IMPORTANT READ BEFORE USING

Operating / Safety Instructions

Dremel DIGILAB
LC40 Laser Cutter

DREMMEL
P.O. Box 081126 Racine, WI 53408-1126

Call Toll Free for Consumer Information & Service Locations

1-844-4DRML3D (1-844-437-6533) www.dremel.com

ENGLISH VERSION
GENERAL SAFETY WARNINGS

WARNING Read all safety warnings, instructions, illustrations and specifications provided with this laser cutter. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury.

READ ALL INSTRUCTIONS
SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE

Work Area Safety
Keep work area clean and well lit. Cluttered or dark areas invite accidents.

Do not operate laser cutter in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Laser beam may ignite the dust or fumes.

Set up and operate the laser cutter in a well-ventilated area. Place laser cutter on flat nonflammable surface and away from flammable material. Provide at least 8 inches of unobstructed spacing around laser cutter to allow ventilation. Laser cutters may create fumes that irritate eyes and airways. Obstructing airflow into or out of laser cutter may result in serious personal injury.

Always use a properly configured, installed, maintained, and operating fume/smoke exhaust system as recommended by the manufacturer when operating the laser cutter. Caustic fumes and smoke from the cutting and engraving process must be extracted from the laser system and exhausted outside or properly filtered to reduce the risk of personal injury.

Always keep a properly maintained and inspected fire extinguisher in the area. Typically, Carbon Dioxide (CO2) chemical fire extinguishers should be used.

Laser cutters must be operated only by persons familiar with their operation and manufacturer’s instructions. Operation of laser cutters by persons unfamiliar with their operation and manufacturer’s instructions can result in electric shock, fire and/or serious injury.

Do not allow unsupervised children and bystanders to interact with the laser cutter while it is operating. Persons unfamiliar with the operation of the laser cutter may change its setup, which may increase the risk of electric shock, fire and/or serious injury.

Electrical Safety
Laser cutter plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) laser cutters. Unmodified plugs and matching outlets will reduce risk of electric shock.

While operating the laser cutter, avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is earthed or grounded.

Do not expose laser cutters to rain or wet conditions. Water entering a laser cutter may increase the risk of electric shock.

Before every operation of a water-cooled laser cutter, make sure that the coolant connections and laser tube are leak-free. Water leaks may increase the risk of electric shock.

Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the laser cutter. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.

Do not operate laser cutters in damp locations. Use of laser cutters in damp locations may increase the risk of electric shock.

Personal Safety
Stay alert, watch what you are doing and use common sense when operating a laser cutter. Do not use a laser cutter while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating laser cutters may result in serious personal injury.

Use personal protective equipment. Always wear eye protection appropriate for class of laser engraver. Protective equipment such as heat and cut resistant gloves used when work pieces are hot or have sharp edges will reduce personal injuries.

Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose
LASER CUTTER SAFETY WARNINGS

Never expose yourself to the laser beam since it may cause physical burns and can cause severe eye damage. Proper use and care of this laser cutter system are essential to safe operation.

Never operate the laser cutter system without constant supervision of the cutting and engraving process. Exposure to the laser beam may cause ignition of combustible materials and start a fire.

Never use PVC or other nonconductive duct materials for the exhaust system. Static charges may build up and may cause a risk of fire or explosion.

Always use fire rated rigid or flexible metal or metalized ducting in the exhaust system. Non-fire rated exhaust ducting may increase the risk of fire.

Always inspect the exhaust fan and duct work for obstructions and ensure proper air flow exists before each use. Unobstructed and properly maintained exhaust fan and duct work will reduce the risk of fire and effectively extract caustic fumes and smoke.

Never engrave or cut any unknown material. Only engrave materials recommended by the manufacturer. The vaporization/melting of many materials, including but not limited to PVC and polycarbonates, can give off hazardous fumes. Always refer to the Safety Data Sheet (SDS) from the material manufacturer to determine the response of any work material to extreme heat (burning/fire hazard) to prevent hazards.

Always use the air assist as recommended by the manufacturer, especially while cutting. Cutting movements are relatively slow and apply an extremely large amount of heat to the work piece. Avoid the build-up of heat in order to reduce the risk of fire.

Keep the interior of the laser cutter, including the table tray, clean and free of debris. Clean the laser. A build-up of cutting and engraving residue and debris is dangerous and may increase the risk of fire.

Never look into the beam of the alignment laser. Eye injury can result.

Never operate the alignment laser without the focus lens or other optical elements of laser cutter in place. The unfocused beam may be reflected out of
LASER CUTTER SAFETY WARNINGS

Do not operate the laser machine with any of the panels removed. Remember that the laser beam is invisible! Exposure of the laser beam will greatly increase the risk of injury and/or fire.

Before using the laser machine, test the ground fault circuit interrupter (GFCI) provided with the supply cord to insure it is operating correctly. A properly operating GFCI reduces the risk of electrical shock.

Do not attempt to modify or defeat the safety interlock system for any reason. This could result in exposure to hazardous laser radiation.

Do not use laser cutter with extension cords. The GFCI on the machine power cord will not prevent electrical shock from the extension cords.

Comply with all codes, regulations and laws, including those for hazardous or noxious exhaust ventilation systems. Consult with federal, state and/or local authorities and applicable homeowner or condominium associations to ensure compliance of ventilation and exhaust systems. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

Consult a qualified installer or service agency for information or assistance if installation of exhaust/venting is beyond your skill level. Improper installation, adjustment, alteration, service, maintenance, or use can cause fire, electric shock or other conditions which may cause personal injury, property damage or even death.

Maintain all manufacturer recommended clearances during exhaust installation. Failure to maintain proper clearances could result in personal injury, death and/or property damage.

Wear proper personal protective equipment such as safety glasses, protective clothing and work gloves when performing exhaust connections. Failure to do so may result in personal injury.

Discontinue use and seek fresh air if respiratory or eye irritation occurs. Ensure ventilation, exhaust, and/or filtration systems are working according to manufacturer specifications and make any necessary adjustments before further use. Exposure to fumes may cause allergy, asthma, breathing difficulties or other adverse health effects.

Always use provided work piece support structure when cutting or scoring. Fabrication without honeycomb plate may lead to fire or release of stray radiation.

Do not use irregularly shaped work piece. Risk of stray radiation or fire.

Do not stack work pieces. Stacking work pieces increases the risk of fire.

Use only recommended accessories. Follow instructions that accompany accessories. Use of improper accessories may cause hazards.

Ensure tools and parts such as spacer puck, wrench, debris, etc. are removed from the honeycomb plate before starting a laser job. Objects or debris may interfere with the laser head and lead to stray radiation or risk of fire.

This product is provided with a GFCI built into the power cord plug. If replacement of the plug or cord is needed, use only identical replacement parts.

Do not try to clean exhaust ducting. The high concentration of particles may become airborne and create inhalation exposure.

Do not spill water on the Hex Box™ unit. Damage to electronics may occur.

Choice of material used during laser cutter operation and subsequent health consequences are the sole responsibility of user. Health effects of materials used may not be documented nor available.
ADDITIONAL SAFETY WARNINGS

⚠️ CAUTION ⚠️ Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Do not tap or scratch LCD screen with sharp objects. The LCD screen may become damaged.

Do not move the laser head by hand when locked. Moving a locked laser head by hand may result in damage to the gantry system and/or personal injury.

Use care when removing the tube guard. The LED lights may be damaged by contact with tube guard edges.

Never remove the mirrors for cleaning. Take extra caution to not move the orientation of the mirrors as this will affect laser beam alignment and would require time intensive laser beam realignment.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE.

SYMBOLS

IMPORTANT: Some of the following symbols may be used on the Dremel LC40 Laser Cutter. Please study them and learn their meaning. Proper interpretation of these symbols will allow you to operate the tool better and safer.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Designation / Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Volts (voltage)</td>
</tr>
<tr>
<td>A</td>
<td>Amperes (current)</td>
</tr>
<tr>
<td>Hz</td>
<td>Hertz (frequency, cycles per second)</td>
</tr>
<tr>
<td>Ø</td>
<td>Diameter</td>
</tr>
<tr>
<td>⬌</td>
<td>Alternating current (type or a characteristic of current)</td>
</tr>
<tr>
<td>⚠️</td>
<td>Alerts user to read manual</td>
</tr>
<tr>
<td>⚠️</td>
<td>Earthing terminal (grounding terminal)</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warns of high voltage. Contact with high voltage can cause death or serious injury.</td>
</tr>
<tr>
<td>⚩️</td>
<td>This fire warning icon calls attention to fire risks that are present while operating the laser.</td>
</tr>
<tr>
<td>🔥</td>
<td>This symbol designates that this tool is listed by Underwriters Laboratories, to United States and Canadian Standards.</td>
</tr>
</tbody>
</table>
X – must be at least 26" (660 mm) when using onboard fan and at least 10" (254 mm) when using external booster fan. See Exhaust Management section (p. 24) for details.

Y – 6" (152 mm) min. bend radius. See Exhaust Management section (p. 24) for details.
While the Dremel LC40 Laser Cutter can cut and etch a variety of materials, some materials such as most metals, cannot be marked and will give less than desirable results. Other materials may not have acceptable finish quality.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust Hose</td>
<td>Duct that is connected to the Dremel LC40 Laser Cutter unit to vent exhaust outside or into a filtration unit or to outside ventilation.</td>
</tr>
<tr>
<td>Exhaust Shroud</td>
<td>A metal tubing connection that is screwed onto the rear of the Dremel LC40 Laser Cutter unit over the exhaust vent fan.</td>
</tr>
<tr>
<td>Exhaust Port</td>
<td>An opening on the rear of the laser unit that allows the vent fan to draw air out of the workspace.</td>
</tr>
<tr>
<td>Firmware</td>
<td>Software that is embedded on the computer hardware of the Dremel LC40 Laser Cutter and controls its operation. Updates to the firmware will be provided by Dremel and applied to the Dremel LC40 Laser Cutter directly over the internet.</td>
</tr>
<tr>
<td>Fumes</td>
<td>Visible or invisible submicroscopic particulate matter produced and discharged from incomplete combustion, chemical reaction and/or heating of metals or metallic compound. Also refer to smoke.</td>
</tr>
<tr>
<td>Grayscale</td>
<td>Also called &quot;dither&quot;, takes a black and white image and assigns different densities of dots to visually create a number of different shades of gray. Darker areas of the image will have more dots, while lighter areas will have less dots.</td>
</tr>
<tr>
<td>Hex Box™</td>
<td>A separate and interconnected part of the Dremel LC40 Laser Cutter system that integrates the water circulation and air assist functions of the Dremel LC40 Laser Cutter.</td>
</tr>
<tr>
<td>Honeycomb Plate</td>
<td>An aluminum tray that rests on the bed and supports the work piece as it is cut and engraved.</td>
</tr>
<tr>
<td>Job</td>
<td>A project that is sent to the laser for fabrication.</td>
</tr>
<tr>
<td>Laser Head</td>
<td>An assembly of components, including a mirror, lens, and cone, which the laser passes through before making contact with the material.</td>
</tr>
<tr>
<td>LC40 Control Software</td>
<td>The laser control software that is provided on the machine and accessed by a computer through the network connection.</td>
</tr>
<tr>
<td>Laser Tube</td>
<td>A glass tube located at the rear of the laser unit that generates the laser beam.</td>
</tr>
<tr>
<td>Lens</td>
<td>A glass lens in the Laser Head that focuses the beam of the laser for optimal cutting and engraving.</td>
</tr>
<tr>
<td>Material</td>
<td>The substance of which the work piece or work is composed.</td>
</tr>
<tr>
<td>Material Library</td>
<td>A listing of materials for which suggested laser settings are predefined in the Dremel LC40 Control Software.</td>
</tr>
<tr>
<td>Mirrors</td>
<td>A set of mirrors that direct the laser beam of the laser from the tube to the work piece.</td>
</tr>
<tr>
<td>Project</td>
<td>A planned piece of work created in the Dremel LC40 Control Software which can be sent to the Dremel LC40 Laser Cutter as a job.</td>
</tr>
<tr>
<td>Raster</td>
<td>Digital art composed of horizontal and vertical rows of pixels.</td>
</tr>
<tr>
<td>Score</td>
<td>Function used to make a mark on the surface of the material when you want to emphasize the outline of text or an object</td>
</tr>
<tr>
<td>Smoke</td>
<td>The gaseous products that are produced during a combustible event made visible by the presence of a suspension of particles.</td>
</tr>
</tbody>
</table>
GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacer Puck</td>
<td>A small cylinder that is placed between the work piece and Laser Head to assist in focusing the laser.</td>
</tr>
<tr>
<td>Touch Screen</td>
<td>Touch activated full color display.</td>
</tr>
<tr>
<td>Vector Art</td>
<td>Art created using vector illustration software programs, such as Adobe Illustrator® or Corel Draw®.</td>
</tr>
<tr>
<td>Vent Fan</td>
<td>A fan located in the exhaust port that helps draw air out of the workspace. Also referred to as Onboard Fan.</td>
</tr>
<tr>
<td>Work piece</td>
<td>Also called &quot;work&quot; or &quot;material&quot;. It is the object to be cut or engraved with the laser.</td>
</tr>
<tr>
<td>Workspace</td>
<td>a) The area inside of the laser unit that is open for work piece placement and the movement of the Laser Head. b) A screen in the Dremel LC40 Control Software where a job is created. It provides a graphical representation of the intended job and its position relative to the general boundaries of the laser working area.</td>
</tr>
<tr>
<td>X-Axis Guide Rails</td>
<td>A set of rails at the rear of the laser bed that allow movement of the Laser Head to the left or right side of the workspace.</td>
</tr>
<tr>
<td>Y-Axis Guide Rails</td>
<td>A set of rails on either side of the laser bed that allow movement of the Laser Head to the front or rear of the workspace.</td>
</tr>
</tbody>
</table>

INTRODUCTION

Welcome to the world of Dremel Digilab. Our mission is to mentor you through the digital fabrication process and share best practices for bringing your ideas to life.

Laser cutting and engraving are processes that will invoke experimentation and persistence. The Dremel team is here to make your job easier with online tips, documentation, and live support. The Dremel LC40 Laser Cutter brings robust functionality such as network connectivity, recommended settings for commonly used materials, and multi-sensor checks. To get started with the Dremel LC40 Laser Cutter follow the initial setup routine on the touch screen to guide you through the hardware and software setup of the machine.

You can register your Dremel LC40 Laser Cutter and create a user profile by going to dremel.com/support/product-registration. Your profile gives you access to a variety of laser projects and support. Once setup and registration is complete, you are ready to start making.

TOOLS & SUPPLIES NEEDED FOR SETUP

- Distilled Water
- Funnel
- Scissors
- Screwdriver

Based on exhaust management method selected you may need the following:
- Building code approved sealant or duct tape
- Wire cutters
- Exhaust vent hood
- Additional flexible and/or hard duct, elbows and hose clamps.
GETTING TO KNOW YOUR DREMEL LC40 LASER CUTTER

[Diagram of Dremel LC40 Laser Cutter]

1. Lid
2. LCD Touchscreen
3. Start Button
4. USB Port (for service only)
5. Ethernet Port
6. LED Lights
7. Laser Tube Guard
8. Honeycomb Plate
9. Gantry
10. Mirror 1
11. Beam Combiner Lens
12. Mirror 2
13. Laser Head
   a. Mirror 3
   b. Focus Lens
   c. Air Assist Nozzle
   d. Laser Head Knob
   e. Wide Angle Camera
14. Power Switch
15. Power Cord
16. Hex Box™ Power Outlet
17. Air Inlet
18. Exhaust Shroud
19. Water Outlet
20. Water Inlet
21. Water Tank Cap
22. Water Tank
23. Power Inlet
24. Air Outlet
25. Water Outlet
26. Water Inlet
**LCD TOUCH SCREEN**

**WARNING** Observe all provided warnings and safety instructions prior to and when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

**CAUTION** Do not tap or scratch LCD screen with sharp objects. The LCD screen may become damaged.

The LC40 Touch Screen allows control of the basic functions of the laser without the need to connect to a computer.

1. **Status Bar** — Displays information about selected conditions of the LC40.
2. **Menu Bar** — Displays the icons and names of the Touch Screen menus.
3. **Control Interface** — Information or additional action pertaining to selected menu item.
4. **IP Address** — A unique number used to connect the Dremel LC40 Laser Cutter over a network to a web browser.
5. **Firmware Version** — Displays the currently installed firmware version.

Observe all provided warnings and safety instructions prior to and when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

Do not tap or scratch LCD screen with sharp objects. The LCD screen may become damaged.

**DM 1600A01CX8 08-18 LC40 EN.qxp_LC40  8/17/18  10:32 AM  Page 36**
# LCD TOUCH SCREEN

## Status Bar

<table>
<thead>
<tr>
<th>Status Icon</th>
<th>Name</th>
<th>What it means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ethernet</td>
<td>Dremel LC40 Laser Cutter is connected to a computer or a network router via Ethernet Port. The icon will disappear when there is no Ethernet connection.</td>
</tr>
<tr>
<td></td>
<td>Wireless</td>
<td>Dremel LC40 Laser Cutter is connected to a computer or network router via wireless. The icon will disappear either when there is no wireless connection or when the Ethernet icon is active. When LC40 is connected with both Ethernet and Wireless, only the Ethernet icon will display.</td>
</tr>
<tr>
<td></td>
<td>Water Cooling</td>
<td>WHITE: Cooling system functioning normally. RED: Cooling system needs attention.</td>
</tr>
<tr>
<td></td>
<td>Vent Fan</td>
<td>WHITE: Vent fan functioning normally. RED: Vent fan needs attention.</td>
</tr>
<tr>
<td></td>
<td>Air Assist</td>
<td>WHITE: Air assist functioning normally. RED: Air assist needs attention.</td>
</tr>
<tr>
<td></td>
<td>Lid</td>
<td>WHITE: Lid is closed. RED: Lid is open.</td>
</tr>
</tbody>
</table>

Note: Water Cooling, Vent Fan and Air Assist icons will only update in real time. (When the Hex Box™ is activated by the Dremel LC40 Laser Cutter).

## Menu Bar

- **HOME** — Access to Laser Head position controls and to test fire the laser.
- **JOB HISTORY** — Lists previously run jobs and provides option to re-run them.
- **TOOLS** — Information about the unit and settings.
- **NETWORK** — Information and access to network connection settings.

When necessary, the LCD touch screens will offer options to return to the previous screen or advance to the next screen.

- Tap to return to previous screen.
- Tap to proceed to the next screen.
**LCD TOUCH SCREEN**

**HOME > UNLOCKED**

- **LASER HOME** – Moves the Laser Head back to its origin location. Button will flash when homing is necessary.

- **JOG SPEED** – Toggles between fast and slow Laser Head movement speed. Fast is default speed.

- **TEST FIRE** – Enable the laser to fire for a short period to identify its location relative to the material.

- **Directional Arrows**
  Moves the Laser Head in direction of arrow.

- **Laser Head Locked (default)**

  **CAUTION** Do not move the laser head by hand when locked. Moving a locked laser head by hand may result in damage to the gantry system and/or personal injury.

A closed lock icon indicates that the Laser Head is locked and can only be moved using the directional arrow buttons.

Pressing the lock button toggles between locked or unlocked Laser Head setting.
HOME > LOCKED

**Laser Head Unlocked**
An open lock icon indicates that the Laser Head can be moved by hand.

Note: When Laser Head is unlocked the Directional Arrows and Speed virtual buttons are nonfunctional.

---

**JOB HISTORY**

This tab displays jobs received by the Dremel LC40 Laser Cutter.

As received from the factory, this list is empty. The Factory Reset option will clear Job History. Job creation is explained in the Software Section.

Once a job is sent from the software to the laser, it will appear in the job history tab.

**NAME** – the name of project job(s) within the Job History list.

**RUN TIME** – required time to complete project.

 Allows a preview of the job and opens the sub-menu for the job.
LCD TOUCH SCREEN

JOB HISTORY

This screen displays options for the Job selected from the list.

DELETE – Delete files from the Job History list.

RUN PERIMETER – Executes the run perimeter.

NEXT – Changes the text to LOADING. The Job will prepare to start.

Note: If a job is rerun, the system safety checklist will appear (see Operation Screens, page 54).
DREMEL LC40 CONTROL SOFTWARE

This section introduces the major interface features of the LC40 Control Software. The LC40 Control Software is a combination of print driver and control software that communicates with, downloads jobs to, and controls the laser system. There is no download required to operate the LC40 Control Software. The LC40 Control Software will link a web browser with the Dremel LC40 Laser Cutter using the IP address (found at the bottom of the LCD home screen) on the local connection (Wireless or Ethernet).

1. **Menu Bar** — includes the following menu options: File, Edit (shown when a project is opened), and Help.

2. **Tool Bar** — includes the following tools: Import, Undo, Redo, Auto Array, Material, Time, Options, Run Perimeter, and Start.

3. **Workspace** — On-screen area where a job is created. Provides a graphical representation of the intended job and its position relative to the general boundaries of the laser working area.

4. **Project Name** — displays the name of the current project.

5. **Zoom In** — enlarges workspace screen detail.

6. **Zoom Out** — reduces workspace screen detail.

7. **Return to Default Size** — auto size to fit window.

8. **Status** — displays status of the current project.
DREMEL LC40 CONTROL SOFTWARE

Menu Bar

A  B  C

LASER CUTTER  FILE  EDIT  HELP  PROJECT NAME: JOB 1

A. FILE
OPEN — select to open a file.
IMPORT — import a file or use the camera capture feature to create a file or place a picture of your laser bed in the background of your workspace.

B. EDIT
REDO — to redo most recent action/change.
UNDO — to undo most recent action/change.
COPY — select to copy the object that is highlighted.
DUPLICATE — select to duplicate the object that is highlighted.
PASTE — select to paste the object that is highlighted.
FLIP HORIZONTAL — select to flip horizontal the object that is highlighted.
FLIP VERTICAL — select to flip vertical the object that is highlighted.
ROTATE RIGHT — select to rotate right the object that is highlighted.
ROTATE LEFT — select to rotate left the object that is highlighted.
SELECT ALL — select to select all.
DESELECT ALL — select to deselect all.

C. HELP
ABOUT YOUR LASER — select to see more details about your Dremel LC40 Laser Cutter.
MANUAL — select to access the Dremel LC40 Laser Cutter Operating/Safety Instructions.
TUTORIALS — select to access tutorials for your Dremel LC40 Laser Cutter.
FAQS — select to access a list of frequently asked questions with answers.
PROJECT INSPIRATION — select to browse project inspiration.
CUSTOMER SERVICE — select to access customer service contact info.
DREMEL LC40 CONTROL SOFTWARE

Tool Bar

<table>
<thead>
<tr>
<th>IMPORT</th>
<th>UNDO</th>
<th>REDO</th>
<th>AUTO ARRAY</th>
<th>MATERIAL</th>
<th>TIME</th>
<th>OPTIONS</th>
<th>RUN PERIMETER</th>
<th>START</th>
</tr>
</thead>
</table>

A IMPORT
Click to import a file or use the camera capture feature to create a file or place a picture of the Honeycomb Plate in the background of the workspace. Alternatively, the file can be dragged and dropped directly into the workspace.

FILE – Use import/file to bring in a file as typically done in other software programs. For PDF files the options are to bring in only cut files, only engrave files, or both. Select the option from the drop down menu. All other file types will default to either engrave or cut based on their optimal application.

CAPTURE – Use import/capture to access the camera capture feature. This can be used to capture a picture of the actual work piece on the Honeycomb Plate and place the image into the background of the LC40 Control Software workspace. Additionally, the camera can take a picture of a sketch placed on the Honeycomb Plate, and transform that sketch into a file which can be engraved or cut.

B UNDO
Click to undo most recent action/change.

C REDO
Click to redo most recent action/change.

D AUTO ARRAY
Choose the object to duplicate. Then click and highlight the number of times to duplicate the object.
DREMEL LC40 CONTROL SOFTWARE

**E MATERIALS**

**WARNING** Observe all provided warnings and safety instructions prior to and when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

**WARNING** Never engrave or cut any unknown material. Only engrave materials recommended by the manufacturer. The vaporization/melting of many materials, including but not limited to PVC and polycarbonates, can give off hazardous fumes. Always refer to the Safety Data Sheet (SDS) from the material manufacturer to determine the response of any work material to extreme heat (burning/fire hazard) to prevent hazards.

Click to select a material from the list of Dremel provided commonly used materials, or choose "more" to add/delete/edit the list of favorite materials. Use the star to denote a default material that will be saved and used for all jobs, until changed. The settings that are populated when a material is selected will be applied to all files brought in, unless edited in the print settings box, or changed in the materials list.

**F TIME**

Click to calculate a rough estimate of how long the job will take to complete.

**G OPTIONS**

Displays more advanced settings and defaults.
**DREMEL LC40 CONTROL SOFTWARE**

### RUN PERIMETER

Laser head will move along the exterior perimeter of the job. Click again to stop this motion, otherwise it will continue running.

**PAUSE** – Appears once a job starts and will pause the job.

**START**

This button will send the job to the laser.

**STOP** – Appears once the job starts and will cancel the job.

### PRINT SETTINGS

A print settings box will pop up when clicking on an imported file. There are two tab options at the top (Cut/Score and Engrave), and only the ones that are applicable for that file type will be highlighted. This box can be moved anywhere on the screen simply by dragging it. The gear button in the top right corner will expand “advanced” settings for more control. The “X” will minimize the box and can be reopened by clicking on the pencil that appears.

### CUT

This function is used when cutting through a work piece. This function is also called “vector” since a vector, or line file is needed in order to execute. The Laser Head will follow the lines of the file. The LC40 Control Software will detect up to 21 different colors in a line file and allow adjustment of the print settings based on those colors. The order that the different colors are cut can be adjusted in the print preview screen once ready to send.

### HEAT

Adjust how quickly the laser is firing, or how much heat is generated on the surface of the work piece. Turning up the heat will cause charring for materials like wood or paper, but will create a glossy edge for a material like acrylic.

### SPEED

Adjust how quickly the Laser Head moves. Slowing the Laser Head down allows it to cut deeper into the work piece, while turning the speed up prevents the cut from going as deep.

### DEPTH

Adjust to control how deep the laser will go into the work piece. Turning up the depth will increase the likelihood that the work piece will be cut all the way through.

### # OF PASSES

Adjust to control how many times the laser traces over the lines. Increasing the number of passes means the laser will execute that job, then immediately execute it in the exact same location however many times entered. Increasing the number of passes can be an effective way to ensure the work piece is cut completely through, especially as the thickness of the material increases.

### SCORE

This function is used when it is preferred not to cut all the way through the work piece. This function requires a vector, or line type file and is most useful when emphasizing the outline of text or an object. It is very similar to “cut,” but the software will default to less powerful settings, in an attempt to mark the work piece, but not cut all the way through it.
ENGRAVE

This function darkens or removes the surface of the work piece, rather than cutting through it. This function is also known as “raster” and will require an image file to execute. The Laser Head will move side to side like an inkjet printer.

Reducing the depth will keep the surface of the work piece relatively flat or even.

SPEED – Adjust how quickly the Laser Head moves. Slowing the Laser Head down will generally make the engraving darker or deeper, while increasing the speed typically results in a lighter finish.

RESOLUTION – 3 different resolution options are available: low, medium, high. This setting adjusts the DPI (dots per inch) in the image, the low setting will be faster and lighter than the high setting. In low setting the resolution is pixelated, or individual dots are easy to see. The high setting will result in a less pixelated final result.

JOB PREVIEW

After pressing “start” the PREVIEW screen allows review of all the settings and placement of the files before sending the job to the laser. Changes can be made to the order the files execute. By default, engraving is completed first then cutting. If other settings need to be adjusted, exit out of this box before sending the job. If everything looks correct, the job can be sent to the laser. The physical Start Button on the laser must be pressed twice before the job will begin.
OPERATING THE LASER CUTTER

⚠️ WARNING ⚠️
Observe all provided warnings and safety instructions prior to and when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

⚠️ WARNING ⚠️
Always use a properly configured, installed, maintained, and operating fume/smoke exhaust system as recommended by the manufacturer when operating the laser system. Caustic fumes and smoke from the engraving process must be extracted from the laser system and exhausted outside.

⚠️ WARNING ⚠️
Always inspect the exhaust fan and duct work for obstructions and ensure proper flow exists before each use. Unobstructed and properly maintained exhaust fan and duct work will reduce the risk of fire and effectively extract caustic fumes and smoke.

⚠️ WARNING ⚠️
Never engrave or cut any unknown material. Only engrave materials recommended by the manufacturer. The vaporization/melting of many materials, including but not limited to PVC and polycarbonates, can give off hazardous fumes. Always refer to the Safety Data Sheet (SDS) from the material manufacturer to determine the response of any work material to extreme heat (burning/fire hazard) to prevent hazards.

⚠️ WARNING ⚠️
Choice of material used during laser cutter operation and subsequent health consequences are the sole responsibility of user. Health effects of materials used may not be documented nor available.

⚠️ WARNING ⚠️
Discontinue use and seek fresh air if respiratory or eye irritation occurs. Ensure ventilation, exhaust, and/or filtration systems are working according to manufacturer specifications and make any necessary adjustments before further use. Exposure to fumes may cause allergy, asthma, breathing difficulties or other adverse health effects.

This product uses a laser beam to rapidly heat, melt and partially or completely vaporize the material, creating a number of gases and particulate matter. These byproducts of laser operation can, in some cases, pose health risks to those exposed to them.

To reduce or minimize exposure to their health hazards, always use an appropriate exhaust ventilation and/or filtration system and carefully choose your material. When using materials other than those suggested by Dremel, ask the manufacturer for the Safety Data Sheet (SDS) for each material. The SDS “Hazards Identification” section will provide information to help determine if the material or its by-products are harmful. If the material does not have an SDS, consult the manufacturer to determine if the material generates toxic gases and/or dust, and if it presents fire or explosion hazards.

Representative materials listed in Table 1 may be used with a properly installed and maintained exhaust ventilation and/or filtration system when used as described in Table 3. However, these materials can vary in composition depending on manufacturer and other factors. Dremel has not tested all possible combinations and not all materials have documented health effects when used with a laser cutter. As such, the user is solely responsible for material choice and subsequent health consequences.

The Dremel LC40 Laser Cutter may be used with several exhaust management methods to manage the exhaust created during laser fabrication. Always ensure the exhaust management system is properly functioning. Refer to the Exhaust Management section on page 24 for proper exhaust ventilation and/or filtration methods. Exhaust ventilation and/or filtration systems may not be able to remove all hazardous substances or reduce their concentration to acceptable levels, so never use materials that are prohibited (see Table 2). Always check https://digilab.dremel.com/support/faq for the latest material information.
Laser Cutting / Engraving Prohibited Uses & Restrictions

The Dremele LC40 Laser Cutter may be used only for lawful purposes. Dremel does not recommend nor endorse the use of the Dremel LC40 Laser Cutter to create material that is:

i. Prohibited by local, state or federal law;

ii. Unsafe, harmful, dangerous, poses an immediate threat to the well-being of self/others, or is otherwise inappropriate for the environment; or

iii. In violation of another's intellectual property rights. For example, the Dremel LC40 Laser Cutter will not be used to reproduce material that is subject to copyright, patent or trademark protection.

iv. Used as a structural component - The use of parts made must be thoroughly evaluated by a competent professional prior to being included in any structure; or

v. In contact with or consists of food; Prior material use may transfer and contaminate food.

Never attempt to cut or engrave human or animal tissue.
OPERATING THE LASER CUTTER

Before the Dremel LC40 Laser Cutter can be used, a project must be created. The project is then sent to the Dremel LC40 Laser Cutter as a job and fabrication begins. When done, the work piece is ready for removal from the unit. The following steps cover the process from beginning to end.

Sequence of Operations:
1) Create a Project.
2) Place work piece on the Honeycomb Plate.
3) Focus the Laser Head.
4) Send the job to the Dremel LC40 Laser Cutter.
5) System check.
6) Run the Job.
7) Finish the job.

Step 1: Create a Project

Projects are constructed by opening the workspace in the LC40 Control Software and importing a file (or files). The files are available from (3) sources:
A) Creating files in a graphics program.
B) Importing previously created files.
C) Using the camera capture feature.

Most files are created through the use of software such as CorelDRAW®, Adobe Illustrator® or other graphic software. Depending on the software and how the file was created, a project is developed to run a job that will allow the Dremel LC40 Laser Cutter to cut, engrave and/or score the material. Table 5 below lists several file types which can be imported into the LC40 Control Software. Please refer to the graphic software manufacturer’s instructions regarding creation of vector or image files.

<table>
<thead>
<tr>
<th>Extension</th>
<th>File Type</th>
<th>Laser Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cut</td>
</tr>
<tr>
<td>.SVG</td>
<td>Vector</td>
<td>X</td>
</tr>
<tr>
<td>.PDF</td>
<td>Vector/Image</td>
<td>X</td>
</tr>
<tr>
<td>.JPEG</td>
<td>Image</td>
<td></td>
</tr>
<tr>
<td>.PNG</td>
<td>Image</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Compatible File Types and Laser Processes
Operating the Laser Cutter

Source A) & B) File Preparation Details

Most designers use software such as CorelDRAW® or Adobe Illustrator® to create the design files to import into the LC40 Control Software, but pictures that have been taken with a camera can also be used. Any software can be used that exports PNG, JPEG, PDF, or SVG files.

The LC40 Control Software accepts both vector (SVG or PDF) and image (JPEG, PDF, PNG) based files. It is best to think of “cut” and “engrave” separately when designing for the Dremel LC40 Laser Cutter. Vector file types are optimal to cut something out of a material, or trace along lines with the Dremel LC40 Laser Cutter. Image file types are optimal to engrave into the surface of a material with various levels of intensity.

In order to use the file created in the design software, simply “save as” or “export” your file as one of the above file types. It is best to save parts of the file that will have applied different laser settings or applications to, as different files before importing.

By default, the LC40 Control Software will recognize different colors in vector files and allow the application of different settings based on those colors. For a single image file, the same print settings need to be applied to the entire file.

For example, to engrave the dark area in this image in a dark shade, and the white in this image in a light shade, it is best to export the dark area and the white text and circle outline as two separate files:

- dark engrave (image file) + light engrave (image file) = light and dark engrave

A similar output could be obtained by bringing in a single image file and applying “grayscale”. In this case, however, the engraving will fill the object with tiny dots, rather than appearing solid.

Similarly, to engrave the dark area and cut out the white text, it would be best to save the text outline as an SVG or PDF and the dark area as an image file:

- dark engrave (image file) + text outline (vector file) = text and circle cut out

Multiple files can be sent to the Dremel LC40 Laser Cutter as a single job. Simply import multiple files. If multiple files are exported from the same source file, the LC40 Control Software will place them on top of one another by default.
Source C) On-board Camera Capture

There are two ways to use the camera capture feature. The first way is to use the camera to pull a picture of the material into the background of the LC40 Control Software. Being able to see the size and location of the work piece in the software helps with aligning imported files, and reduces wasted materials. This is especially useful when wanting to cover the entire surface, to place a file in an exact location (center, near an edge or corner, etc), or if it is a small piece of material.

In order to use this function (Option 1):

1. In the LC40 Control Software, go to IMPORT menu. Click on IMPORT>CAPTURE.

2. Follow the on screen instructions — Place the material onto the center of the Honeycomb Plate and close the Lid. Click “NEXT”.

3. The LED Lights in the laser will flash off, and a red dot will appear. If the red dot is not on top of the work piece, adjust the work piece and start again with step 1.

4. The camera will then capture 9 different images of the bed and stitch them together.

5. Click “Done” to place this image into the background of the workspace.

6. The background image can be cleared at any time by going to Import>Clear Capture.
Once the project file(s) are created they can be imported into the Dremel LC40 Laser Cutter and executed.

1. Import, drag and drop a file, or use the camera capture to begin a project.

Import PDF or SVG files for objects you would like to cut or score.
Import JPEG, PNG, or PDF files for objects you would like to engrave.

More than one object can be sent to the Dremel LC40 Laser Cutter in a single job by importing multiple objects into the same workspace.

6. Choose whether the file will be engraved or cut, and whether the background image should appear in the software by toggling the switches on or off and then click “done”.

7. The background image can be cleared at any time by going to Import>Clear Capture. The cut or engrave files can be cleared by hitting “delete” on the keyboard.
OPERATING THE LASER CUTTER

2. Select the material type and thickness. The material library will automatically populate suggested cut and/or engrave print settings based on the material and thickness selected.

3. Move, scale, and adjust objects to the desired orientation. More precise adjustments can be made in the bottom left side of the screen.

4. Adjust print settings as needed. If the settings are changed in this box, they will override Dremel recommended settings until a new material is selected. The top right side of the print settings box will unlock more precise setting options. Review job and job execution order to make sure the desired result.

5. Send the job to the Laser.

If you would like to save a job to your computer to repeat again later go to File/Save. The job will be saved in a .bin format and will contain each object, its location, and its print settings.
Step 2: Place Material on the Honeycomb Plate

**WARNING** Observe all provided warnings and safety instructions when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage or personal injury.

**WARNING** Never engrave or cut any unknown material. Only engrave materials recommended by the manufacturer. The vaporization/melting of many materials, including but not limited to PVC and polycarbonates, can give off hazardous fumes. Always refer to the Safety Data Sheet (SDS) from the material manufacturer to determine the response of any work material to extreme heat (burning/fire hazard) to prevent hazards.

**WARNING** Always use provided work piece support structure when cutting or scoring. Fabrication without Honeycomb Plate may lead to fire or release of stray radiation.

**WARNING** Do not use irregularly shaped work piece. Risk of stray radiation or fire.

**WARNING** Do not stack work pieces. Stacking work pieces increases the risk of fire.

Place the work piece inside the laser on the Honeycomb Plate, Fig. 43. Always place the work piece on the Honeycomb Plate for cutting jobs. For engraving or scoring thicker pieces of material, the Honeycomb Plate can be removed and the work piece placed directly placed on the surface that supports the Honeycomb Plate. If it is an irregularly shaped work piece (such as a cylinder), place the work piece anywhere on the laser bed and use the camera capture feature in the LC40 Control Software to align the design with the work piece. Be careful not to damage any part of the machine during this process. The Laser Head can be moved out of the way by hand if necessary, by pressing the “unlock” button on the LCD Touch Screen.

Make sure the work piece sits flat on the Honeycomb Plate. If the work piece is not flat, the Laser Beam will be out of focus. If the difference in flatness of the lowest spot to the highest spot or your work piece is more than 1/8" the Laser Head could touch or move the work piece out of position. Depending on the job, the work piece can be aligned with the top left corner of the Honeycomb Plate, or placed at any location on the Honeycomb Plate.
Step 3: Focus the Laser Head

The bottom of the Laser Head must be at the correct distance from the top surface of the work piece in order to cut or engrave a clean image.

To focus the Laser Head (Fig. 44):

1. Move the Laser Head so that it hovers over your work piece, either by pressing the arrow buttons on the LCD Touchscreen, HOME menu, or by pressing “unlock” and moving the Laser Head manually with your hand.

2. Loosen the Laser Head Knob (left hand side of the focus lens). Loosening the knob frees up the focus lens to move up and down.

3. Raise the Laser Head and place the Spacer Puck between the Laser Head and the work piece.

4. Let the Laser Head rest on the Spacer Puck and tighten the Laser Head Knob to fix the Laser Head in place.

5. Remove the Spacer Puck.

Note: If the work piece to be engraved is too thick to fit in the laser with the Honeycomb Plate, remove the Honeycomb Plate and place the work piece directly on the surface that supports the Honeycomb Plate. However, this is only recommended when engraving. Do not do this if the material needs to be cut.
**Step 4: Send the Job to the Laser**

Close the Dremel LC40 Laser Cutter Lid. The “Run Perimeter” feature on the LCD laser screen or in the LC40 Control Software can be utilized to ensure that the work piece and the design are aligned. The “Run Perimeter” feature moves the Laser Head around the perimeter of the job as it is set up in the software.

Send the job file to the laser so the laser can perform its system checks. From the LC40 Control Laser Software toolbar click “START” to run the job.

**Step 5: System Check**

Review the screen to make sure that all four system icons are white, indicating the system is ready to run.

If any icons are red, the Dremel LC40 Laser Cutter Touch Screen will notify you that these systems need to be fixed before beginning the job. Touch the “?” next to the appropriate line item for help diagnosing and correcting each error.

Refer to Touch Screen information starting on page 36 for additional information.
OPERATING THE LASER CUTTER

Step 6: Run the Job

⚠️ WARNING ⚠️ Observe all provided warnings and safety instructions prior to and when using the Dremel LC40 Laser Cutter. Failure to do so may result in fire, equipment damage, property damage and/or personal injury, up to and including death.

⚠️ WARNING ⚠️ Always use a properly configured, installed, maintained, and operating fume/smoke exhaust system as recommended by the manufacturer when operating the laser system. Caustic fumes and smoke from the engraving process must be extracted from the laser system and exhausted outside.

⚠️ WARNING ⚠️ Never operate the laser cutter system without constant supervision of the cutting and engraving process. Exposure to the laser beam may cause ignition of combustible materials and start a fire.

⚠️ WARNING ⚠️ Always use the air assist as recommended by the manufacturer, especially while cutting. Cutting movements are relatively slow and apply an extremely large amount of heat to the work piece. Avoid the build-up of heat in order to reduce the risk of fire.

⚠️ WARNING ⚠️ Do not operate when access door is open. An open door can lead to stray radiation, increased exposure to hazardous vapors or burn hazard.

Note: If an external ventilation system is being used, make sure that it is operating before starting the job.

Ensure tools and parts such as Spacer Puck, wrench, debris, etc. are removed from the Honeycomb Plate before starting a laser job.

On the Touch Screen, verify that all system warning icons are still white.

Press the Start Button twice to start the job (Fig. 45).

Step 7: Finish the Job

Once the job is complete, wait at least 30 seconds before lifting the glass Lid and removing the finished part and remaining material from the Dremel LC40 Laser Cutter.

1. Verify that the Laser Head is not firing and has stopped moving.

2. Wait 30 seconds, and then open the Lid to get access to the parts.

3. If the Laser Head is above the part, unlock the Laser Head by pressing the “Unlock” button on the HOME menu of the Touch Screen and then move the Laser Head to the top left corner by hand.

4. Carefully remove all pieces from the Honeycomb Plate. Be careful not to damage any part of the Dremel LC40 Laser Cutter during this process.