MODINE

ShopTalk

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TECHTOPICS

All Options Are Not Equal For Good Aluminum Repair

This "Tech Topics" segment is the fifth authored by Larry LePrevost, national sales manager for the Johnson Manufacturing Company. Larry has 20 years of experience with the Johnson organization, which produces a wide range of products and supplies for radiator shops nationwide. The

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appearance of Larry's observations on these pages does not necessarily imply Modine's endorsement of same. Questions relative to subject matter can be directed to Larry at the Johnson Manufacturing Company, 114 Lost Grove Road, Princeton, Iowa 52768. Or, telephone 319-289-5123.

In an article in last October's issue of **ShopTalk**, Jim Rogers of Modine made some excellent observations about the evolution of aluminum radiators and their ever-increasing prevalence in the marketplace. Also, we've seen a fine series of features by Cecil Muggy describing how to make aluminum repairs using brazing materials with a torch.

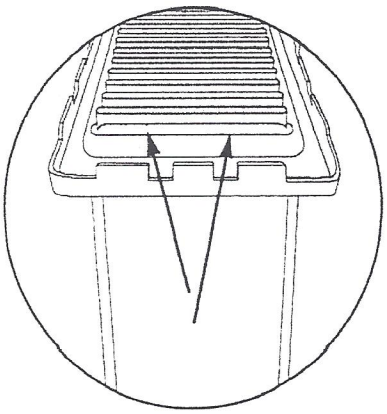
While the procedures described by Cecil are certainly well established, there are other methods being used to repair aluminum radiators, the pros and cons of which should also be discussed. These methods include: 1) Aluminum solders that are supposedly easy to use because they melt at lower temperatures than brazing alloys; 2) Hot-melt adhesives in both coil and stick forms; 3) Superglues or RTV silicones, and 4) Two-part epoxy compounds such as Epoxi-Patch or Johnson's Alumabond.

Let's talk first about low-temperature aluminum solders. There is at least one very good reason why you should consider **not** using certain alloys for repairing aluminum radiators. Some aluminum solders contain up to 80% cadmium and, when heated, they may release fumes that are highly toxic. It takes lower doses and fewer exposures to develop symptoms of cadmium poisoning than from lead. And cadmium poisoning is irreversible.

Cadmium-bearing solders may be fine for some things, such as soldering aluminum wire using a small electric soldering iron. But for radiator work, where a torch can produce a 2,500-degree flame, it's another matter. It's wise to obtain OSHA "Material Safety Data Sheets" for every solder, epoxy, and chemical that you use in your shop. Study them and ask questions if need be, then keep them on hand for ready reference and OSHA compliance.

Some other tin/zinc solders for aluminum begin to melt as low as 390 degrees F. These alloys contain no cadmium and they can produce good-looking solder joints. However, due to a process called "galvanic corrosion" (which was discussed by Jim Rogers in the aforementioned October story), these joints will almost certainly deteriorate in a relatively short time. When repairing radiators for strength and permanency, there is no substitute for aluminum brazing, if done properly.

(continued on page 2)



After the tank and gasket are removed, pinholes often are discovered in the tube-to-header joint(s) (see arrows) on the water side.

and dry thoroughly with a blow dryer. Don't use shop air as it may add contamination from dirt, oil or water in the lines.

6. Carefully add the entire contents of catalyst (hardener) to the large jar of Alumabond epoxy resin. Stir slowly to avoid splashing, until the glossy look is gone (about one minute). Always wear safety glasses and gloves when mixing chemicals.
7. "Paddle in" the Alumabond epoxy on the air side to replace the epoxy which was removed (see Figure 3). Work the epoxy into pinholes that are visible, building it up around the base of the tubes to a depth of about 1/4", then feather out the edges. *(Note: If you are repairing a hole in a tube, it's a good practice to enlarge the hole slightly, using an ice pick, so that epoxy can be forced into the hole more effectively. Doing this, in combination with a good bond on the outside of the tube, provides the strongest epoxy seal. Some shops use a vacuum to pull epoxy into a hole, providing that the radiator can be repaired with its tanks in place).*
8. Next, apply more Alumabond around the tubes on the water side of the header, without disturbing the fresh epoxy on the air side (see Figure 4). Build up the Alumabond so that it is level with the tube ends, being careful not to plug them. Smooth the epoxy to a feathered edge, with movement away from the tubes. *(Note: Do not allow any Alumabond to cure in the gasket trough. If some gets in there when you're applying it to the header, wipe it totally away with a clean dry rag on the tip of a screwdriver. For GM aluminum radiators that have those wide gaskets with a flange, avoid buildup of any epoxy on the header that may interfere with seating the gasket).*
9. Curing may be done using a 375-watt heat lamp, positioned 15 inches away from the header, for about 20 minutes. Each side must be cured separately. However, the second side should take less time (10 to 15 minutes) if done immediately after the first. don't attempt to accelerate the curing process by placing the lamp closer than 15 inches, as "outgassing" may cause blisters to form. Curing may also be accomplished at room temperature (72 degrees) in approximately 24 hours.
10. Clean up gloves, tools, and other items immediately. Uncured epoxy is easily wiped off using mineral spirits or Toluene. Then place the small bottles (pre-treat solution and catalyst) into the larger Alumabond jar and screw on the lid.

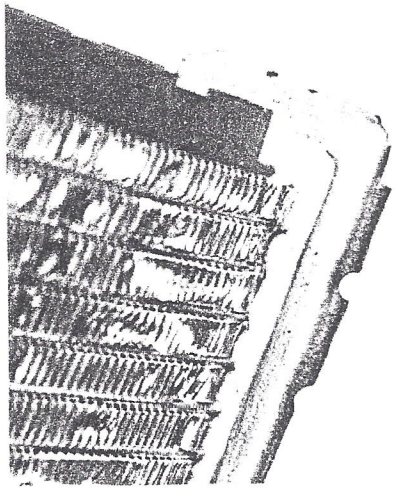


Figure 3

In this view we see the Alumabond that was applied around the tubes on the air side, replacing the header epoxy that was carved out.

Figure 2

A small stainless steel brush is handy for cleaning aluminum prior to making a repair. It is best not to use a brush that is excessively abrasive so as to cause gouges in the tank trough. Above right, we see that the area to be repaired (on the water side) has been nicely cleaned by the brushing action.

As with our previous *Tech Topics* feature on Nylobond, I should emphasize that the foregoing is not intended to be a "commercial" for Johnson Manufacturing's Alumabond product. Again, it is the epoxy product with which I am most familiar and provides a stronger bond with aluminum than any other epoxy we have tested. For complete instructions, safety information and an OSHA material safety data sheet, write to Johnson Mfg. Co., P.O. Box 96, Princeton, Iowa 52768-0096.

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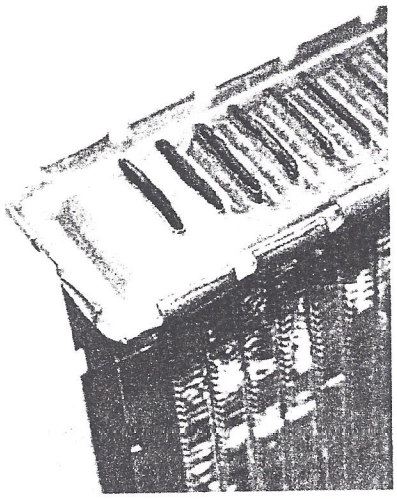

Figure 4

Here we see Alumabond applied around two of the tubes on the water side of the header to seal the source of the leak.