

ACRYLIC CANOPY AND LEXAN WINDOW HINTS

Definitions

Plexiglas or Poly(methyl methacrylate) (PMMA) is a transparent thermoplastic often used as a light or shatter-resistant alternative to glass. This material is specifically used for canopies and windows contained in RV Finish Kits.

Lexan or polycarbonate resin thermoplastic is the brand name for polycarbonate sheet and resin in a wide range of grades. This material is used specifically for the RV-12 aft window.

The Plexiglas canopy bubble and Lexan window are one of the most expensive and fragile components in the kit. Mis-handling, scratching, and cracking them are one of the most disappointing and gumption-robbing experiences a homebuilder can have. Below are a few general Do's and Don'ts.

Safety

Most of us understand the importance of Shop Safety. Eye, ear, and respiratory protection are essential when fabricating Plexiglas and Lexan. Die grinders will cut fingers without a second thought, turn at very high rpm, and can throw chips and dust at un-dodgable velocities. Two hands are recommended to guide this tool. Drill bits can also break and become flying hazards so eye protection is a must. Remember to support your work well and use gloves when it makes sense.

Handling

The canopy is the most vulnerable to cracks when it is moved or flexed when there are un-deburred or finished edges or holes. Be especially cautious when the canopy is in this state. Plexiglas and Lexan are dramatically less brittle when warm. Do not try to work on these materials in a cold shop. Cutting or drilling the acrylic transparencies in temperatures under 60° F is asking for trouble. Heat the shop to 75-80° -- it may be uncomfortable to you, but your canopy loves it. Many builders will put a small space heater under the canopy when trimming, just as insurance. Take care not to overheat the canopy. Too hot is when any part of the canopy is hotter than "warm to the touch". More than one builder has melted a canopy in an attempt to make sure it is "warm enough". Localized heat is as bad as no heat and can deform the canopy. Be cautious when fitting your canopy over small protrusions and/or transitions in canopy frame tubing diameters. You might elect to shim the tubing surfaces so that the acrylic isn't pinched or bridged over a given area.

Cutting

Cutting discs, supplied with the kit, do an excellent job when used in a high-speed die grinder. If a die grinder is not available, an electric drill will work but you will have to make several passes going a little deeper each time until you penetrate through. Practice on the flanges of the canopy for both the cutting and drilling operations. Work slowly at first pass to begin cutting an initial slot and to gain confidence with the procedure. Once the initial slot is made, continue cutting through the material. Once cut, the edges should be smoothed and rounded with a scraper. Do not leave the edges rough. Ensure that no edge has a sharp corner.

CAUTION: DO NOT try to use a saw of any kind. You might get away with it once or twice, but eventually you will crack the canopy.

Drilling

Special Plexiglas/Lexan drills are available from tool suppliers. Diamond Dust drills and Unibits are a couple of such recommended tools. Clamping a piece of wood to the acrylic material and drilling through into the wood can eliminate chipping on the backside of drilled holes. Start drilling the warmed acrylic with slow speeds and light pressure. Increase speeds and pressures as you progress. As the drill bit starts to go through the canopy, reduce the speed and pressure so that the drill bit penetrates through slowly. It is important to deburr both sides of the holes lightly with a machine countersink. No hole should have a sharp corner.

Practice drilling holes in scrap pieces until you are familiar and confident with the process. It is important to remember that heat from the machining and drilling processes *may* change the acrylic characteristics some to allow some of the approved products to affect the material. This is an important reason to cut slowly and avoid overheating the acrylic material.

Use of a step-drill (Unibit) or reamer is recommended for hole enlargement.

CAUTION: DO NOT use a regular twist drill as they have tips that tend to fracture the acrylic. Using a regular twist or plexi drill to enlarge a pre-drilled hole is not recommended and will almost guarantee to crack a canopy.

Fiberglass Bonding, Cracks, Etc.

Be certain to use ONLY epoxy resins. Do *not* use the more common polyester or vinyl ester resins. They are not compatible with Plexiglas and cause crazing that will ruin the canopy. We have had excellent luck with West Systems Epoxy products, available from boat yards and mail order houses.

Cracks... Seriously avoid jeopardizing or cracking the canopy at all costs. If the worst does occur and you develop a crack, they may sometimes be fixed using a solvent adhesive such as Plasti-Fix or Weld-On 3. Stop-drilling the crack is typically required to keep it from running.

CAUTION: DO NOT use Polyester resin of any type, as it will cause crazing.

Cleaning And Use Of Liquids

For general cleaning use Dawn dishwashing liquid or equivalent and water followed by a clear water rinse. To prevent water spots, blow dry with compressed air or wipe dry with soft cotton flannel. Plexus, Sprayaway #848 Industrial Plastic Cleaner, or All Clear can also be used for day to day cleaning. Grease, oil, tape residue, etc. may best be removed with Mineral spirits, refined kerosene, white gasoline, naphtha, or isopropyl alcohol. Wash approved solvents off of canopy with Dawn dishwashing liquid and water. It is best to avoid using products that are not specifically formulated for acrylics on your canopy such as Rain-X or Lemon Pledge.

CAUTION: DO NOT use Loctite, aromatic solvents, acetone, benzene, ethyl acetate, carbon tetrachloride, lighter fluid, lacquer thinners, gasoline, toluene, window sprays, concentrated alcohols, ketones, scouring compounds, ammonia, or 409 cleaner on or around acrylic or Lexan canopy materials.

CAUTION: DO NOT allow electrical tape or auto fuel to come into contact with Lexan as it will also cause crazing. This is a particular issue to beware of when refueling the RV-12.

Scratch Removal

Small scratches can be buffed out with Meguiar's Mirror Glaze #17. For deep scratch removal, use Scratch Off , Micro Mesh, or 3M Window Repair kits. Avoid removing scratches in critical areas where clear visibility is important, as the process will usually result in some degree of optical distortion.

Canopy Protection and Ventilation

If the aircraft is tied down outdoors and subject to weather elements for any length of time, then the use of an aircraft canopy cover is highly recommended. The cover will protect canopies and windows from abrasive dust, dirt, and sand kicked up by wind or prop wash. Before purchasing, verify that the canopy cover is NOT waterproof as the trapped moisture and heat from the sun can be deleterious. Acrylic subjected to this treatment over a period of time may turn slightly milky and eventually crazes.

Keep your canopy ventilated or covered when your aircraft is parked in the hot sun. Cabin temperatures can easily reach 150-200 degrees F even on a mild day. The acrylic can generally take these temperature conditions multiple times without any apparent adverse effect. It is the cumulative affect that will cause shortened service life of your canopy. The use of a Van's Aircraft Canopy Cover will significantly reduce the internal temperatures inside your aircraft to just a few degrees above outside ambient temperatures. Additionally it will also protect your expensive avionics from heat and your upholstery/seat belt harnesses from harmful UV rays.

In winter conditions, ensure that the cabin and canopy is warmed adequately prior to flight if possible. A heat lamp or small, low output ceramic space heater can raise the cabin temperature to warm the acrylic, keeping it free from ice or snow. It will also be less prone to cracking.