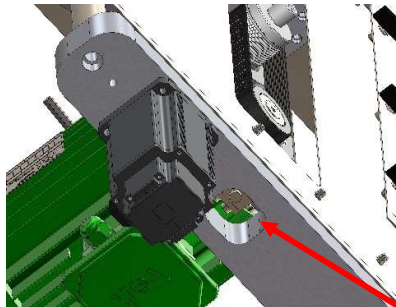
- 9.1.1. Remove the saw by performing saw changing operations.
- 9.1.2. Remove the saw casing sheet metal cover.
- 9.1.3. Remove the M6 screw by turning with a 5 mm allen key.



- 9.1.4. Remove the belt cover.
- 9.1.5. Loosen the M8 screws by turning them clockwise with a 6 mm Allen key.



- 9.1.6. Loosen the M10 key-head bolt with the 10 mm keys.



- 9.1.7. You can change the belt by loosening the motor block.
- 9.1.8. Once you have changed the belt, finish the process by following the procedures.

10. **MAINTENANCE**

1. **Routine Controls, Maintenance And Work Starting**

- 1.1. Make sure the table and all parts are clean and dry. Clean the table from the oil and dry it. Be especially sure of the cleanliness and dryness of the handle.
- 1.2. Clean all surfaces of the machine from the sawdust, chips and foreign materials. Use glasses and glove to protect yourself from harmful substances.
- 1.3. Check the saw blade against wear, bending, cracking and breakage before each use. Turn carefully to see each tooth of the saw (after removing the saw protective housing). If the saw is damaged, change the saw.
- 1.4. Check the air pressure system pressure. If necessary, set the air pressure around 6-8 bar.
- 1.5. Check the air pressure filters and the oil level in the conditioner. If you do not have enough oil, complete it.



Disconnect the electrical power connection and air pressure connections before doing all this.

2. SPRAY MIST SYSTEM MAINTENANCE

- 10.2.1. Add the coolant prepared by opening the lid of the coolant into the container, provided that it is not filled completely.
(The coolant used should be close to water flow)
- 10.2.2. Note that the hose on the cover is fully inserted into the receptacle and above the filter.
- 10.2.3. Make sure that the cover is tightly closed and the hose does not break.
- 10.2.4. When you want to make lubrication, you can turn it on and off on the screen.
- 10.2.5. The lubrication action only happens when the saw goes up.

3. Work Day End Care

- 3.1. Disconnect the electrical and pneumatic power connections.
- 3.2. Clean all surfaces of the machine from the sawdust, chips and foreign materials. If cleaning of the protective housing is necessary, remove the front cover and wear gloves to protect your hands from the cutting edges of the saw. Use glasses to protect yourself from harmful substances.
- 3.3. If water and water based liquids are used during cutting operations, dry the machine with dry cloth at the end of the work.
- 3.4. Apply a thin layer of oil to the plate to protect it from corrosion. If it is not to be used for a long time, lubricate with a protective oil.
- 3.5. Avoid materials that damage the paintwork while cleaning the machine.
- 3.6. Lubricate both surfaces with machine oil or a protective oil to protect the saw from corrosion.

11. TROUBLESHOOTING GUIDE

Here are our suggestions to get rid of immediate problems. If the fault can not be rectified or if you encounter a fault other than those listed below, please contact the technical service.

TROUBLES	CAUSES	REMEDY
Low surface quality (at aluminum and similar materials); <input type="checkbox"/> Rough surface, <input type="checkbox"/> Large chip, <input type="checkbox"/> Not homogenous surface, <input type="checkbox"/> Saw blade traces visible	Not cooling the saw blade surfaces.	Lubricating the saw blade cutting surfaces, Using of cooling liquid.
	Using of damaged or blunt saw blade or the saw rotating in reverse.	Check the saw blade teeth. Replace if necessary. Check the electricity.
	Saw blade moves too quick.	The cutting speed is too high for the material. Decrease the cutting speed.
Motor does not work (Start button is pressed, not working)	No power supply to the machine.	Check the electric cable connections. Check the electric power sockets.
Motor is working but the pneumatic clamp piston do not work.	The air supply connections are missing, or the air pressure is too low.	Check the air compressor connections. Adjust the air pressure between 6-8 Bar on the conditioner.
The saw blade rotates in reverse direction.	The electric connection or the power cable is wrong.	Let the electric connections carry out by a qualified electrician.

No lubrication.	It may be related to the oil amount, oil fluidity or valve.	<input type="checkbox"/> Check the oil level. <input type="checkbox"/> Observe the oil hose in the oil. <input type="checkbox"/> Open the valve. <input type="checkbox"/> Be sure to use the appropriate oil. <input type="checkbox"/> Blow air into the end of the hose inside the drum with an blow gun.
Lubrication is less.	It may be related to the sprayer.	Open the dimmer on the sprayer.

12. COMPONENTS

1. ELECTRIC COMPONENTS

PART NAME	QTY
ELECTRIC MOTOR	1
SERVO MOTOR	2
POWER CABLE 5x2,5 mm	3,5 m

2. HYDRAULIC-PNEUMATIC COMPONENTS

PART NAME	QTY
FRC 1/4 D MINI CONDITIONER	1
PNEUMATIC CLAMPS	6
KSØ50 x 5 PNEUMATIC CYLINDER	2
KSØ50 x 3 PNEUMATIC CYLINDER	2
KSØ63 x 5 PNEUMATIC CYLINDER	2