MODINE

ShopTalk

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TECHTOPICS

Plastic and Aluminum: History Sharpens Eye for Future

Plastic tank repair and replacement continues to be the fastest-growing area of service activity in the radiator industry. To re-visit this subject area,

Larry LePrevost

Modine is pleased to welcome back Larry LePrevost, a frequent contributor to these pages. Larry, national sales manager for the Johnson Manufacturing Company, is well-known as a speaker at industry seminars nationwide. The observations of guest contributors in ShopTalk do not necessarily reflect Modine's own viewpoint. Questions on any of the subject matter that follows can be directed to Larry at the Johnson Manufacturing Company in Princeton, Iowa, 319-289-5123.

Several times, I've listened to a splendid motivational tape featuring Jim Valvano, the former North Carolina State basketball coach who recently died of cancer. I think so highly of this dynamic tape that I would encourage all *ShopTalk* readers to purchase one, play it for your kids, share it with friends. At many times on the tape, Valvano repeats this theme: "In order to get where you're going, you have to know from whence you came."

I think that's a significant theme to ponder in the context of our own industry, particularly in regard to the dramatic impact of aluminum and plastic. Even though my employer, a producer of solders and fluxes, has strong interests in furthering the copper/brass radiator industry, it would be inconceivable for us to ignore the PTR (plastic tank radiator) revolution. Instead, we've responded by introducing a variety of appropriate tools, equipment and supplies for PTR work. In looking at this "revolution" and where it's likely to take you and me, it makes sense to learn more about the history of plastic and aluminum radiators.

Back To 1952

It's difficult to believe that more than 40 years ago, Ford and Alcoa began studies on the feasibility of an aluminum radiator as a possible cost-cutting measure. Although concern about aluminum's corrosion-resistance remained, efforts

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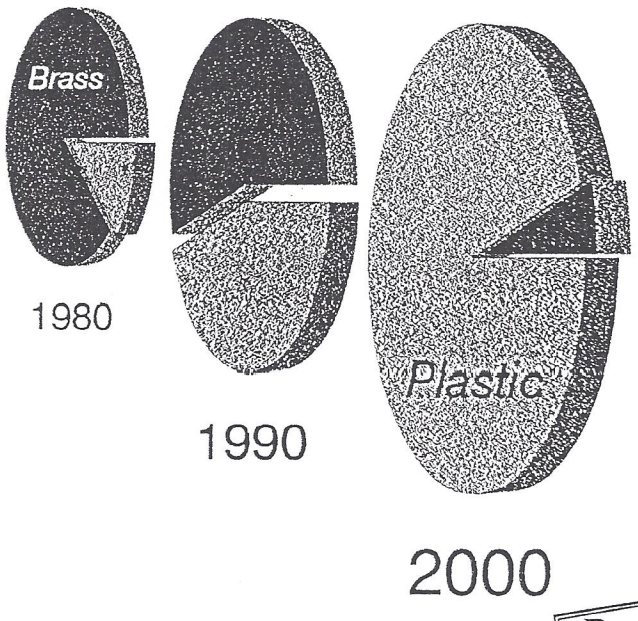


This pie chart graphically shows the growth of plastic tank radiators since 1980, as well as anticipated growth to the year 2000.

Putting Quality In Your Hands.

History Offers Clues for Industry's Future

(continued from page 1)

to develop all-aluminum radiators continued through the 50s and 60s. General Motors was actually first to market all-aluminum radiators on its Corvettes from 1960-65, as well as a drawn-cup aluminum radiator (but with a downflow design) for the 6-cylinder 1962 Chevy II.

The late 60s saw Ford and Celanese begin testing Nylon 6/6, which later met with Ford's approval for plastic radiator tanks. Not long after, GM and Norrell began the qualification process of another fiberglass-reinforced nylon (called "Norrell"), which has also proven highly successful for radiator tanks. Other glass-reinforced nylons for radiator tanks soon followed, including DuPont Zytel and Nylatron.

The Weight Issue

Tough new standards for fuel economy and emissions were introduced in the 70s, putting pressure on America's Big-3 automakers to reduce the weight of their vehicles. It was not just the radiator industry that was being "picked on!" The development of aluminum alloys was also proceeding at a fever pace for use in engine blocks, heads, housings, manifolds, wheels and other parts. About the same time, special resins and plastics were being developed for body panels, fasteners, moldings, shrouds, wheel covers and even fuel tanks. Looking back, the switch to aluminum radiators with plastic tanks seems almost inevitable, doesn't it? Yet today, within our own industry, we still have skeptics.

As early as 1969-70, the Japanese company, Showa Aluminum Corp., was producing aluminum radiators. But, these were found to fail at a rate six times faster than conventional copper/brass radiators. Perhaps this explains why the Japanese have been more cautious to embrace aluminum radiators, even though they have switched almost entirely to plastic tanks.

In Europe, Sofica was producing mechanically assembled all-aluminum radiators between 1972 and 1976, and the first all-aluminum heaters were introduced by both Sofica and Behr in 1977. Modine began to source and distribute aluminum heat-exchangers in the 1970s but did not begin manufacturing them until the 1980s.

Improvements Made

By the late 70s, the proper balance of alloys, coolants, process technology and economics finally led to the development of the aluminum/plastic radiators that we know today. Ford pioneered the use of a fluxless, vacuum-brazed process, while GM's Harrison Division embraced the patented Nocolok flux-brazing process, developed by Alcan. Modine also uses the Nocolok process to make its aluminum heat-exchangers. Ford's first fluxless brazed aluminum radiators with plastic tanks were installed on 1978 Mercury automobiles. GM's first radiators using the Nocolok brazing process were utilized on 1980 Chevrolet and Pontiac models.

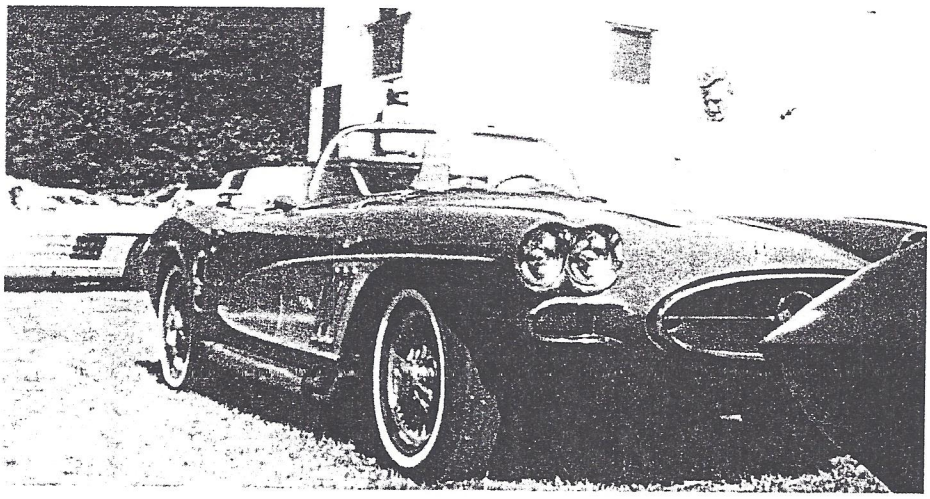
During the 80s, with companies like Modine leading the way, the refinement of manufacturing processes and the durability of these new materials has been well established.

By 1991, approximately 95% of Ford's OE radiator production had become aluminum with plastic tanks. The only copper/brass model being produced at that time was for the Econoline series, and it was being made in Mexico. GM has already indicated plans to go completely aluminum/plastic by 1996-97. Chrysler has been somewhat slower in moving to aluminum, but they have definitely jumped on the plastic tank bandwagon. So have the major players in the import market, especially those in the Far East and Europe.

Heavy-Duty Market

Even the big truck producers are making the transition. Today, most Ford, Kenworth, Peterbilt, GM/Volvo/White, Navistar (and now, Freightliner) over-the-road trucks are being equipped with HD copper/brass radiators that have plastic tanks. Due to fewer numbers and more severe operating conditions, the HD market may continue to be dominated by cooper/brass radiators (with plastic tanks) for some time. However, pressure from aluminum is evidenced by development of several aluminum packages, including charge-air coolers, by major players in the field. I expect these developments to continue.

Why the switch to aluminum? In addition to the weight factor already discussed, it's stronger, more efficient, and lasts longer (based on the latest studies), and there are manufacturing efficiencies to be realized. Will the OE manufacturers ever move away from aluminum? Not likely; not after investing millions in aluminum forming and brazing technology. Even as



The first American automobile to be manufactured for the general public with an aluminum radiator was the Corvette, model years 1960-65. Here we see a rare factory special edition of a 1959 Corvette Sting-Ray. This photo was snapped at the Road America June Sprints in Elkhart Lake, Wisconsin during the '59 racing season. The Chevrolet road racing team had a number of these specialty cars on display for spectators on the race grounds, and it is believed all were equipped with the aluminum radiator that was to become a production-model staple the next year. The 1959 Elkhart Lake race was won by a specially-designed "SR-2" Corvette driven by Jim Jeffords, a Wisconsin racing figure who enjoyed great success in the 1950s and 60s.

copper becomes cheaper than aluminum, the OEMs will be compelled to stick with aluminum due to their huge investment in equipment.

Aftermarket producers, on the other hand, will continue to make high-efficiency copper/brass replacements (both cores and completes, we hope). And, as stated earlier, HD radiators should continue to be produced in large numbers using copper/brass. But look for an increasing number of plastic tanks to be used across all markets.

Will plastic tanks ever fall out of favor with manufacturers? Not for a long time. As noted earlier, it has taken more than 20 years to develop resins for plastic tanks. They offer approximately 20% weight savings over equivalent metal tanks. And, the time and labor savings are tremendous. Look at the cost of injection-molding plastic tanks complete with all the inlets, outlets, filler necks, flanges, supports, etc., with each tank an exact duplicate of the one before it, and production speeding along at one tank every 30 seconds.

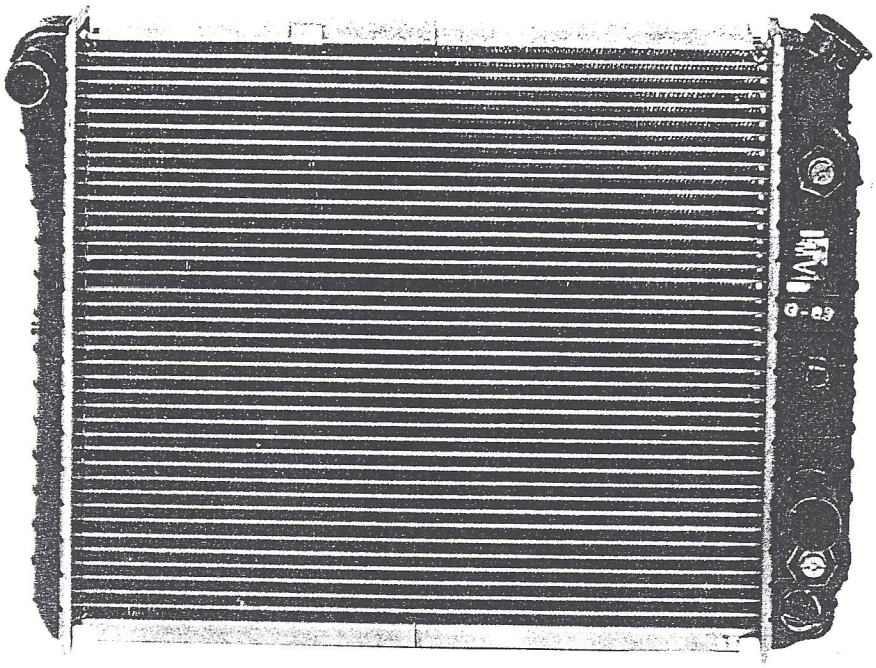
Compare that to the labor-intensive practice of fabricating metal tanks; stamping or deep-drawing some brass parts, while others like flanges and drain cocks are turned out (milled) using screw machines, and still other parts like inlets are extruded, then formed. Finally, all these parts must be assembled and soldered together. Unleaded solders are being developed for radiator manufacturing. However, a move to unleaded solder would almost certainly require changes in the manufacturing process, which will take still more time to perfect.

And Here We Are

And that's where we stand. I can certainly tell you how the growth of aluminum/plastic has changed the supply business. And I'm sure most *ShopTalk* readers can provide ample testimony to the ways plastic and aluminum have affected your business. Many of you have already viewed the plastic and aluminum radiator as another excellent profit opportunity for repair and tank replacement.

Based on input from many different sources, I estimate that within a couple of years (depending on your location within the country) over 75% of all the work you do in your shop will involve the replacement and/or repair of plastic radiator tanks. Are you equipped to meet the challenges and opportunities implicit in this estimate?

NOTE: Part of the background for this article was derived from a paper that was presented by Klaus Gump of Celanese Engineered Resins at the 4th Solder Symposium of the Lead Industries Association in Houston, Texas in 1985. Another key source was an article that appeared in Advanced Materials and Processes Magazine in May of 1990, authored by Walter L. Winterbottom of Ford Motor Company.



The popular model #951, which serves many Chevy Camaro and Pontiac Firebird applications, typifies Modine's strong coverage in aluminum/plastic tank radiators. Some 90 aluminum/plastic tank models are included in the current full-line catalog.

A/C Coverage Grows

Modine has increased its A/C condenser coverage with the addition of two new models plus the announcement of extended applications for two existing models.

The new model 1K100071 covers Ford Aerostar vans from February 1990 through 1993. The corresponding Ford O.E. part number is F09H-19710-AB-1. The new model supersedes model 1K100065 and will cover all of the 1K100065 applications and part numbers.

The second new model, 1K200115, covers GM's APV vans, including Lumina, Transport and Silhouette, years 1990-93. The GM part numbers are 52453114 and 52453959.

The new model supersedes the 1K200110 and will cover all 1K200110 applications and part numbers.

Modine's engineering department has also confirmed that Modine model 1K200074 will cover 1993 and '92 S/T Series pickups, except those equipped with the 262 V6 (4.3L) engine. The 1K200074 also will cover GM part number 52452126. Another Modine model, 1K200105, has been found to also cover all 1993 and 1992 S/T Series Blazers, Jimmys and Bravadas, as well as the '93 and '92 S/T Series pickups, except those with the the 262 V6 (4.3L) engine. 1K200105 will also cover GM part number 52456127.

All of the aforementioned models are in stock and available from Modine product sources.