



Mantech Laser Cutter

Safety Requirements

The Mantech Laser Cutter RUIDA60W is a high voltage machine which uses a powerful laser emitting energy on the infrared spectrum. While safe when used within the operating parameters, caution should always be observed and the machine should never be left unattended.

- **Eye protection**— The machine has a contained machine bed and automatic cut offs which should prevent exposure of operators to the laser beam but, as a failsafe, eye protection should be worn at all times.
- **Respiratory protection** — The laser cutter has an extraction system which vents fumes out of the operating space. The extractor should be fully operational and if fumes build up within the cutting bed the machine should be stopped.

Additionally

- The laser cutter vaporises materials at a high temperature which could produce hazardous fumes. Materials containing PVC (polyvinyl chlorides), mercury and other toxic materials should not be used.
- Never leave the machine running unattended/unsupervised.
- Always work in pairs when operating the machine
- Ensure the cutting bed of the machine is kept clear of flammable materials (other than the work piece being cut)

Safety considerations

The Laser cutter presents a small number of specific risks to your safety. These are easily addressed:

Laser / emissions hazard

The laser cutter uses a 60W infrared focused beam which can cause severe burns and life changing retinal damage, the machine should never be operated with the failsafe cut offs disabled.

- When operating the machine everyone within the vicinity of the machine should be wearing infrared opaque (plastic) safety or prescription glasses.
- When the machine is running operators should avoid looking at the cutting beam for extended periods of time

Mechanical hazard

The laser cutter head is controlled by a set of high torque electric motors which can move at speed and have the potential to cause injury. To prevent this:

- Do not place hands / limbs within the cutting bed when the cutting head is moving
- Before controlling / moving the cutting head from the control panel, check no one is within the vicinity of the cutting bed
- Before controlling / moving the cutting head, verbally indicate to anyone near the cutting bed that you will be moving the cutting head.

Respiratory hazard

- Cutting some materials (eg PVC based materials) can produce highly toxic fumes which are highly toxic and corrosive to the machine. If in doubt about a material's composition, consult the machine team leader for advice and testing.
- The cutting bed should always be well ventilated and all fumes should be vented out of the workspace through the extraction system. Stop the machine immediately, if the cutting bed is not clearing fumes promptly or workspace around the machine starts emitting fumes.

Fire hazard

There is a risk of fire due to the high temperatures found at the focus point of the laser beam on the material. There are two main risks of fire:

- Over powering / incorrect settings : Depending on the material, running the machine at too high a power / low a speed might lead to fire. This is particularly true of materials with a low combustion point such as paper. If in doubt about settings, carry out small tests before starting a longer job.
- Machine error / crashes : Occasionally the control panel will fail, causing the cutting head to freeze in a specific position. When this happens when the laser beam is active heat may be concentrated in one area until the surface fumes combust.
- To mitigate the risk of fire, the machine should always be monitored when cutting is underway.

Machine Operating Safety Checklist

1. Be safe — wear appropriate safety equipment, ensure clothing, hair and jewellery cannot become caught up in the machine. Ensure the ventilation system is correctly set up and venting out of the workspace. Ensure everyone in the vicinity of the machine is wearing eye protection while the machine is running.
2. Before powering the machine, check the machine is ready for use. This includes making sure that:
 - The cutting bed is clear of debris
 - The workspace around the machine is clear of clutter and all controls are easily accessible
 - The ventilation system is correctly set up and venting out of the workspace window
3. After powering on, check that the system is working correctly. This includes making sure that:
 - The cooling system is operational
 - The extraction system is venting correctly
 - The machine has successfully completed the startup calibration and the computer control is working fully
4. Before sending a job to the machine ensure that
 - The settings for the job (especially the power settings) are within the limits set for the machine (power limit of 30%)
 - The dimensions of the job are within the limits of the cutting bed
 - The duration of the job is no more than 25 minutes in duration for any one job
5. After starting a job, monitor the machine continually for issues relating to the cutting bed. On longer jobs, check the temperature of the cooling unit periodically to ensure it does not exceed 26°C. If any issues are noted, stop the machine immediately
6. After completing a job on the machine, tidy up the workspace removing any materials from the cutting bed and tidying up the work space.
7. Leave the machine as you found it, restoring the configuration and calibrations to the default settings. Where required, check the machine is properly aligned and ready for the next user.
8. If you observe any issues or degraded performance to the machine while using it, immediately log the issue with the team lead for the machine and leave a note on the log.