

## I-CAR Is On-Line

You can now access the latest news from the world of I-CAR from your computer. The I-CAR Web Site became available this summer. In order to access this site, you need a modem and an account with a network provider or online service provider such as America Online, CompuServe, or Prodigy.

Besides offering some basic facts about I-CAR, the web site can also introduce you to I-CAR Regional and National Managers, and members of the Board of Directors. You can also preview I-CAR U.S. and foreign activities, and other useful collision repair documents and information.

The I-CAR web site gives you access to the list of current Gold Class shops. And soon you'll also be able to browse through a list of class schedules for your area.

Join us on-line by accessing the I-CAR Web Site at:

<http://www.i-car.com>. **A**



## Don't Get Into A Sticky Situation —Know How To Properly Use Repair Adhesives



Adhesively bonded panels were compared to welded panels in FMVSS 301 crash test. (Courtesy of Lord Fusor)

Over the past few months, the I-CAR Tech Centre has been receiving an increasing number of inquiries about when and where to use repair adhesives. Most of the calls stem from information on recent adhesive tests (see above photo). In these tests, at least one of the adhesive makers concluded that adhesively bonded panels are just as strong as welded panels. While this may be considered a giant step forward in automotive repair, there are many issues that should be considered before replacing OEM welds with repair adhesives.

### THE TESTS

The adhesive makers intended that the tests to show if quarter panels attached with repair adhesive products would offer the same strength as welds on steel panels. The test that was performed for each adhesive company was a standard Federal Motor Vehicle Safety Standard 301 test. This test makes sure fuel tanks do not leak following a rear impact. It's designed to protect passengers from fires that result from fuel spillage during and after collisions.

Continued—Page 2

Three types of vehicles were tested for each adhesive maker: one with a welded-on replacement quarter panel, one with an adhesively bonded replacement quarter panel, and one with a factory-installed quarter panel. Each vehicle was hit in the rear with an 1,800kg (4,000lb) sled traveling at about 50kph (30mph). Each damaged vehicle was placed on a piece of equipment that rotated the vehicle, to simulate a rollover (see Figure 1). While the vehicles were being rotated, they were checked to see if any fuel leaked. Though each adhesive maker tested a different make of vehicle, all vehicles passed this test.

Following the test, the adhesive companies inspected the mating flanges on the quarter panel to make sure there was no bond separation. All adhesive makers stated that their product held up very well in the collision.

## TYPES OF ADHESIVES

There are three types of adhesives available for vehicle repair: epoxies, urethanes, and acrylics. The adhesive chosen is selected based on a number of factors, including:

- substrate compatibility.
- rigidity.
- fill properties.
- cure rate.
- working time.
- heat resistance.
- tensile strength.
- lap shear.

However, the vehicle makers' engineers have already determined which type of adhesive will work best on each type of repair. Therefore, always refer to the OEM body repair manual. In many cases, the preferred adhesive is listed with its product number. If the product number is not available, and an

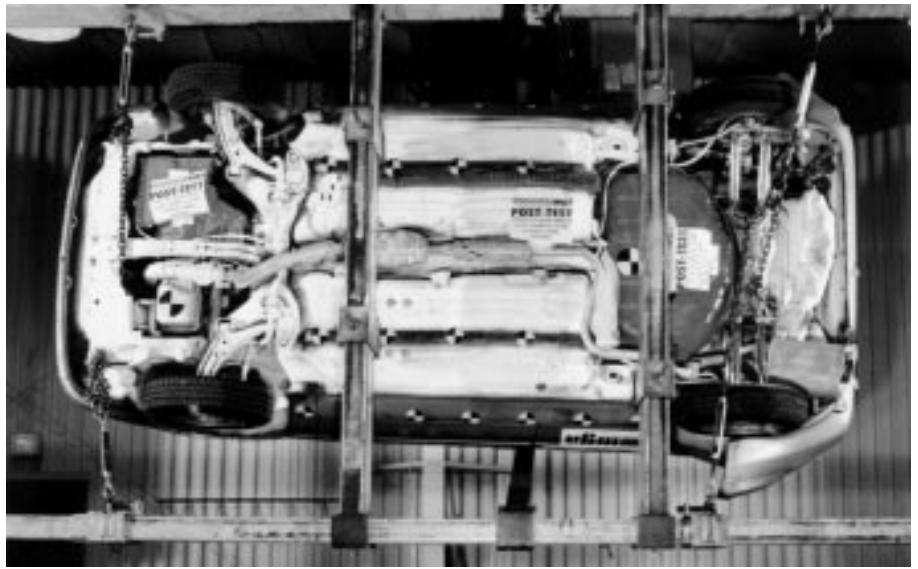


Figure 1—After the vehicles were hit in the rear, they were positioned on a rollover simulator. (Courtesy of Lord Fusor)

equivalent product is not identified, use the factors listed above in selecting an equivalent adhesive.

## WHERE ADHESIVES ARE USED

While this list may expand in the future, there are only a few areas on the vehicle where vehicle makers specify the use of repair adhesives. These areas may include, but are not limited to: door skins, metal roof panels, hoods, and plastic body panels (see Figure 2).



Figure 2—Vehicle makers now recommend adhesive joints on only a few parts, such as some metal roof panels. (Courtesy of GM)

To date, there are no adhesive or vehicle makers that recommend replacing a structural part such as rocker panel, A-pillar, frame rail, etc. with repair adhesives. When

repairing a vehicle, follow the vehicle maker's recommendation for panel replacement. If recommendations do not exist, you should replace the part using the same method that was used by the vehicle maker.

## USING REPAIR ADHESIVES

### Adhesive Application

When preparing a flange for bonding, make sure the area to be bonded is cleaned. This procedure varies according to the adhesive maker.

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TECHNICAL INFORMATION FOR THE COLLISION INDUSTRY

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Some adhesive makers require removal of the topcoats, primers, and the E-coat. Then, the area is rough-sanded and wiped clean with a wax and grease remover. Finally, a light coating of adhesive is spread over the area to provide corrosion protection.

Others require priming the area with a self-etching or epoxy primer, leaving the factory applied E-coats or primers intact.

Some adhesive makers feel that just cleaning the area to be bonded with a wax and grease remover, then scuff-sanding that area, is adequate. To determine which of the preparation procedures to use, read the adhesive maker's directions before application.

When applying the adhesive, follow the adhesive maker's recommendations for the thickness of adhesive to remain between the flanges (see Figure 3). For example, the cure rate of epoxy depends on the thickness of the product. A thin application will cure more slowly than a heavy bead. One epoxy maker recommends a 1.5mm (.06") minimum thickness. Another adhesive maker recommends a minimum .12mm (.005"). Always follow the adhesive maker's recommendations.

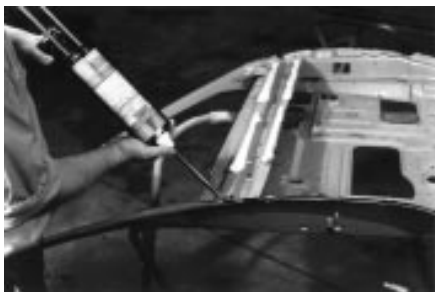


Figure 3—The adhesive maker's application recommendations, such as bead height and width, must be followed. (Courtesy of Kent Industries)

It's important not to squeeze the panels together too tightly, since the majority of the adhesive will be squeezed out of the joint. This affects the strength of the bond. To assist in getting the desired adhesive thickness, temporary sheet metal screws can help adjust the amount of separation between panels.

In addition to the thickness, adhesive makers also recommend a specific width. This varies according to the product and application. Follow the adhesive maker's recommendation whenever possible.

After the adhesive has been applied, clamp the panel in place (see Figure 4). Generally, there's 30–60 minutes working time before the adhesive cures to a point where any movement of the panel will weaken the bond. Some adhesives have shorter or longer working times, so make sure you're familiar with the product.



Figure 4—Attach clamps to the mating flanges to hold the panel in place while the adhesive is curing. (Courtesy of Kent Industries)

Cure time will vary according to temperature. At 25°C (75°F), most adhesives will take about 12 hours to cure. This time can be reduced by using a heat gun or lamp.

Once the adhesive is fully cured, the clamps can be removed. Any fasteners that have been used to hold the panel in place may be ground flush with the panel or completely removed.

## Removing Parts Attached With Adhesive

The crash tests show that the adhesive bond is very strong. However, this does not mean that the adhesive bond can't be broken. Parts that are attached with adhesive can be removed by heating the adhesive with a heat gun to soften the material, and then removing it with a putty knife (see Figure 5).

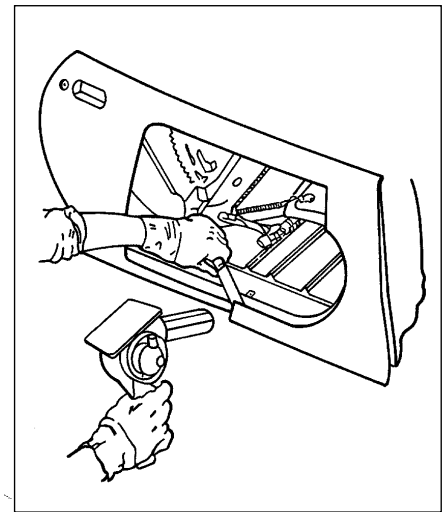


Figure 5—To break the adhesive bond when removing a part, heat the adhesive with a heat gun and remove it with a putty knife. (Courtesy of GM)

## ADHESIVES VS. MIG WELDS

The lure of using adhesives instead of MIG welding is understandable. Using adhesives instead of MIG welds:

- may reduce overall repair time and increase productivity.
- may reduce possible corrosive hot spots, since the E-coat and zinc coatings will not be burned away by the heat of a MIG weld.
- may reduce vehicle noise and vibration.
- allows joining of dissimilar metals while preventing galvanic corrosion.

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Though these reasons offer a very tempting repair method, consider these issues:

- vehicle finish
- the original bond
- fatigue stress
- potential liability exposure

## Vehicle Finish

The vehicle finish may affect the strength of the bond. A chain is only as strong as its weakest link. If the finish does not adhere well to the substrate, no matter how strong the adhesive is, the bond will fail. To compensate for this, some adhesive makers may recommend removing the paint coatings before applying an adhesive.

Removing the paint coatings, especially the E-coat, may be inviting corrosion. If the adhesive does not completely cover or seal the joint due to improper application, corrosion will cause the joint to eventually lose adhesion.

## Original Bond

If the panel was originally welded to the vehicle, the flange design may not be well suited for adhesive bonding. For example, when installing the panel, the bead of adhesive applied to the flange may be spread over a wider area than recommended, or be scraped off altogether.

Also, some quarter panel joint configurations may prevent complete panel replacement at the factory seams. In these cases, the quarter panel would have to be sectioned, eliminating any advantage of adhesives.

## Fatigue Stress

It's important to consider fatigue stress in the joint areas. Will the area that was just bonded maintain its adhesion after continual, repetitive forces over a number of years?

## Potential Liability

The liability of using a product incorrectly will lie solely with the repair facility. So, if you decide to use an adhesive where it is not recommended, you will lose the support of both the OEM and the adhesive maker. All adhesive products have a disclaimer that generally states if the product is used improperly, the adhesive maker assumes no liability.

Some adhesive makers will warrant their product if the product is used according to OEM and adhesive maker recommendations. Others will provide reimbursement for damages if it's determined that the product itself has failed. For these types of claims, the adhesive maker will send out a representative to determine if the failure is in fact a product failure or a poor repair. Most, however, do not provide any type of implied warranty or assume any liability for their product.

## THE FUTURE OF ADHESIVES

As to the future of adhesives, there are varying opinions, but most think the use of adhesives will likely grow. Most adhesive makers feel that due to the increased strength of repair adhesives and their performance in the recent crash tests, the use of adhesives can only increase in the future.

It's important to keep in mind that OEM repair recommendations will dictate when, and if, adhesives will

become an acceptable method of repair. And this may be the case in the future. In an effort to make vehicles lighter for increased fuel economy, more and more vehicle makers will be using thinner steel, aluminum, and plastic body panels. These lighter panels will probably be bonded with an adhesive.

## CONCLUSION

Adhesives are stronger and more durable today than ever before. For this reason, it is very easy to start thinking that using a repair adhesive to attach a panel is equal to or better than MIG welding. To use, or not to use, adhesives is a decision based on many variables, but most importantly, does the vehicle maker recommend it?

The following guidelines will help you make your repair decision:

- Does the flange design allow replacement without sectioning?
- Will the flange design allow the bead height and width to remain intact just before it is pressed against the mating flange, or will some of it scrape off?
- Does the primer, E-coat, or topcoat have proper adhesion to the substrate?
- Will the joint handle fatigue stress similar to or better than MIG welds?
- Will the corrosion protection remain intact?
- Will a heavy-bodied adhesive seal the mating flanges too tightly and prevent water drainage?
- Will the part perform identically in another collision?
- Will a continuous bead of adhesive cause a mating flange to become too rigid—not allowing proper energy absorption?
- Will you have to assume liability if the bond fails? **A**

# Shifting Colors

## -Prism Pigment Comes To Refinishing, But Only For A While

As you walk around the vehicle and the light angle changes, the color shifts like a prism, from green, to red, to purple, to copper. You're told this variable color-effect is contained in the pigment. The finish is as easy to apply as any two-stage finish, and blending in spot repairs is almost foolproof. It's enough to make a custom refinisher, and the hard-to-please customer, drool. But don't fall in love. These special color-shifting finishes are available only for a limited time, and in limited amounts.

### MYSTICAL BEGINNING

The first finish using prism-effect pigments was applied by Ford Motor Company to about 2,000 1996 Mustang Cobras. The finish is not available to the aftermarket, and in only limited amounts to Ford dealerships. But the same paint maker that developed that finish has developed three similar finishes for aftermarket use only. Two of them are two-stage finishes, that appear dark teal on the head-on angle. One shifts to purple on the side tones. The other shifts to green. The third is a three-stage finish that shifts from green/blue, to red, to purple, to a copper color, depending on the angle of the light source.

These finishes are available on a limited basis throughout the U.S. And once they're gone, they won't be made again. According to the paint maker, the reasons are high cost, and patent issues. The pigments were never intended for glamour vehicle finishes. One of the primary uses for the pigments is for

anti-counterfeiting measures on U.S. and Canadian currency.

### MANUFACTURED FLAKE

The prism-like effect is made possible by flakes added to the paint pigment. But unlike mica flake, these flakes are manufactured in a laboratory. An illustration of one flake is shown in *Figure 1*. A highly reflective metal, such as aluminum, is sandwiched between two glass-like layers. This sandwich is coated by a light-absorbing metal, which is so thin it is semi-transparent.

What we see as color is actually reflections of light. The three materials used in the flake are colorless by themselves. Different colors can be made by varying the thickness of the layers in each flake.

This is all taking place on a very small scale. Each flake is about 1/50 the thickness of a human hair. The layer thicknesses must be controlled to within a few atoms to keep within a standard color tolerance.

### REFINISHER'S DREAM

The best news about these prism-effect finishes is that they are extremely easy to refinish. The flakes are contained in the pigment of the basecoat in the two-stage finishes, and the finishes are no harder to apply than any other two-stage finish. The flakes are contained in the midcoat of the three-stage finish.

The manufactured flakes don't settle and cause an orientation problem like mica finishes. For this reason, and because the colors change as you move around the vehicle, blending is almost foolproof.

### IN SUMMARY

Prism-effect finishes are here today, at least in small amounts, but will not be here long. If a vehicle with one of these finishes needs spot refinishing in about five years, the exact refinishing supply will likely not be available. Prism-effect finishes may be the finish of the future, but in order to have these finishes available for the aftermarket, someone will have to recreate the technology. **A**

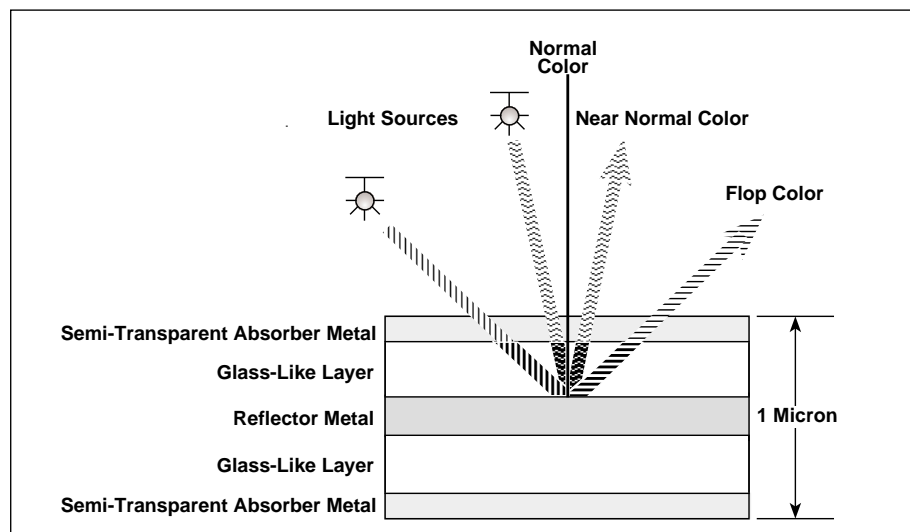


Figure 1—The cross-section of a single manufactured flake used in prism-effect finishes. The distance light travels through the flake determines the color reflected. Different layer thicknesses vary the color-effect.

# Magnesium Structural Parts

## —Not Just For Airplanes

Add magnesium to the list of high-tech materials you'll encounter repairing structural parts. Magnesium is a very light, strong, rigid metal. Until recently, however, magnesium was also very expensive and difficult to work with. Because of the cost and processing problems associated with magnesium, its use was limited primarily to aviation applications, especially for combat aircraft.

Now magnesium, actually a magnesium alloy, is starting to be used for automotive structural parts. Currently, you'll find magnesium used in two vehicles, the Chevrolet/GMC full-size van and the new Mercedes-Benz SLK two-seater sports car.

### GM INSTRUMENT PANEL CARRIER

In the Chevy/GMC van, magnesium is used as the support bracket, or carrier, for the instrument panel (see Figure 1). GM says the magnesium part functions as a structural cross-vehicle beam, air-bag support, instrument panel carrier, and steering column mounting bracket; and it replaces as many as 30 different steel and plastic parts. The van instrument panel carrier is also part of the vehicle's passenger crash protection system. It's designed to deform in a collision, reducing the energy transfer to the passenger compartment.

Although the Chevy/GMC full-size van is the only place GM now uses magnesium, a company spokesman says its use is being considered for instrument panel carriers in other vehicles.

### MERCEDES-BENZ PANELS

The Mercedes SLK has a magnesium panel between the fuel tank and the underside of the trunk. Another magnesium panel is installed behind the passenger compartment. According to a spokesman for Mercedes-Benz, the decision to use magnesium was based on the goal of making the SLK as light as possible, while still having a strong, rigid frame to meet performance goals.

Magnesium is still more expensive than either steel or aluminum, but the price has been declining. Right now, the cost of magnesium is close to the cost of aluminum, so it can be used in applications where strength and rigidity are important, along with saving weight.

In a book about the SLK, Mercedes-Benz states that while they were designing-in strength, the

engineers had to be mindful of weight. And so, they used magnesium in several places. Behind the rear bulkhead, between the fuel tank and the trunk, is a die-cast magnesium partition. Magnesium was chosen because it is about 50% lighter than steel, and is especially strong. The magnesium partition weighs about 3kg (7lb). The same panel in steel would weigh 6kg (13.2lb). Even in aluminum it would weigh about 4kg (9lb).

### REPLACE, DON'T REPAIR

Despite the advances in metallurgy, magnesium is still a tricky metal to work with. In both the Chevy/GMC and the Mercedes-Benz applications, if the magnesium part is damaged in a collision, it must be replaced.

GMC is very specific in its directions regarding servicing the magnesium part after a crash:

"Under no circumstances is the instrument panel carrier to be repaired in any way. Any crack or

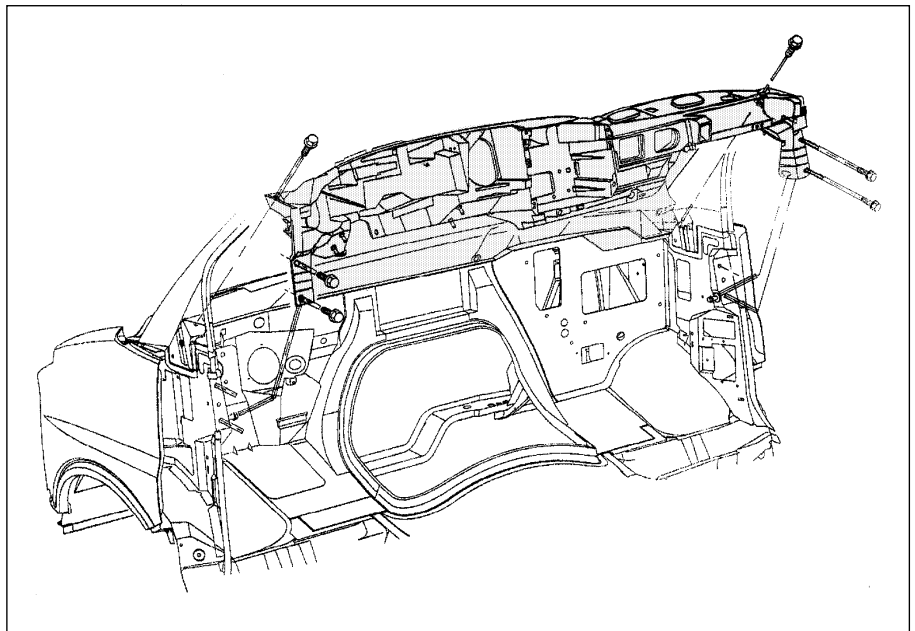


Figure 1—The magnesium instrument panel carrier is a cross-vehicle beam, and part of the vehicle's passenger crash protection system. (Courtesy of GM)

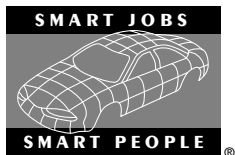
deformity in the part means it must be replaced.”

In addition to damage to the part itself, GMC says the instrument panel carrier must be replaced if:

- the gaps between the dash trim panels are greater than the specifications in the body repair manual.
- both air bags are deployed on the 10 and 20 series models.
- the steering column is collapsed, or the steering wheel requires replacement on the 30 series.
- there is damage to the lower instrument panel, the knee bolster, or the knee-bolster brackets.

## CONCLUSION

Even though magnesium is hard to work with, the panel replacement is easy. Once you've gained access to the panel, on either the Chevy/GMC van or the SLK, it's a straightforward operation: unbolt the damaged panel and install the replacement. From the perspective of a collision repair technician, magnesium panels are probably one of the easiest of the new materials to work with. If it's damaged in any way, don't try to fix it, just replace it. **A**



I-CAR EDUCATION FOUNDATION

## Uniform Procedures For Collision Repair —What's New?

NACE '96 attendees will be among the first to experience the benefits of industry-accepted uniform repair procedures. I-CAR will present a special sneak-peek of its Uniform Procedures For Collision Repair (UPCR) in its NACE booth, number 1760. The special CD-ROM demonstration will allow attendees to see how easy UPCR is to use, and how their industry segment and their business will benefit (see Figure 1).



Figure 1—One page of the CD-ROM demonstration of UPCR. The demonstration shows how the procedures can be used in a shop setting.

UPCR outlines industry-accepted, uniform repair processes for technicians, insurers, suppliers, vehicle makers, educators, and others. The procedures enable the Collision Repair Industry to produce uniform, safe, quality repairs for the consumer.

UPCR is intended to build on basic skills, like sanding, welding, applying paint, and more. The procedures do not replace information on how to use specific brands of equipment and materials, or repair procedures for specific vehicle makes and models. I-CAR procedures can be applied to any product or vehicle. When more specific information is required, UPCR refers to it, provides it, or both.

UPCR is an easy-to-use reference source that will be distributed on

CD-ROM on a subscription basis. Subscribers will receive a new CD-ROM every three months (four issues per year). Each issue will include the newest, most accurate repair information. The first issue will be distributed on CD-ROM in April, 1997.

The benefits of UPCR were identified early on by the Steering Committee, made up of representatives from all segments of the industry.

UPCR is expected to impact the delivery time of vehicles by reducing the amount of time needed for repair, and making the repair time more predictable. It will also improve repair quality and consistency, resulting in fewer comebacks and fewer customer complaints.

As with any I-CAR project, the development of UPCR has been guided by volunteers. A Canvass Review Committee of more than 400 individuals is reviewing each of the procedures. At least 11 Collision Industry groups are represented on the committee: associations, collision repair, education, equipment, independent appraisal, information providers, insurance, suppliers, paint, recyclers, and vehicle makers. Consumer groups are also represented.

Each procedure is reviewed at least twice by the Canvass Review Committee. When reviewing the procedures, the Canvass Review Committee checks for technical accuracy of the graphics, step-by-step procedures, and guidelines that are listed. The Committee also checks for thoroughness of the steps listed in each of the twelve sections.

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## PROCEDURE DESCRIPTION

To make the procedures more consistent and easy to use, each procedure is organized into 12 sections: Description, Purpose, Referenced Documents, Equipment and Material Requirements, Damage Analysis, Personnel Safety, Environmental Safety, Vehicle Protection, Repair Procedure, Use Of Recycled (Salvage) Parts, Inspection And Testing, and Definitions.

To reduce the amount of repetitive text, not every process required to complete the procedure is described. Instead, the user is referred to another procedure. For example, if the procedure requires MIG plug welds, the MIG plug weld procedure is listed in Section 3 Referenced Documents. If the user already knows how to make a MIG plug weld, there's no need to refer to the MIG plug weld procedure. All of the documents listed in Section 3 are considered part of the procedure.

As a general rule, the equipment or materials listed in Section 4 do not include basic hand tools or materials found in every repair facility. Only those specific items needed to perform the repair are included. For example, a stud welder, thermal paints, and a spray facility are listed, but hammers, files, wrenches, etc. are not. When reviewing this section, reviewers check for a complete listing of required specific equipment and materials.

The steps in Section 5 Damage Analysis are steps to be completed before actually beginning the repair. Examples would be visible damage, paint film thickness, or misalignment of adjacent parts.

Section 8 Vehicle Protection includes steps that must be taken to protect the vehicle before or during

the repair. Examples are using a welding blanket and protecting electronic parts.

In Section 9 Repair Procedure, the intent is to list the steps necessary to perform that specific repair only. For example, when repairing a core support, the repair procedure begins with straightening the core support. It does not include removal of the headlamp assembly, bumper assembly, or cooling fan. It also does not include the reinstallation of these items. If use of salvage parts is applicable, the requirements for inspection and installation of these parts are listed in Section 10 Use Of Recycled (Salvage) Parts. One common requirement is that the part must be for the exact make, model, and year vehicle being repaired.

Once a repair has been completed, Section 11 Inspection And Testing is used to verify a proper repair. Examples would be proper alignment, finish appearance, and corrosion protection.

The glossary of terms in Section 12 was created to clarify terms found within each procedure. A term will only be in Section 12 if it appears somewhere within the document. All of the definitions will be compiled into one master glossary which will be included as a separate document in the package.

UPCR will include more than 150 procedures in 38 subject areas. I-CAR plans to continually develop new procedures and enhance existing ones based on changing technology and new materials.

## PILOT PROGRAM

Before UPCR is released to the industry, I-CAR will conduct a pilot program. The objectives of the pilot

program are to field test the completed procedures and update process using representatives from many different segments of the industry. About 40 procedures will be distributed on a trial basis from November, 1996 to February, 1997. The pilot will help identify and resolve any problems related to the subscription processing, distribution, and user-friendliness of the electronic version.

## UPCR INFORMATION ON LINE

If you miss the demonstration at NACE, you can still get a sneak-peek of UPCR. For a CD-ROM demonstration, call 1-800-ICAR-USA (1-800-422-7872). UPCR information is also available on the I-CAR Web Site (see article on the front page of this issue). The web site keeps you up-to-date on the progress of UPCR (see Figure 2). You can also download a sample procedure, a current task list, and a Canvass Invitation. The site also allows you to e-mail your thoughts and ideas about the UPCR project. You can contact us at:

[upcr@i-car.com](mailto:upcr@i-car.com). **A**



Figure 2—UPCR information can be accessed on the I-CAR Web Site.

# ASK I-CAR...

The I-CAR Tech Centre receives many questions on collision repair subjects and articles that appear in the Advantage. Some of those questions, and the answers, are being published as a regular feature.

**Q Why can't we paint air bag covers? Sometimes the dealer doesn't have the right color service part or the right air bag module.**

**A** Technical information provided by several vehicle makers says air bag covers should not be painted.

According to the vehicle makers, solvents from the paint may soak into the plastic of the cover and damage it. This could weaken the material and could change the deployment characteristics of the air bag.

Ford Motor Company says: "Air bag modules with discolored or damaged deployment doors must be replaced, not repainted. Any applied paint may damage the cover material. This could affect air bag performance during deployment and may increase the risk of injury during a collision."

**Q What type of respirator is needed when plastic welding?**

**A** According to the companies which make plastic welding rods, a standard NIOSH-approved organic respirator would be appropriate (see Figure 1). The welding rod makers further recommend that the technician work in a well-ventilated area, and avoid breathing the fumes created when plastic welding.

One manufacturer's MSDS gives the following "Inhalation Health Risks and Symptoms of Exposure:"

As with any combustible or semi-combustible material, avoid breathing any of the products of combustion. Some, such as PVC and CPVC can be severely irritating and cause serious injury or death.

**Q In an I-CAR class, the Instructor said that when adding corrosion protection to the inside of a sectioned rail we should use self-etch primer covered by two-part epoxy. Is this right?**

**A** After sectioning a structural part such as a rail, it is important to replace the corrosion protection which was built into the vehicle during the manufacturing process. When the parts are cut and welded, bare metal is exposed. Grinding of the metal and the heat from welding remove the factory zinc. All of this causes a "corrosion hot-spot" which must be protected.

Several years ago, I-CAR commissioned a study which compared the performance of self-etch primers against two-part epoxy primers. The results of that study showed that, as a group, self-etch primers did not

give the same level of corrosion protection as two-part epoxies.

A later study, however, found that self-etch primers which were covered with a topcoat gave performance equal to that of two-part epoxy primers. Self-etch primers are not made to be a final coat. Self-etch primers must be covered by a two-part primer-sealer, color coat, or other topcoat.

As we said, it's important to restore the corrosion protection, especially on structural parts when they have been sectioned. We did an informal survey of the paint companies to ask for their recommendations on priming the inside of sectioned rails. Their thoughts and concerns are listed below.

All of the companies agreed that the technician should apply primer of some kind inside of the rail, preferably two-part epoxy or self-etch. Whether to use two-part epoxy primer or self-etch primer is the technician's or manager's decision.

Two-part epoxies may adhere better inside closed rails which cannot be adequately cleaned after the final welding. But two-part epoxies may not provide as much corrosion resistance, to prevent rust creep and remove flash rust, as a self-etch primer. However, self-etch primers have to be covered by a two part product, such as a two-part epoxy, two-part primer surfacer, and so on.

So to answer your question, yes, your instructor may have said that self-etch primer should be covered with a two-part epoxy, not because that is the I-CAR recommendation, but because self-etch primer should be coated with a two-part product.



Figure 1—A standard NIOSH-approved organic respirator has a cartridge filter containing an absorbent material, usually activated carbon.

Continued—Page 10

**Q** I was told that caffeine and tobacco can affect color vision. I am a painter, and want to know if this is true?

**A** We checked with an optometrist, and asked for information on any research which would show whether exposure to certain chemicals or elements can affect color vision.

The optometrist told us of a study which showed that exposure to tobacco, alcohol, and carbon monoxide can affect the retina. The retina is the part of the eye which receives the image formed by the lens, and which is connected to the brain via the optic nerve.

Therefore, tobacco, alcohol and carbon monoxide may affect an individual's color vision. Whether or not exposure affects one's color vision will depend upon several factors, such as the amount of material the individual is exposed to, and how sensitive that individual is to those chemicals.

**Q** I heard that someone was building a vehicle with an air bag in the bottom of the dash. Is this true?

**A** The air bag you refer to is actually an inflatable knee bolster. The inflatable knee bolster is available on the driver's side of the 1996 Kia Sportage SUV. The system is made up of an air-bag activated knee-bolster panel located in the lower instrument panel (see Figure 2). The panel protects the driver's knees and lower legs in a frontal impact.

Upon deployment, a small air bag pushes the panel in the lower instrument panel outward toward the driver's knees. When the driver slides forward, his knees contact the panel. This stops the driver's

forward motion, and helps keep him in a more upright position. This helps to maximize the protection offered by traditional air bags and seat belts.

The inflatable knee-bolster system can provide other benefits to the vehicle occupants. It helps keep the occupants from "submarining" beneath the dash. And the manufacturer says the system also can reduce potential windshield-head impacts, by keeping the occupant in the proper position to receive the best protection from the conventional air bag.

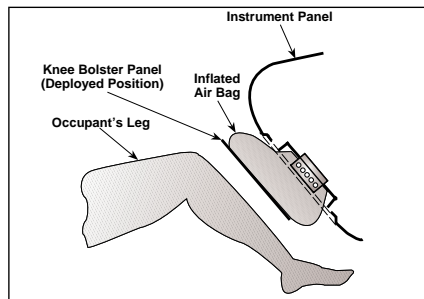


Figure 2—The 1996 KIA Sportage SUV features an inflatable knee bolster. (Courtesy of Morton International)

**Q** Must the sensors on a Ford Windstar be replaced following a collision?

**A** The Windstar Service Manual recommends that if the grill or fenders have been damaged, the technician must check the sensor mounting and pigtail for damage. If the sensor, mounting brackets, and pigtail are undamaged, then the sensor does not have to be replaced. The sensors will automatically reset.

**Q** I was told that General Motors recommends changing the air bag diagnostic module on certain vehicles following flood exposure. Is this correct?

**A** There have been unconfirmed reports of air bag deployments on GM vehicles equipped with

Sensing and Diagnostic Modules (SDM) when those vehicles were in flood situations. The SDM is located on the floor tunnel (see Figure 3). Apparently if the level of the water reaches the SDM, it could cause the air bags to deploy.

The Service Manual for the 1996 F Platform says, "If the vehicle interior has been exposed to extensive water intrusion, such as water leaks, window left open, driving through high water and so forth, the Sensing and Diagnostic Module (SDM) and the SDM connector may need to be replaced. With the ignition OFF, inspect the floor tunnel and the area around the SDM, including the carpet. If any significant soaking or evidence of significant soaking is detected, the water must be removed, water damage repaired and the SDM and SDM connector MUST be replaced."

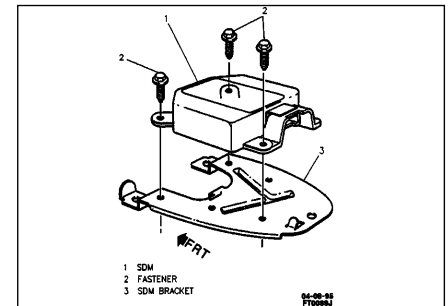


Figure 3—The Sensing and Diagnostic Module is located on the floor tunnel, exposing it to some flood damage. (Courtesy of GM)

This recommendation is only for 1996 GM vehicles which have the SDM. This would include the following vehicles:

- Buick Regal and Roadmaster
- Cadillac DeVille, Concours, Eldorado, Seville, and Fleetwood
- Chevrolet Camaro, Caprice, Cavalier, Impala SS, Lumina, and Monte Carlo
- Geo Metro and Tracker
- Oldsmobile Cutlass Supreme
- Pontiac Firebird, Grand Prix, and Sunfire **A**

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