

3. 3 Cutting lift device consists of: lift motor, lead screw, guide rod, lifting seat

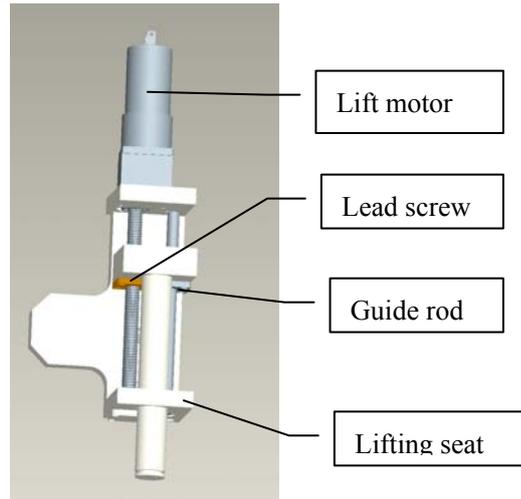


Diagram 3.3

3. 4 Cutting torch holder set

The Cutting torch holder consist of holder connection, torch holder. The torch holder is designed for adjusting freely the height and angle of cutting torch.

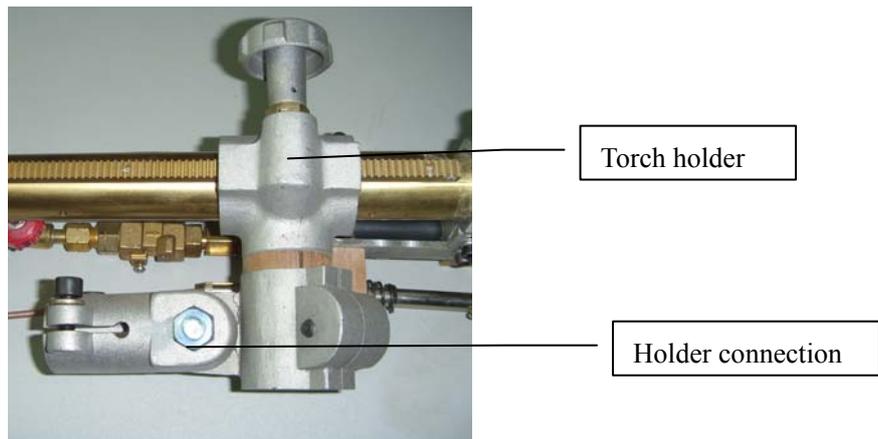


Diagram 3.4

3. 5 Gas flow control

Oxygen and Fuel gas flow are divided into 3 way namely preheating oxygen, cutting oxygen and fuel gas which controlled by solenoid valve regarding shutoff or opening, gas valves are used control the flowrate.

4 Machine maintenance and repair

4.1.Clean

The cutting operation is usually undertaken in rigid condition and produces much spatter, dust etc. so the machine needs to be periodically cleaned to ensure neat and accurate cutting. Soft rags are recommended for the clean service of lengthways guide rail and cross bar unit. Then coat lubrication oil to keep them from rust or other sticks.

Also Gear and rack needs to be cleaned periodically to ensure the smooth running, apply the engine oil on rag to scrub the racks on lengthways rail or cross bar unit to avoid the rust.

Compressed air is recommended to blow off the impurities stickled the gear and rack

where clean is not available by hand.

4.2. Lubrication

4.2.1 All supporting wheels and guide wheels are build in permanent oily sealing bear which usually are exempt of maintenance. Cross guide rail must be cleaned and lubricated weekly. Inject oil weekly into the oil hole on slide blocks.

4.3 Correction

4.3.1 Lengthways guide rail and cross guide rail are of double-axis-center at a high rigidity. Take care to reduce the wear to ensure the accuracy. Periodically clean the clearance between Nylon wheel and cross Al beam and the foreign matter on Nylon wheel.

4.3.2 Should severe wear affected after long use. Dismantle the machine main unit case, adjust the motors placing and the gap between gear and rack.

4.4. Tip clean

Cutting tip might be clogged due to spatter or impurities of gas and often needs to be cleaned. Shut off the preheating and fuel gas valve, turn on the cutting oxygen button on system control panel and the cutting oxygen solenoid valve, close the cutting oxygen valve on torch, clean the tip with cleaner first, then turn on the cutting oxygen valve on torch to blow off the impurities inside the orifices of cutting tip

5 Oxy-fuel cutting

5.1 Know-how of Oxy-fuel cutting

Oxy-fuel flame is used to melt the metal at high temperature. Oxygen jet flow is used to blow off any slag in the kerf to obtain a clean cut.

- (1) The ignition temperature should be below the melting point.
- (2) Oxide melting point should be below the workpiece melting point.
- (3) Keep the ignition temperature on the start point. the heat loss is compensated by the preheating flame. Mild steel with 0.4% less carbon content is easily cut in this way.

5.2. Working pressure

Oxygen and fuel gas regulators should be used to limit the gas pressure before flowing into machine manifold. The fine pressure adjustment also is needed to done by the gas valve on the pipeline to torch.

5.3. Cutting data

There is a wide variety of cutting tip styles and sizes available to suit various types of work. The thickness of the material to be cut generally governs the selection of the tip. The cutting oxygen pressure, cutting speed, and preheating intensity should be controlled to produce narrow, parallel sided kerfs. Cuts that are improperly made will produce ragged, irregular edges with adhering slag at the bottom of the plates. [Table 5-3](#) identifies cutting tip numbers, gas pressures, and hand-cutting speeds used for cutting mild steel up to 180 mm thick.

For acetylene

MINI CNC CUTTING MACHINE

No.	Cutting thickness (mm)	Cutting speed (mm/min)	Acetylene pressure (Mpa)	Oxygen pressure (Mpa)	Kerf width (mm)
1	5-10	700-500	>0.02	0.25	1.80
2	19-20	600-380	>0.025	0.3	2.00
3	20-40	500-350	>0.025	0.3	2.30
4	40-60	420-300	>0.025	0.3	2.80
5	60-100	320-200	>0.03	0.4	3.00
6	100-150	260-140	>0.04	0.4	3.60
7	150-180	180-130	>0.04	0.45	4.10

No.	Cutting thickness (mm)	Cutting speed (mm/min)	Propane pressure (Mpa)	Oxygen pressure (Mpa)	Kerf width (mm)
1	5-10	700-500	>0.02	0.25	1.80
2	19-20	600-380	>0.02	0.3	2.00
3	20-40	500-350	>0.02	0.3	2.30
4	40-60	420-300	>0.025	0.3	2.80
5	60-100	320-200	>0.03	0.4	3.00
6	100-150	260-140	>0.035	0.4	3.60
7	150-180	180-130	>0.04	0.45	4.10

Note: 1.All pressure are torch inlet pressure

2. Oxygen purity is minimum of 99.7%; Propane is minimum of JIS grade 3.

3.Depending on the surface condition o the steel plate(Scale, paint),either increase the fuel gas pressure of decrease cutting speed. Also, when precision cutting is required, adjust all data accordingly.

5.4. Cutting speed and gas pressure

The oxygen and acetylene gas pressure settings listed are only approximate. In actual use, pressures should be set to effect the best metal cut.

5.5 Neutral flame ensures a good quality of cutting surfaces. (Oxygen flame may be used for groove cutting.)

Oxygen flame causes short cutting-oxygen current, allowing slugs to adhere, melting the upper edge of the cutting surface, and causing adverse effects on the cutting surface. Similar defects will occur when the pressure of cutting oxygen is too high.

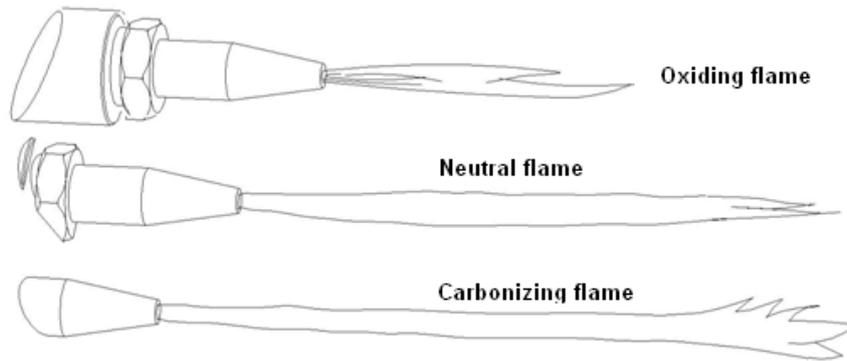


图 5. 6

5.6 Appropriate distance between the tip top and workpiece surface:

- Acetylene gas8-10mm
- LPG gas5-8mm

5.7. Preheating time

Cutting thickness	Acetylene		Propane	
	Preheating (Start from edge)	Piecing	Preheating (Start from edge)	Piecing
20mm	5s	30s	8s	34s
50mm	8s	50s	10s	53s
100mm	10s	78s	14s	80s

Preheating time can be set on the control system.

5.8. Cutting

5.8.1. Check the cutting program to find the start point of cutting path. and choose whether to commence from edge or piece in one point of workpiece. Press Start button to perform the cutting operation.

6. Torch handling

- a.Remove any stacks or scrap on the cutting table before torch movement to prevent possible bump.
- b. Attach the required cutting tip to the torch and adjust the oxygen and acetylene pressures in accordance with [table 5-3](#).

C. Adjust the preheating flame to neutral.

D. Hold the torch so that the cutting oxygen lever or trigger can be operated with one hand. Use the other hand to steady and maintain the position of the torch head to the work. Keep the flame at a 90 degree angle to work in the direction of travel. The inner cones of the preheating flames should be about 1/16 in. (1.6 mm) above the end of the line to be cut. Hold this position until the spot has been raised to a bright red heat, and then slowly open the cutting oxygen valve.

E. If the cut has been started properly, a shower of sparks will fall from the opposite side of the work. Move the torch at a speed which will allow the cut

to continue penetrating the work. A good cut will be clean and narrow.

Note:

Flashback might occur if the dirty or damaged tip are used though the torch has been subject to flashback test in the factory. To clean the used tip by the tip cleaner before next operation.

7. Job shift

To finish one job, Shutoff the oxygen solenoid valve then close the fuel gas solenoid valve. Lift the torch to move to another job start point.

8. Operation steps

- a. Check all joints and connections for any possible leakage. Check if all safety devices works well
- b. Check if gas pressure is in the range of required scope.
- c. Check if the power source up to the requirements.

Operation

- (1) Keep the workpiece align with lengthways rail
- (2) Select the suitable tips according to the plate thickness and property.
- (3) Set the cutting speed and preheating speed. Set the oxygen pressure for preheating and cutting respectively.
- (4) Actuate ignition and make sure no part of anybody near to the flame area.
- (5) Check if the preheating flame and oxygen jet flow is normal. Should any dirty or damage of tip. Repair or replace it.
- (6) Should backfire or flashback phenomenon occurs, Switch off the power source. Shut off the gas supply. Replace the flashback arrestors before next operation.
- (7) Press the emergency button to stop the machine should abnormal phenomenon occurs such as gas leakage.

When not in use

- (1) Place the machine body onto the safety location on rail. Close the gas valves and exhaust the hoses. Switch off the power.
- (2) Machine tools should be collected into the pointed storage.
- (3) Should shift taken, records are required to make and being handled over.
- (4) Clean the operation spot. And make everything in right order.

Daily maintenance

- (1) It's forbidden to stand on or drop heavy objects on the guide rail as well as knocks on the machine parts. Every shift is required to wipe off the dust by compressed air and then clean the rail with oily cloth.
- (2) Clean the gear and rack by engine oil to make sure no spatters or foreign matter affect the machine.
- (3) Inspection of wiring system should be carried out by qualified technicians.
- (4) Operators should stop the machine before declaring the abnormal info to the service people timely.

Safety precautions:

- (1) No vibrant source around the machine.
- (2) Avoid the machine fall off during transportation. There mustn't be heavy bump to the machine.

- (3) Power cord should be in used singly and UPS or other AC current stabilizer are recommended to be fitted.
- (4) Follow the dangerous gas safety rule during operation or clean the nozzle by pressure.