

FORMED HEADLINERS

Over the years, Cessna experimented with several types of formed headliners. With appropriate guidance, these headliners are straightforward to remove, repair, and reinstall. **By Dennis Wolter**

“New and improved!”

Have you heard that before? Well, I definitely take that concept with a grain of salt. As the 1960s came to a close, Cessna was looking for ways to cut manufacturing and labor costs. The skilled labor and time required to fabricate and install stretched, soft-material headliners was getting the attention of the bean counters.

The fix was to fabricate heat-molded, semi-rigid light foam, two-piece headliners that could easily accommodate the less-complex shapes of new Cessnas with the Omni-Vision rear windows.

Foam headliners

The first material Cessna selected was a self-skinning, semi-rigid urethane of approximately 3/16 of an inch thickness. Once heated to about 200 F, it could be vacuum-formed into the compound shapes needed to create a Cessna headliner. This method required far less skilled labor to manufacture, install, and remove than the stretched headliners.

What's not to like about that? Well, here is what is not-so-improved about these head-

liners. This material is non-thermal-setting, meaning that if it is reheated, it will slightly expand and become soft enough to lose its designed shape. This creates headliner sagging when airplanes are exposed to high temperatures.

Another problem occurs when years of exposure to chemicals in the atmosphere, high-phosphate cleaning agents, and numerous hot and cold thermal cycles result in the headliners shrinking in winter, expanding in summer, and becoming quite brittle. Not so improved, huh?

Kydex headliners

By the mid-1970s, Cessna switched from the semi-rigid,

Self-skinning urethane semi-rigid foam material.

thin foam headliners to a hard, thin, non-thermal-setting plastic known as Kydex. This material, less delicate and slightly lighter in weight, is the same stuff used to make Cessna's lovely plastic window frames. Kydex headliners have the same advantages and disadvantages as the semi-rigid foam headliners.

Here's the good news about both “new and improved” types of headliners. All you need to do to re-form non-thermal-setting plastic and semi-rigid headliners is to heat the deformed area with a heat gun to approximately 210 F, and push and hold the deformed place

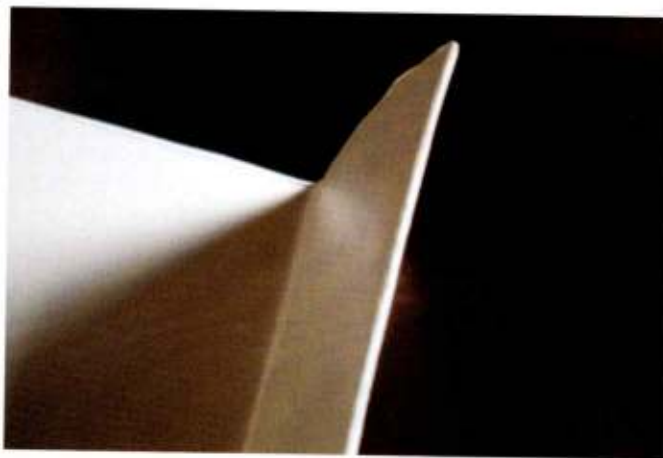




Molded Kydex rigid thin
plastic headliner.



Non-thermal-setting materials exposed to high temperatures become soft and deformed.



Thin, rigid Kydex plastic.



Using heat guns and a wood shape to re-mold a headliner into its original designed shape.

back to its original shape.

We use scrap aluminum or contoured wood shapes that will hold the heat-softened material in its intended shape while it is cooled with either compressed air or cold, wet rags. You should practice this procedure with scrap material before attempting to re-form a big, expensive headliner.

Once the headliner is re-formed, it will be necessary to bond formed 0.020-inch 2024T-3 aircraft aluminum to the back surface of the re-formed areas. We first rough up the surface of the aluminum with 80-grit sandpaper and apply a coat of upholstery contact cement to the clean back surface of the headliner as well as the roughed-up aluminum.

Allow the adhesive to tack up. Read the tacking times on the label! Then bond the formed aluminum to the back surface of the headliner. This process will thermally stabilize the heat-sensitive headliner and prevent any heat-induced warping and sagging in the future.

No discussion about Cessna interior plastic components would be complete without delving into the process of repairing this stuff.

The first step is to re-form the clean plastic back to its designed shape. Then, using thin Polyfix adhesive (available from Aircraft Spruce), bond the cracked place back together followed by an application of a thin reinforcement layer of



Using scrap aluminum and clamps to hold a heat-warped Kydex plastic component in its designed shape as it is heated and cooled.

Hobbico 2-ounce fiberglass cloth bonded to the back surface with the thin Polyfix. We apply two layers of this strength-enhancing fiberglass cloth to the back surface of the repaired area.

Finally, a thin layer of regular automotive body filler is applied, sanded, and primed on the finished surface. The entire headliner can be prepped and painted with semi-gloss SEM spray paint or acrylic lacquer.

(Find more about repairing Cessna plastics by reading Dennis Wolter's "Prepping, Priming, and Painting Interior Plastic Parts," in the January 2020 issue of Cessna Flyer. —Ed.)

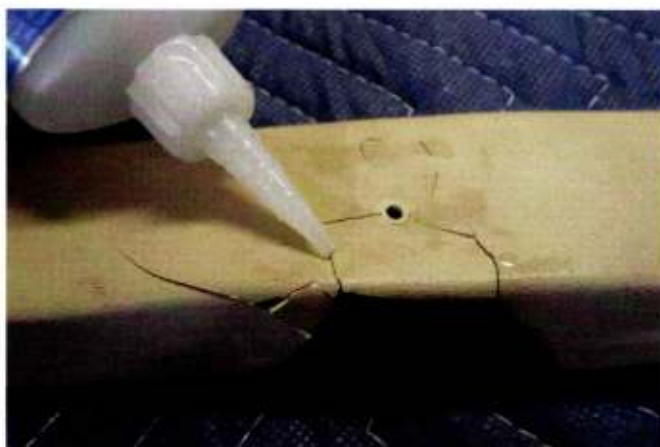
Headliner overlays

Let's now discuss the idea of covering these hard plastic headliners. Beginning in 1981, I bonded some stretchy, tightly woven, French-made material to my own headliner as well as to several customers' headliners. This material was very stretchy in two directions, making it possible to fully bond it to the very compound shapes of the molded headliner. This material was no longer available after about 1990.

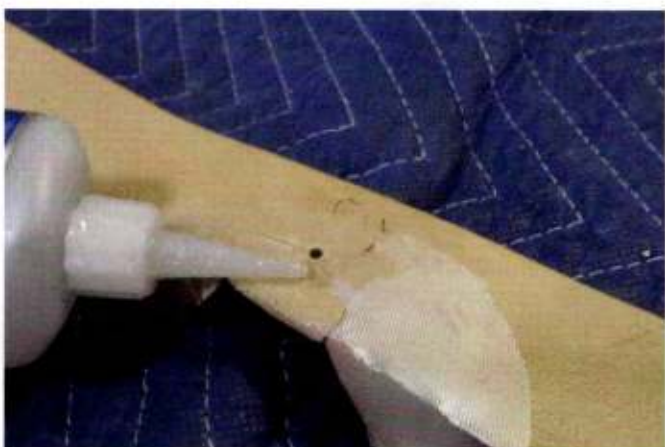
In an effort to continue to offer this option to our customers, we tried using countless different, somewhat stretchy



A re-molded plastic Cessna headliner with formed aluminum, thermally stable, bonded-in-place panels. These panels won't ever deform in the future!



Once re-formed, the broken plastic pieces are bonded together with water-thin polyfix.



2-ounce fiberglass reinforcement cloth being bonded in place with water-thin polyfix on both sides of the plastic.



Reinforced and repaired part ready to be cosmetically finished with automotive body filler and sandable primer.

materials with very limited success. We even tried sewing multiple pieces of contoured, shaped material together and were disappointed with the results. Over time, we had to replace several plastic headliners (under warranty) to which we had bonded material. As the material shrank with age, the adhesive degraded. Ouch!

Foam headliner repair

Moving to the earlier semi-rigid urethane foam headliners, the repair process is the same as the process of repairing hard plastic headliners, with one difference. Due to the more flexible nature of these semi-rigid headliners, ordinary less-flexible automotive body filler cannot be used. Instead we use flexible, sandable filler sold under the name of Evercoat Polyflex.

This material is applied and finished in the same way as when using standard body fillers, but is flexible enough to hold up well when applied to semi-rigid headliners.

Once repaired, these semi-rigid headliners can be painted with the same products

and processes as the hard headliners.

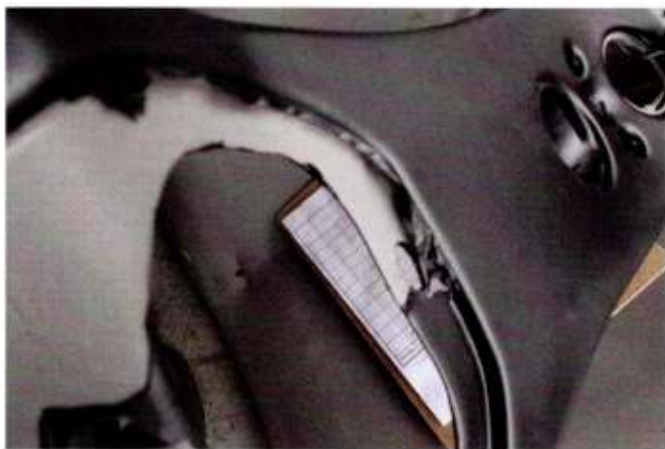
Newer Cessna headliners

A classic example of the dubious value of a new-and-improved headliner is seen when we remove the interiors in airplanes currently being produced by Cessna. In a never-ending effort to save weight, Cessna fabricated all the cabin interior trim plastic (including molded headliners) using thinner plastic. This much younger material is definitely more prone to cracking than the now 40- to 50-year-old plastic that we find in legacy airplanes.

Adding to this problem is the fact that this new plastic is vacuum-formed from sheets of material that has a very thin and delicate layer of colored vinyl bonded to its finish surface. This makes it impossible to apply fiberglass cloth, Polyfix, fillers, and finish primers and paints to the thin vinyl surface.



Poly-flex sandable cosmetic filler used on the finished surfaces of semi-rigid, self-skinning, early plastic headliners.



The only finish that can be applied to this vinyl is a paint sold by 3M under the name Mar-Hyde. So, what does a person do, hang on to the old or grab on to the new?

Reinstallation

With corrosion removed, everything chromated, systems and components inspected, and upgrades completed as needed, it's time to reinstall your like-new plastic headliner. Nothing is perfect, but molded headliners demand less skill and are easier to install than the older hung and stretched ones.

Call me a dinosaur, but I do like the look and feel of those old stretched material headliners we talked about last month.

At this point in our interior renovation, we've addressed

Super-thin vinyl film peeling off the finished surface of thin Kydex components used in new-production Cessnas.

seats, side panels and headliners. Next, we will move on to carpet.

Until then, fly safe!

Industrial designer and aviation enthusiast **DENNIS WOLTER** is well-known for giving countless seminars and contributing his expertise about all phases of aircraft renovation in various publications. Wolter founded AirMod in 1973 in order to offer private aircraft owners the same professional, high-quality work then only offered to corporate jet operators. Send questions or comments to editor@cessnaflyer.org.

RESOURCES

3M MAR-HYDE

tinyurl.com/MarHyde

AIRCRAFT SPRUCE AND SPECIALTY (POLYFIX)

aircraftspruce.com

EVERCOAT

evercoat.com/product-detail/part-number/100411/us/

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