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Delphi headliner at SPE awards By Rhoda Miel

Delphi is able to use 100 percent recycled material for this prize-winning radio housing with a Naxaloy glass-filled polycarbonate/ABS blend from MRC Polymers Inc. of Chicago.

LIVONIA, MICH. (Nov. 12, 8:45 p.m. ET) -- Three years ago, Delphi Automotive LLP put together a dream team of engineers from across multiple disciplines to rethink the way the company made auto parts.



The Product Systems Design team hit a home run one of its first times at bat, with a plastic radio housing that not only is becoming Delphi's new standard for replacing metal cases, but also is the grand prize winner of the Society of Plastics Engineers' Automotive Innovation Awards for customer General Motors Corp., which put the radio into its newest Chevrolet Tahoe sport utility vehicle.

"Radios are our bread and butter, and we needed to make radios faster and better," said Vineet Gupta, project team leader. The radio casing also won the process/assembly/enabling technology category during the Nov. 12 awards ceremony in Livonia, Mich. It was not merely a matter of swapping out metal for plastic. In a traditional radio, the metal housing also acts as a Faraday cage, which ensures radio signals do not interfere with other vehicle electronics. The cage is needed for good reception, but more importantly, no one wants a favorite song to confuse the electronic throttle control, for instance, Gupta joked. But metal cases are also complex structures, requiring 29 separate screws during assembly. Conductive plastics would still require screws to ground the electronics, he said. So the PSD team developed a new Faraday cage from a thin mesh screen that can be insert molded into a plastic case. The process has 29 patents pending, while Troy, Mich.-based Delphi is also rolling it out from the Tahoe to other vehicles for Detroit-based GM and a cross-section of other automakers. The 1½-year product-development time required more than simply buying a mesh Faraday cage from the open market, pointed out Mike Coady, manager of the PDS innovation group. No one was making the cage, so Delphi had to create its own out of the thin mesh material and also create a way to manufacture the mesh — which is thin and as flexible as a window screen material — in a way that allowed it to be cut and

folded into the right shape. Insert molding added another wrinkle, as the flexible mesh is harder to work with than rigid copper or other metals. The resulting cage, though, easily hit Delphi's goals. Assembly time was reduced by more than 50 percent, and all the screws were replaced with a snap-fit system, going from 33 separate components to two. The 1.2-pound weight reduction achieved by swapping out metal for plastic saves automakers and drivers fuel, and automakers can reduce the structural support needed within the instrument panel, which saves even more weight, Gupta said. **Delphi also boosted its environmental credentials by using 100 percent recycled material with a Naxaloy glass-filled polycarbonate/ABS blend from MRC Polymers Inc. of Chicago.** Team Amity Co. of Tipp City, Ohio, was the mold maker on the project. Beyond the auto industry, Delphi is also looking at new uses for a plastic radio housing in other electronics uses, such as aerospace, Coady said. SPE also honored Ford Motor Co. with the Vehicle Engineering Team Award for the variety of engineering improvements within the 2010 Ford Taurus sedan. Five different processes used in the Taurus were finalists in the annual competition, including a molding and mold-making process that creates faux leather panels and stitches for the doors, a metallic-look headlight bezel and improvements to the glass run weatherstrip. Dearborn, Mich.-based Ford also used a faster-cycle thermoplastic polyolefin material for bumper fascia and improved the fit and finish of interior plastic trim. Other categories and the award winners are: Powertrain. For Ford's 6.7-liter power-stroke turbo truck engine, Dana Holding Corp. of Maumee, Ohio, redesigned the thermoplastic oil pan to create the first thermoplastic pan that can handle full exposure to the road surface. Thermoplastic pans now in use are paired with an underbody shield that can help protect the pan. Dana designed a new shape for the pan, however, that could handle the wear and tear of debris such as road salt and rocks. The typical molded pan today has structural ribs, but those same ribs add a stiffness that can cause the pan to crack or break under stress. Dana developed a pan with a "waffle" style of rib, which not only provides structural support, but also can flex if hit by a stone. BASF AG of Ludwigshafen, Germany, supplies the glass-reinforced nylon and Decatur Mold Tool & Engineering Co. of North Vernon, Ill., was the toolmaker. The final part is 2.1 pounds lighter than a steel pan and 30 percent less expensive than similar cast aluminum or steel alternatives. Materials. BMW AG's 7 Series sedan has a new resin blend hidden under the interior trim of its door panel, with a natural-fiber thermoset composite that comes in with a 20 percent weight savings compared with other natural-fiber options — 6.6 pounds per vehicle for standard plastics — and reduced equipment costs result in lower part costs. Dräxlmaier Group of Vilsbiburg, Germany, is the molder and developed the door panel substrates with BASF, using BASF's Acrodur

acrylic co-polymer. The compression molded door panels are made of a blend of 70 percent natural fibers — including kenaf, jute and hemp — and 30 percent Acrodur. Environmental. Toyota Motor Corp.'s 2010 Camry has nylon radiator end tanks that are the first commercial use of Wilmington, Del.-based DuPont Co.'s Zytel RS, a nylon with 40 percent of its content made from renewable resources — in this case oil from castor bean plants. Denso Corp. is the molder and toolmaker of the end tanks. The resin is now being used on tanks for Camrys made in Japan, and Toyota soon will use it for cars manufactured in Russia, India and China soon. Chassis/Hardware. Nexteer Automotive, the onetime steering division of then-Delphi Corp., used to rely on stainless steel, grease and rubber tubes to make flexible couplings for electric power steering systems. The coupling transfers torque and so must be flexible, but also has to be stiff. The Saginaw, Mich.-based company redesigned the coupling, injection molding a new part with structural ribs for stiffness, and using a living hinge for flexibility. The part made its debut on Fiat SpA's 500 compact car. The part, which uses Stanyl glass-filled nylon from DSM NV of Heerlen, Netherlands, offers a 50 percent cost savings over previous steel and rubber parts. Forteq AG of Nidau, Switzerland, is the molder for the Nexteer part. Body Interior. The 2010 GM Chevrolet Camaro uses a redesigned plastic post isolation part within the heating, venting and air conditioning blower motor that offers an alternative between an inexpensive direct-mounting system for blower motors and a rubber isolation system that reduced vibration but was more expensive to produce and install. Delphi created a housing that fits into an existing instrument panel structure and uses polypropylene ribs that flex to absorb vibration. A snap fit for the housing also reduces production costs, adding to a 20 percent savings. Delphi uses a talc-filled PP from Clayton, Mo.-based Spartech Polycom Inc. Nara Mold & Die Co. Ltd. of Changwon, South Korea, made the molds. Body Exterior. GM's Cadillac CTS Wagon replaces a two-piece, injection molded spoiler with a more streamlined, integrated spoiler molded by ABC Group using a proprietary polycarbonate/ABS blend that also improves dimensional stability. Better stability means GM can design in smaller gaps with body panels near the spoiler. Toronto-based ABC developed its own PC/ABS blend using Cycloy resin and nanofillers to get the improved performance. Omega Tool Inc. of Menomonee Falls, Wis., is the toolmaker for the project. The finished spoiler reduces the part cost by \$15-\$20 per vehicle through improved integration and easier assembly at the plant. Performance and Customization. Zeeland, Mich.-based Innotec Group used a combination of plastics technologies including light pipes, screen printing, overmolding, in-mold decorating and two-shot molding to create an illuminated sill plate option for the 2010 Ford Mustang, MKZ and MKT vehicles using only a single LED bulb. The technology combined

with laser-etched graphics allow customers to create custom graphics for the backlit trim. Customers can pick stock graphics of the car name or symbol, create a unique sill with a name or design of their choosing. Innotec worked with Altuglas International, Sabic Innovative Plastics LP and Serigraph Inc. to develop the program. Safety. Ford's small European SUV, the Kuga, integrates an energy absorber into its thermoplastic fender design to create a single part that will meet Europe's pedestrian safety guidelines while also offering up a 50 percent weight savings over steel fender alternatives. The polyphylene oxide/phthalic anhydride fender using Noryl GTX979 resin from Sabic IP is designed to for the safety of pedestrians in the event of a collision with a Kuga. Montaplast AG of Morsbach, Germany, molds the fenders. Schneider Form GmbH of Dettingen unter Teck, Germany, made the molds. Lifetime Achievement. Irv Poston spent 42 years with GM, retiring in 1997 as the head of plastics development at the automaker's technical center. He helped shepherd development of both thermoset and thermoplastics and was involved in launching an injection molded PP fender liner, reaction injection molded fenders, tailgates made of sheet molding compounds, polyurethane bumpers, the all-composite Fiero sports car and RIM and SMC body panels. Hall of Fame. GM became the first automaker to use an engineering thermoplastic on a vertical body panel when it used Noryl GTX 910 on the front fenders of the 1987 Buick LeSabre T sports coupe. GE Plastics, now Sabic IP, supplied the co-polymer thermoplastic. GM modified the program for other uses, including the 1987 Buick Reatta and eventually used Noryl for the vertical body panels on all of its Saturn vehicles from 1989-2005.