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Introduction

In response to numerous requests from valued Collision Advice customers across the US, we have created this tool to help explain, justify and negotiate time for repair operations. The collected information and documentation are intended to help clarify whether or not specific repair processes are considered to be required repair operations and if they are included or not-included within any other repair procedures. Our objective is to help our customers build a complete repair plan and to get paid for the work they do.

To do so, we utilize four negotiation questions and supporting documentation as described below:

1. Is it required to put the vehicle back to pre-accident condition?
   - OEM Position Statements
   - ALLDATA®, TechAdvisor and Other Similar Systems
   - Paint Manufacture Bulletins
   - Material Manufacturer Bulletins (ex. 3M, Wurth, Kent)
   - Equipment Manufacturers
   - Internet (www.YouTube.com)
   - Estimating Systems
   - Scan Tools (Ex. ASTech)
   - The Vehicle

2. Is it included in any other labor operations?
   - Estimating Systems
   - ASA Not-Included Charts
   - www.Degweb.org
   - www.Estimatescrubber.com
   - SCRS Guide to Estimating

3. Is there a pre-determined time in the database?
   - Estimating Systems
   - www.Degweb.org

4. What is it worth?
   - Do a Time Study
   - Print an Invoice
   - OEM Warranty Times
   - Equipment Manufacture Times
   - ALLDATA®, TechAdvisor and Other Similar Systems
   - Internet
Definition
Definition

Structural foam is a foam material that has either a very closed cell structure or is totally devoid of any pores or cells in its structure. It is commonly used to reinforce the upper pillars, inner rails, and – in some instances – frame torque boxes to enhance the vehicle’s crashworthiness.

Structural foam also serves the function of reducing noise vibration and harshness (NVH). Foams used for this purpose help to keep the wind noise levels down in areas where air flow becomes strong. They also help reduce vibration of panels that could contribute to road noise.

Foams also protect parts from the harshness of roadways, environment and use. In other words, they keep water and chemicals from entering the vehicle where they should not.
Auto Foam: Overlooked and Misunderstood

Here’s a quiz for you and your technicians:

1. What does NVH stand for?
2. Where is pillar foam found?
3. What is the ratio of expansion of foam?
4. What primer is most often recommended under foam?

The answers to this quiz may, or may not, surprise you. If you read through this article and then answer all correctly, then congratulations! You’re keeping up on technology. If you miss a couple, then you, like myself, could probably use a reminder on the use and need for automotive foams.

A Nuisance
Technicians often look at foams in vehicles as almost a nuisance in the repair process. The need for caution while welding near any foams due to their flammability looms in the mind of a technician whenever they pick up the torch. Sometimes, they wonder, “Why do they use foam here?”

When it comes time to replace the foam used in today’s vehicles, technicians may not understand the ramifications of improperly using or placing them, or not replacing them at all. This is where shops need to understand that even what may seem insignificant may be much more.

Location
First, identifying where foams are located is necessary to avoid causing problems during repairs.

Many automobile manufacturers have sectioning procedures designed in areas to prevent foam damage or fires. Others require foam removal before welding or sectioning to prevent fires. Once repairs are complete, all foams must be replaced. Procedures for locating foams can be found on manufacturer websites, OEM repair procedure providers or the I-CAR FOM-01 course. Another source for information is the
Auto Foam: Overlooked and Misunderstood

State Farm tool tech site, which has some short films on the proper use of many products.

Function
Foam in today’s vehicles has many functions, some obvious and some not so obvious.

One function is noise vibration and harshness (NVH). Foams used for this purpose help to keep wind noise levels down in areas where airflow becomes strong. The foams are also used in places where vibration of parts or panels could create unwanted road noise.

Foams also protect parts from the harshness of roadways, environment and use. Simply put, foams are used to keep water and roadway chemicals from entering where they should not. Foams also can be used to keep metal from fatiguing prematurely, such as in door hinge areas.

As you read this article, it’s important to note that foams do not always require replacement. There is some reparability on some foams to be reused, but where and how is up to the car manufacturer. Many foam manufacturers will also have instructions as to when and where repair and reuse is possible. Some will require a new product or part. The same is true of rails and quarter panels. In rocker panels, we may find plastic carrier foams that activate during the manufacturing process to control air and stiffen panels. If removed for repairs, they may be trimmed and reused if not damaged. Some carriers may need to be added, such as in the Camaro quarter panel.

Forms
The foams come in many forms, from the soft foam blocks to urethane two-part products. Soft foam blocks are low-density products, whereas sound dampening materials and structural foams are strong. Each type has one or more qualities that serve as reasons why and where it’s used.

- **Soft foam or foam fillers.** This foam is found throughout the vehicle in areas where wind or howling may be an issue. Most times, we find it sort of jammed in places. An example is in rearview mirror pockets on doors. Because of its flexible nature, many times it’s removed and reinstalled. It’s most likely used in dry areas where moisture is not a concern. The foam is open celled in nature, and water can and will wick in or saturate. Although simplistic in nature, it may be overlooked and not replaced. This may bring a vehicle back to the shop after repairs due to the wind noise that often occurs from not reinstalling the foam or improperly replacing it.

- **Flexible foams or flutter foams.** These types of foams are used in between panels and reinforcements. They’re usually used to prevent the fluttering of the metal as the vehicle travels down the highway. It’s soft, but not too soft. When compressed, it will return to its original shape. The foam may also adhere to both surfaces, securing the panels. This is evident on door skins and intrusion beams. Another application is for the blocking of water or moisture. When undamaged, it
Auto Foam: Overlooked and Misunderstood

will be a closed cell structure, forming a skin that can block water from entering. If the closed cell foam is damaged or cut, it should be sealed with two-part urethane sound deadening material or urethane adhesive, which will prevent moisture issues and reduce the chance of corrosion. This is evident on the new Ford trucks on the upper rail under the fender where it comes into the A-pillar. The foam prevents water from getting to interior welds and areas that are less corrosion-protected. It may not look pretty, but it’s an important area to apply foams if damaged or removed.

- **Semi-rigid foams, pillar foams and rigid foams.** Depending on which product manufacturer you use, these foams are used in areas that may need to have a stiffener to prevent flex or vibration. This helps keep the vehicle quieter while traveling down the road. The stiffness may prevent metal panels from moving and causing metal fatigue, which is why we see these foams near hinges. As the door opens and closes, metal movement may cause fatigue of the steel, which may cause cracking and failure of steels further down the road. Semi-rigid and rigid foams can also be used to prevent water from entering the body cavities of a vehicle. These two-part products fill a void and may adhere to all surfaces. Semi-rigid foam, when compressed, will not return to its original shape. It offers limited reinforcement to help maintain shape and manage energy. It is not to be confused with structural foam and is not in any way interchangeable. If the foam is damaged or cut, seal the cells with a sound damping material or urethane adhesive to prevent water from entering. The stiffness and placement of these foams is critical to some safety system sensors. Side impact airbags may rely on the foam stiffness to deploy the curtain airbags faster in a collision, so failure to replace or improper placement could change reaction times.

- **Structural foam.** This is a two-part product that, when cured, is very strong. It’s used to stiffen engineering changes and reinforce energy areas of the vehicle and should never be substituted for any other foam product. Structural foam can normally be found in torque boxes on frames, but it may also be found in pillars and lower rails. Because of its strength, structural foam can be difficult to remove. Find ways to remove all existing foams, but limit the damage to metals.

- **Pre-formed foam blocks.** These play a critical role in energy movement in doors and under panels. As mentioned with the semi-rigid foams, pre-formed blocks may play a role in airbag activation during side impact and rollover situations. They may be held in by clips or glued in place. When damaged, they must be replaced. With some vehicle manufacturers, if the glued-in-place blocks must be removed or have come loose, they must be replaced – even if they are not physically damaged. The fact that they came loose or the glue seal broke is enough to be concerned as they may be contaminated to the point where they can’t be reattached. I cannot express enough the importance of them being in their proper locations and staying in there proper locations during the crash. The pre-formed blocks also are behind trim panels. They protect in body strike zones to prevent the human body from hitting steel components. They also can help steel components from hitting the human body, which can be seen in door panels and A-pillar interior trim panels.

**WARNING:** The use of foams that are not specifically engineered or approved for automotive use can cause damage to vehicles. Many consumer foams may be available at stores and should not be used. These foams can be acidic in nature and expand at uncontrollable rates, causing major problems for technicians. Once the foam goes in, getting it out is very difficult.
Auto Foam: Overlooked and Misunderstood

Application
The application of foams can be as simple as shoving them into a void, or applying them into a trapezoid-shaped area. How to apply enough to be effective and not overdo it and waste money and time is a fairly simple approach.

Follow the manufacturer’s instructions in preparing the vehicle for foams. I emphasize this because I continually see corrosion issues on vehicles that have been repaired. But also understand that there are shops out there that do an incredible job on all aspects of repairs. If I were their customer, I would be ecstatic to get my car back better than it ever was. The number of these types of shops is growing as instructions become more available.

Removal
Find a way of removing foam that’s the least intrusive and/or least damaging to metal. I find using new, hard plastic chisels causes less damage to metals. I also like mild abrasive wheels or bristle disks as they will remove material and not thin the metal. The lack of grinding will also keep the heat from damaging the metal. Also, there are file belt sanders on the market that are incredible tools for removing existing foams where required.

Remember that any bare metal exposed must be primed according to directions. Many recommend using an epoxy primer in repair areas as it is an excellent barrier coat for moisture and chemicals. The foams will also adhere to the epoxy primer very well.

The application of foams can be as simple as cutting to size and smushing in place. Two-part epoxy and urethane foams, however, will be different in that they will require some thought: how much foam? Where does it need to be when cured? Where is access to apply?

Establish access points. Figure out where foams need to be and how to get there. In most cases, there is a hole to work with. Drilling or creating access is not an option.

As in some plastic carriers, they may be glued in place when panels are put together for welding. Squeeze type resistance spot welding is great for not affecting or burning materials used. When access is found, how much travel to the destination needs to be established. For example, the access may be 30 inches from where the foam needs to be. Thus, you would need to pump it in as liquid very quickly to get it to travel that distance before expanding.
Auto Foam: Overlooked and Misunderstood

How Much?
We need to find out how much foam is needed. If it’s in a long rail, an oddly-shaped hollow part or a gap, simple math equations will help to establish how much volume is necessary.

Once cured volume is established, we need to know the expansion rate of the foam to be used. Many are a 1:10 ratio. This means for every one ounce of product dispensed, it will expand to 10 ounces of cured material. We want to be sure of how much material to use because if too much is used, it will expand and block areas not necessary or flow out of holes and joints, making a mess. If too little foam is used, we may not have enough required to keep the vehicle quiet, among other things.

The expansion is related to the temperature being used. If the temperature of the product is low, it will react slower and expand less in volume. If warmer than recommended, it will expand fast with more volume. Be sure to check temperature and expansion rates before use. Many suppliers offer a chart on these.

Structural foam will react differently. This foam has a low expansion rate. Some manufacturers’ product must be heated before dispensing. This foam must be used (as all others) according to product and vehicle manufacturers’ specifications.

Mixing Tips and Speed
Once we learn our expansion ratio, we need to be sure the proper mixing tip is used. They are specific for different products used, and they may fit the package but will mix incorrectly. The wrong tip could create a major mess. Adhesive mixing tips and foam mixing tips may be totally different.

We also need to figure in trigger speed, which will affect the viscosity of the product. If we need foam to travel a distance down or into a panel, we need a lower viscosity product to achieve this. By the technician triggering fast, the liquid foam will travel to the desired area. If the foam is needed right at the access point, we need a higher viscosity or damming material. By gunning slower, the technician will create a foam that begins expanding immediately out of the mixing tip, limiting travel.

Damming materials will be used to hold foams in place when the traveling of liquid is not desired past a certain point. Dams can be made of different materials and cut to size. Be sure to use materials not affected by moisture such as paper and cardboard. A painter’s glove or balloon inflated in the area works well as a damming material and can be removed once the foam has cured. Mentioned before are plastic clips or carriers, which may be trimmed down and reused in most cases.

After the foam is applied, follow vehicle manufacturers’ guidelines as to corrosion protection. This important step will help to seal out moisture and prevent corrosion.

Bumper Foams
As far as pre-formed foams or foams used in bumpers go, it’s best to replaced damaged ones. Vehicle manufacturers have guidelines to follow regarding the use of these blocks or pieces of foam. Also, these foams or foams attached to the top of wheel skirts may not be structural but they do keep a lot of road noise to a minimum. A good rule of thumb is if the vehicle manufacturer did not need it, the part or foam
Auto Foam: Overlooked and Misunderstood

or product would not be there.

One step often overlooked in this procedure is to follow directions. Product makers have wall charts to identify which foam to use and its various uses. The next is application. All instructions take just a little time to read for the best results.

Verify
Always verify to see that the shop is using the right foams at the right places. Although they may seem like a minor part of the repair, they are not. Happy customers are the results of things going right the first time. If technicians are having problems, look on YouTube for manufacturer videos. These videos can become priceless for training technicians.

Question 1. Is it required?
Four Negotiation Questions

1. Is it required to remove and apply corrosion protection foam in order to return the vehicle back to pre-accident condition?

Answer: Yes, it is required to remove and apply corrosion protection foam in order to return the vehicle back to pre-accident condition.

Answer Documentation:

1. The following OEMs have statements saying corrosion protection foam may be required to return the vehicle back to pre-accident condition:
   - Audi
   - BMW

2. The following industry organizations have statements regarding where corrosion protection foam is used, proper application and more which support that corrosion protection foam is required:
   - American Chemistry Council
   - Dow Automotive – Application of BETAMATE™ Structural Adhesive and BETAFOAM™ Structural Foam in Delivering Mass Efficient Seating Structures
   - Dow Automotive – Dow Automotive Systems Unveils Multiple Strategies, Technologies for Lightweighting Cockpit Components, Reducing VOC Content and Costs
   - I-CAR Structural Foam Guide

3. Several trade magazines have articles discussing the need for corrosion protection foam, including:

The source documentation follows.
Audi

Expanded Foam Inserts

CAUTION!
Expanded foam inserts expand only after reaching 180 °C. Because of this, filler foam is used for repairs.

Filler foam D 506 000 A2 is required for repairs.
Insert replacement expanded foam inserts.
Foam D 506 000 A2 must be applied before fitting replacement part.
The foam hardens within 25 minutes.
Do not do perform welding within 15 mm on either side of molded foam element.
After painting vehicle, preserve cavities in repair area.

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BMW

41 00 ... Working With 2-component PU Cavity Foam

Sourcing reference for cavity foam, refer to BMW Parts Service.

Properties of cavity foam:
- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound

Information on dangers/hazards:
- Avoid eye and skin contact.
  Wear protective goggles, solvent-resistant protective gloves and protective clothing.
- Do not inhale.
  Apply in well ventilated rooms only.

WARNING:
- Application time after mixing: within 8 minutes.
- Completely empty open can after use.
- Remaining amounts which are not used can cause the can to explode on account of a chemical reaction (buildup of heat).
  Alternatively, cool the can containing the non-removed remaining amount for several hours in cold water.
- Do not eat, drink or smoke during this operation.
- Keep heat and ignition sources well away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Application instructions:
- Use by date on can.
  Do not use the spray can after the Use by date on the can has expired. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.
- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Backing surface must be clean and free from dust, grease, oil and stripping agent.
- Application temperature at least 15 °C. Optimally 20 °C.
- Remove fresh, non-hardened PU foam with adhesive cleaner 208.
  Sourcing reference: BMW Parts Service.
  Hardened PU foam can only be removed by mechanical means (machine).
- Excess, hardened PU foam can be disposed of as residual waste.
  Cans which are not entirely empty and unused whose Use by date has expired are classed as hazardous waste.
  Observe country-specific waste-disposal regulations.

- Observe the manufacturer's application instructions (printed on the can).

IMPORTANT: Foam expands many times over as it sets (change in volume).
- Setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible.

Lightweight plastic foams can add strength to automotive body cavities and increase occupant safety in vehicles
Lightweight plastic foams can add strength to automotive body cavities and increase occupant safety in vehicles

- Filling thin-walled, hollow structures in vehicles with rigid, plastic foam can improve the structural strength of the vehicle without adding significant weight.¹
- Foam is injected into hollow cavities of the body sections such as the pillars, cow, and rocker panels. It assumes the shape of the cavity and remains intact over the life of the vehicle, blocking noise, air, and water paths.¹
- Structural foam can also provide stiffness to hollow body sections and joints. A bending test found that a tube filled with a low-density foam of 3 pcf (pounds per cubic foot) provided nearly twice the bending strength of the unfilled tube.¹
- Plastic foam can be used to help increase safety in rollover accidents by enhancing the structural support necessary to prevent roof crush; a structural failure that kills 10,000 people on the roads every year.²
- A roof crush simulation aimed at evaluating the effectiveness of foam found that filling the B-pillar ring, B-pillars, and rear roof header with foam raised the strength of the roof by 72%, as compared to hollow steel components. In fact, filling only the upper portion of the B-pillars (see picture above), which carry most of the roof-crush load, with foam resulted in a substantial 14% strength improvement.¹
- While improving strength, foam treatments can also help reduce vehicle weight. One case study demonstrated that applying foam to the front rail under floor, B pillar to rocker and B pillar to roof reduced weight by 16.2 kg compared to sheet metal (35.71 lbs).³
- Another simulation demonstrated that plastic foams have the potential to save space for additional energy absorbing structures such as head impact safety components. A section of B-pillar 20mm narrower than an unfilled section resulted in nearly the same strength as the unfilled pillar—the foam filling helped reduce the section sizes in the B-pillars without appreciable loss of strength or increase in mass, creating extra space.¹

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Foam injected into the pillar assumes its shape.

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Bending test on a steel tube filled with 6 pcf density of polyurethane foam. These indentations are caused by energy absorbing foam compression locally, NOT section collapse.

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Bending test: End of hollow steel tube deformation vs. end of foam-filled tube.
Additional Information

- Current applications for structural plastic foam include body-side joints, sills, pillars, underbody cross-car structure, frame rails/longitudinal structure, door panels, engine cradles, lateral rails, and hydroformed reinforcements.²

- According to an auto authority with an expertise in crashworthiness, “When an accident occurs involving roof structures with a filled inner space, the outcome has been shown to be safer due to a lesser amount of roof crush. Pillars filled with high-density foam can reduce the severity of a roof crush significantly, saving lives and reducing serious injuries.⁴

- The density of the foam material is a critical parameter for strength applications, as higher density implies higher strength. Because higher density foam has greater mass, however, a density range is usually selected that provides strength without substantial weight gain.¹

- Injecting foam into hollow steel structures—the “foam-in-place process”—has been in production since 1992 and over 2 million North American cars and trucks per year use low-density and high-density foam for various purposes.¹

- In a study that was featured in the Journal of Materials Engineering and Performance, no corrosive effects or foam degradation were evident in either durability testing or production vehicles.¹

Lightweight foam applied to the front rail, front rail under floor, and roof rail can also help absorb energy in front end crashes, which can help protect the passengers inside.
DOW Automotive – Application of BETAMATE™ Structural Adhesive and BETAFOAM™ Structural Foam in Delivering Mass Efficient Seating Structures

Application of BETAMATE™ Structural Adhesive and BETAFOAM™ Structural Foam in Delivering Mass Efficient Seating Structures

ITB Automotive Cockpits 2010
Instrument Panels, Doors and Seating Systems
October 21-22, 2010

Mustafa Ahmed, Ashish Lokhande, Onkar Bijjargi
Dow Automotive Systems

Dow Automotive Systems

- Dow Automotive Systems is a technology-driven solutions provider offering
  - Safety and health performance
  - Improved energy efficiency
  - Reduced exhaust emissions
  - Enhanced quality and appeal

Structural Bonding BETAMATE
- Roof panels
- Gluestrips
- Body sheet metal joining

Structural Reinforcement Solutions
- BETAFoam
• Benefits
  - Enable excellent body joint rigidity
  - More than 40 percent more mass efficient compared to steel at equivalent weight
  - Enables down gaging or elimination of body in white content
  - Improved performance with net body structure mass and cost savings
  - Design flexibility due to foam filling any cavity shape and contour, and no redesign required after sheet metal changes
  - Low material cost and reduced or eliminated metal tooling cost
  - Low MDI formulations may relieve ventilation requirements and can be more easily facilitated in assembly plant environments
  - Enables increased performance to meet FMVSS requirements
• Applications
  - B-pillar
  - Engine Cradles
  - Hydroformed Components
  - Seat Structures, etc.

• Case 3 - Rear Seatback Weight / Cost Reduction
  - Evaluation under FMVSS 207/210, FMVSS 225 with and without tether
  - Measured maximum deflection of the seatback
  - Four BETAFOAM™ treatment locations identified weighing 135 gms and 130 gms for 60% and 40% seatback respectively
  - Mass savings of 0.76 kgs for the 60-40 design configuration
  - Cost savings / 60-40 seat structure is $ 1.78

<table>
<thead>
<tr>
<th>Normalized Displacement</th>
<th>40% Seatback</th>
<th>55% Seatback</th>
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<tr>
<td>FMVSS 225 INT</td>
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<td>FMVSS 225 VCOT</td>
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<td>FMVSS 207/210</td>
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CONCLUSIONS

BETAMATE™
- Adhesives can be used to replace spot welds and/or laser welds - potentially reducing cycle times
- Adhesives can help reduce displacements for luggage retention test
- Adhesives allow to bond dissimilar materials
- Adhesives allow for sheet metal down gaging, reduced weight and/or down grading of steel for cost reduction
- The continuous bond line provides improved load transfer between sheet metal parts, resulting in improved stress distributions

BETAFOAM™
- Meet or exceed performance compared to baseline steel design
- Structural foam allows for sheet metal down gaging, reduced weight and/or down grading of steel for cost reduction

Dow Automotive Systems Unveils Multiple Strategies, Technologies for Lightweighting Cockpit Components, Reducing VOC Content and Costs

Auburn Hills, MI - November 18, 2010

Automotive OEMs can meet increasingly stringent mass, fuel efficiency, sustainability and performance targets by significantly lightweighting various cockpit components using next-generation SPECIFLEX™ ultra-low-density/low-emission polyurethane foams, BETAMATE™ one-component toughened structural epoxies and mass-efficient BETAFOAM™ structural foams.

Two technical papers delivered last month by Dow Automotive Systems researchers at the ITB Automotive Cockpits 2010 Conference in N帅, Michigan, also disclosed that these materials and design strategies can help minimize volatile organic compound (VOC) content, cut panel cost, enhance processing efficiencies, improve stress distributions and increase design flexibility.

Next-Generation Foams for Instrument Panels and Interior Trim Dow Automotive Systems researcher Steve Flicks explained how the new SPECIFLEX NM 858 low-density, semi-rigid foam systems can achieve a 20-percent reduction in mass for instrument panels and interior trim while meeting the most rigorous current VOC requirements. In addition to best-in-class density and emissions performance, the new foam system exhibits improved physical-mechanical properties as well as compatibility with all skin and substrate materials.

The superior adhesion and heataging properties of SPECIFLEX NM 859 polyurethane foams meet or exceed all North American and European OEM specifications, with up to 25 percent lower indentation load deflection (ILD) for a softer, more luxurious feel. These improvements were achieved while maintaining the quick processing speeds and critical performance parameters required for both open- and closed-pour polyurethane foam systems.

Structural Adhesive/Foam Solutions for Automotive Seatbacks Dow Automotive Systems researcher Mustafa Ahmed described the results of a series of tests for producing mass-efficient automotive seating structures using BETAMATE 1409V toughened structural epoxies and BETAFOAM 8710/87124 structural foam under static and dynamic loads. To determine how structural epoxies would perform for bonding front and rear seatbacks, Dow Automotive Systems evaluated the seatback performance utilizing predictive engineering tools under different loading conditions to determine the overall effects on weight, stress distribution, load transfer and cost per seat.

The first two load cases evaluated lightweighting potential in 60 percent rear seatbacks. BETAMATE 1409V toughened structural epoxy was used in place of 96 traditional spot welds, providing 0.3 kilograms (kg) of weight savings and a reduction of $1.56 per seatback. During the dynamic test under simulated ECE17—utilizing one 22.5 kg luggage rack moving at a velocity of 22 miles per hour—the epoxy was found to improve stress reduction and provide more efficient load transfer throughout the structure. In the third load case evaluated, 26 spot welds were eliminated on a front seatback for net savings of $0.30 to $0.80 per seat.

To test the viability and effects of replacing steel in the baseline seating design, four BETAPOLAM® structural foam locations were selected, weighing 125 grams for the 60 percent seatback and 130 grams for the 40 percent seatback (see Figure 1).

Evaluated under Federal Motor Vehicle Safety Standard (FMVSS) 207/210 and FMVSS 325 with and without tether, the BETAPOLAM components exhibited excellent body joint rigidity and were 40 percent more mass-efficient compared with steel at equivalent weight. This performance improvement offers OEMs the design flexibility of down-gauging or eliminating body-in-white content, as well as the foam's filling capability of any cavity shape or contour.

Overall cost savings for the 60-40 seat structure were estimated to be $1.78 per vehicle, which includes lower material costs for structural foam and reduced or eliminated metal tooling costs. In addition, the low MDI polyurethane formulations of BETAPOLAM structural foams may relieve ventilation requirements during manufacturing, making foam processing more easily adaptable to assembly plant environments.

For copies of the papers, visit http://www.dowautomotive.com/supportindex.htm

- Next Generation SPECFLEX™ PU Foam Systems for Instrument Panels & Interior Trim Applications, Steve Burke et al.
- Application of BETAMATE™ Structural Adhesive and BETAPOLAM™ Structural Foam In Delivering Mass Efficient Seating Structures, Mustafa Ahmed et al.

About Dow Automotive Systems

Dow Automotive Systems is a leading provider of polyurethanes, elastomers, films, fluids, adhesives, emissions solutions and acoustic-management materials to the global transportation industry. By working collaboratively with passenger vehicle, commercial transportation and aftermarket customers, Dow Automotive Systems is developing industry-leading solutions to address a wide range of critical market needs - increasing energy efficiency, improving safety and health, reducing exhaust emissions and enhancing vehicle quality and appeal. For additional information about Dow Automotive Systems, visit www.dowautomotive.com.

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Foam may be located virtually anywhere on a vehicle. Some of the more common locations include:

- A-, B-, C-, and D-pillars.
- rocker panels and roof rails.
- frames and rails.
- crossmembers.
- between the roof skin and roof bows.
- between the door skin and intrusion beams.
- quarter panels.

Objectives Worksheet

Foam may be located virtually anywhere on a vehicle. Some of the more common locations include:

- A-, B-, C-, and D-pillars.
- rocker panels and roof rails.
- frames and rails.
- crossmembers.
- between the roof skin and roof bows.
- between the door skin and intrusion beams.
- quarter panels.
Common Structural Foam Locations

Structural foam has limited applications. Structural foam is used for collision energy management and is very dense. Locations where structural foam is used include the:

- Front lower rails. The 2004–2005 Cadillac CTS and STS use a structural foam block in the front lower rails.
- Full-frame torque box areas. The 2003 Ford Crown Victoria uses structural foam in the torque box areas of the frame.
Some locations where flexible foam may be found include:

- where the roof skin attaches to the crossbeams and where it attaches to the roof side rails.
- between the door skin and the intrusion beam.
- inside any of the pillars.
Locations where flexible foam may be found include:

- behind the quarter panels at the:
  - fuel fill pockets,
  - wheelhouse and quarter panel.
- dog legs of the C- or D-pillar.
- rear body panel-to-quarter panel joint.
- door striker inner plate area.
- inside rocker panels.
- inside upper rails.
Common locations where rigid foam may be found includes:

- pillars.
- rocker panel.
- dog legs.
- quarter panels.
- rails.
- front or rear roof bows.

Rigid foam is used in the lower dog leg area and lower B-pillar of the 2004 Chrysler Pacifica.

Technicians can encounter a variety of replacement foams during the course of a repair, and the differences between each are not always apparent. To avoid unnecessary headaches, take the time to confirm the characteristics and applications of the replacement foam you are using.

In the case of two-part dispensible fillers, things aren’t always what they seem.

By two-part dispensible fillers, we mean those foams that are supplied to the body shop in cartridges that are loaded into either a manual or pneumatic applicator gun. The foam is then pumped onto the appropriate surface or into the required aperture during the course of a vehicle repair. The “two parts” referred to are a catalyst and resin (also known as a base and accelerator), and the systems are sometimes referred to as full-fill foam fillers or pumpable foam fillers.

The method of delivery just described is convenient for the technician, in that catalyst and resin are mixed automatically in the gun’s nozzle, ensuring—both the proper mix ratio and the stability of the product before it leaves the gun. It’s also an efficient means of deployment, with the nozzle in place, uncombined material left over in the cartridge remains visible for the next application.

Despite these basic similarities, these products possess many differences that are not readily apparent—characteristics that, if not identified before application, can cause an inferior or unsafe repair. The OEMs and aftermarket suppliers that provide replacement foam systems make plenty of useful product information available, but challenges of use remain. Different foams look similar and are applied in similar ways, which can cause confusion. Product information is not always at hand when the technician begins working on the collision-damaged vehicle.

And terminology—what manufacturers call their classes of foam—sometimes varies from supplier to supplier.

“It sounds basic, but the incorrect identification of replacement foams is one of the most common and serious problems we see in the field,” says Dr. Stuart Bingham, technical manager for 3M Corp.

The dispensible foam systems used in today’s vehicles are classified into two groups. The first are noise vibration harshness (NVH) foams. NVH foams are used, for the most part, to help dampen noise and vibration when the vehicle is being driven. This class makes up the majority of the foams in use.

The second type of foam—structural foam—helps reinforce the vehicle by stiffening and reinforcing pillars and some frame components. Compared to their NVH counterparts, structural...
foams are relatively new. Their use is less widespread, being confined, at this time, to a few specific applications on a few specific car lines.

**Non-structural foam**

NVH foams, sometimes called non-structural foams, fall into one of two categories. The first are the flexible anti-flutter or flexible non-structural foams. With a density of about 4 lbs. per cubic foot, these foams have plenty of “give,” allowing them to function as a dampening agent for reducing vibration and noise during a vehicle’s ride. They are usually applied to small areas, such as gaps in roof bows and door safety beams.

The second kind of NVH foam is sometimes called acoustic foam, but is also known as rigid non-structural foam. This material takes up space in larger apertures such as those found in rocker panels, pillars and quarter panel cowlings, and is used for acoustical purposes. The density of these foams is about three times that of the flexible foams, or 12 lbs. per cubic foot.

Both classes of dispensible non-structural foam are urethane-based and go through three stages after leaving the nozzle—foam time, work time and cure time.

Foam time is the time it takes for the foam to start, or “foam up” on the surface or back out of the cavity to which it has been applied. This marks the beginning of the material’s transition from its liquefied state in the nozzle to its spongier consistency after curing. Rigid non-structural foams usually take about one minute to get to this point, while it’s only a matter of 10 to 15 seconds with flexible foams.

Technicians can continue to work with the material through the duration of its second stage, the “work time,” before the product can no longer be shaped or molded. For flexible non-structural foams this is less than a minute. In contrast, rigid non-structural foams possess a generous work time of up to 75 minutes. This is advantageous because the material is generally applied to larger cavities that are somewhat difficult to access completely. Their application tends to be more time-consuming and requires more technique on the part of the technician than is the case with flexible non-structural foams, which are usually dispensed onto flatter, more open surfaces.

The third stage is the time the product takes to set and cure. For rigid, non-structural foams, this is about an hour. Flexible non-structural foams take 30 minutes to an hour depending upon the temperature and other conditions. Heat is not required for the curing of these products.

“Shake the nature of flexible, non-structural foams can be extremely fluid when they come out of the nozzle,” cautions Bob Zweng, senior technical service representative for the Lord Corp., “you want to make sure you’re prepared. For example, you should cover any part of the vehicle that is not part of the application, and if it’s possible, in the case of a doorframe, lay the part flat to neutralize the effects of gravity. Gun the material slowly and carefully so as to not lose control of it.”

Steve Marks, industry support manager at the I-CAR Tech Centre, adds, “Technicians have to remember that these are dynamic products that go through chemical changes right before their eyes.” Marks continues, “A rigid, non-structural foam will travel a bit before it begins to foam up, so you have to anticipate that change in its behavior. You don’t want to be caught in a situation where the sheet metal is going to distort or become misaligned because you didn’t anticipate the replacement foam’s expansion to ten times its original volume. I-CAR recommends making practice samples so that technicians can get used to how these products behave in terms of flow, expansion and fill rate.”

Though more widely used as a technique with structural foam replacement systems, a plastic piece known as a dam can be used to control the flow and location of rigid, non-structural foam fillers. Fillers cut to fit the space into which foam is being applied and then inserted; dam help reduce the distance a foam must travel down (for instance) a pillar or rocker panel and reduce the

Filling the Gaps: Straight facts about two-part disposable foams | Search Autoparts

amount of material required to fill a part. Dames are available from vehicle manufacturers and suppliers of replacement foams. Sometimes they are part of the replacement package.

Structural foam

Structural foams are designed to add rigidity and structural strength to a part without adding much vehicle weight, and are designed to improve the crash performance of a vehicle without modification to its structure.

In the aftermarket, disposable structural foams use the same cartridge/pen method of deployment as non-structural foams, and may look similar to their NHV counterparts while in the cartridge. This causes more concern among industry professionals than any other aspect of replacement foam given the dissimilarities of their characteristics and function.

While urethane forms the chemical basis of disposable NHV foams, structural foams are two-part epoxy compounds that are much denser, at approximately 3.1 lbs. per square inch. Their expansion factor is much less: while acoustical foam expands up to 1,000 percent, structural foam increases only 30 percent.

The density of the product, its limited expansion and the places on the vehicle to which it is applied, make structural foam a challenge to use. First there is that pesky identification problem, with the good news being that there is a relatively easy test a technician can conduct to find out what exactly is in that cartridge.

“When structural foam hardens, it’s almost like concrete,” says Marks, “so a useful test is to fill a soda can or other container with the product you are about to use, let it cure and test it by punching it with a screwdriver. Structural foam is extremely difficult to penetrate, while non-structural foam—even those products classified as ‘rigid’—is always somewhat spongy. In that way they are easy to tell apart.”

3M’s Bingham suggests making a sample of the foam, letting it cure and comparing it to what you know was supplied by the

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rails on the Cadillac CTS. This arrangement, in effect, makes the rest an assembly. As in the case previously cited, the foam is simply replaced.

"General Motors is evaluating the use of the dispensible replacement foam," says Brian Oosterhuis of GM's New Material Technology Development, "because there are a multitude of issues to consider. For one thing, it is very difficult to come up with standardized applications because every vehicle manufacturer has its own preferences. Development costs are significant, distribution channels aren't yet adequately developed. Plus the pumpable stuff isn't very forgiving when you make a mistake. This, combined with the cost and quantity of the materials, makes for a potentially less than feasible solution."

Technicians confronted with structural foams will be glad to know that the Society of Automotive Engineers (SAE) has issued a recommended practice, SAE J2611, conceived to help OEMs define the characteristics of two-component replacement structural foams. This document, which includes baseline classifications for different structural foams as well as testing methods, will undoubtedly help answer questions and clear up the muddier areas regarding these materials, including their performance in the aftermarket.

"The document should help automotive manufacturers work toward a common understanding of these products, which will, in turn benefit the collision repairer," says Marks. "Their advance on the market has been slower than anticipated, but structural foams are definitely coming and the industry has to be ready for them."


Auto Foam: Proper Application and Placement

Foam is showing up all over the modern vehicle. Although its presence adds a new level of complication to repairs, it’s imperative that it be reinstalled — and reinstalled correctly.

Mike West

Being a collision repairer for the vast majority of my life, I never imagined that I’d be fascinated by foam — in an automotive sense, that is.

Whenever an overabundance of foam has appeared in my beer glass, it would bring about a general sense of being taken advantage of and change my attitude toward the barman, to the extent that when I asked for the “same again,” I’d request that, “This time, decapitate the head.”

Other than that, my feelings toward foam were pretty benign.

Sure, I knew foam had something to do with getting a good night’s sleep and getting all comfy driving down the road, but I really wasn’t involved with foam in an automotive collision repair sense, nor did I imagine I ever would be. So I was blindsided when it began to show up all over the modern vehicle.

It really shouldn’t have surprised me that much because I’d been seeing different materials stuffed into waterproof bags and then packed into the inner quarter panel areas, which reduced the drum-like quality these large voids produced. This was the first NVH material (noise, vibration, harshness) and really dampened down the hollow, echoing sound that made an automobile less-than-a-pleasure to be in when driving down the road trying to appreciate Swan Lake on your classic FM station. These bags of textile material, packed snugly between adjoining parts, went a long way to control NVH, but that was just the feeble beginnings of what has become an important concept in the production and supply of the modern automobile.

Foams initially replaced textile materials because they were lighter, odorless, readily available, inexpensive, waterproof in their closed cell form and durable. They’re also adaptable in shape, strength, weight and cell structure to applicable needs. Actually, it’s an ideal material in its many forms and has a multitude of uses, which include:

1. Controlling NVH.
2. Strengthening the body structure to prevent flexing or twisting.
3. Supplying added safety for the vehicle occupants in case of collision damage.
4. Supplying predictable collision energy management.
5. Allowing vehicles to be lighter to achieve fuel efficiency mandates while maintaining the safety of a much heavier automobile.

These are some powerful attributes for such a humble material.

Types and Uses of Foam

Foams come in several configurations and structures, depending on their intended use.

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• **Preformed Energy-Absorbing Foam** — We’re all familiar with this type of foam. These parts are supplied by the OEM and may be purchased as replacement parts. They’re commonly found in bumper systems and replace the expensive, heavy systems that used massive steel bumper reinforcements and hydraulic or gas shock/energy absorbers. Set-in-place foam blocks are made of the same material and are commonly found in doors and some quarter panels.

If this type of foam is simply broken and not deformed or crushed, it may be repaired simply by gluing. Ford and General Motors both recommend repairing broken impact absorption foam with hot melt glue. Check the OEM’s recommendations. Repairing makes sense because these parts don’t derive their strength from shear or tear strength, but from the ability to absorb energy. Most of these simply sit on, or in another part and are covered and held in position, so there’s absolutely no loss of strength in gluing a broken energy absorption foam part.

• **Filler Foam** — This type of foam has several consistencies and intended uses, and some of the same type of foam is known by different names.

• **Rigid Foam/Semi-Rigid Foam/Pillar Foam** — These three descriptions are basically the same type and consistency foam. Don’t be confused. It’s almost like shopping for a mattress. From one brand to another, the descriptions are such that comparison is difficult. In the automotive foam world, rigid, semi-rigid and pillar describe automotive foam not within the same brand line, but across the multitude of producers.

In other words, one manufacturer’s rigid foam may be replaced by another’s semi-rigid, or yet another’s pillar foam.

The purpose of this foam is multifaceted. It has a closed cell structure in its cured and unshaved or uncut state. It won’t absorb water unless it’s cut, shaved or shaped with a blade. If this is done, the area affected should be sealed with a urethane sealant to prevent water absorption. This will come into play in the application process, where some cured material oozes out of an opening or hole and must be cut to properly allow attaching parts to fit. Simply apply a low-grade urethane sealant to this shaved area and brush in to assure thorough sealing of the open cells.

Rigid, semi-rigid and pillar foam should NEVER be used in place of structural foam. The name rigid may be misconstrued to have a structural use, but this would be a serious mistake and compromise the structural integrity of the vehicle. Be aware!

These types of foam have limited chassis reinforcement capability. They can expand up to 10 times their liquid or cartridge state and can be used to block air movement, reduce noise and control the movement of body parts. In other words, they can control two or more adjacent parts from rattling against one another. Even though they’re not considered a structural component and should never, ever be used in place of structural foam, rigid, semi-rigid or pillar foam may be used to minimize a vehicle’s twisting or flexing capacity. If you were to simply leave it out, you could seriously affect the designed durability and stiffness of the vehicle. It should be considered deficient to do so.

This type of foam has a visible cell structure, permanently deforms if compressed and must be sealed if cut.

• **Flexible Foam** — Unlike the preceding foam, this foam has little confusion connected to it. It has many uses, which include filling large voids, blocking air movement, sealing water leaks, controlling sound by absorbing it and preventing panel flutter.

It’s often found when you remove a top, between the crossbeam and the top panel, between the door skin and the intrusion beam, between the quarter and inner wheel house, in any pillar, the fuel system filler pocket and anywhere two panels are in close proximity but the manufacturer doesn’t want them touching.

Flexible foam is a tremendous sound dampening material. It also prevents flexing panels from contacting...
each other and, if compressed, easily springs back to its original pre-compressed position. It’s closed cell in its cured state but, if cut, must be sealed to prevent moisture absorption. If detached in the panel replacement process, it can be reattached by the use of a urethane adhesive. Expansion rate can be 1 to 10.

During a recent frame rail repair job on the rear of a Mazda Miata Roadster, I observed the use of flexible NVM foam at the attaching location for the upper strut nut and shaft. Of course, this vehicle is very small and the driver’s head is not more than three feet from this location. The foam was used in this scenario to quiet the action of the strut to the body. Hmm … sometimes these guys amaze me.

• **Structural Foam** — Structural foam is intended to reinforce and strengthen the structure of the automobile and manage collision energy forces. It can be found in the torque box area of full frame vehicles, pillars and front lower rails. It can also be used between engineering changes.

‘What’s that mean?’ you ask. Well, maybe the OEM realizes that the vehicle is structurally deficient in some way, but before they can make changes to rectify that deficiency, they’ve got a few thousand parts to use up. So they enhance the strength through chemistry.

Structural foam is definitely tough. You can dispense it into a cup and, when it’s cured, drive a pickup onto it and see absolutely no distortion or deflection. Leaving this out of a repair procedure would seriously and definitely compromise the repaired vehicle’s structural integrity.

While it has a closed cell structure, you can see it with your naked eye. The expansion rate is negligible. Some manufacturers recommend heating it to aid in dispensing (115 to 165 degrees F). Just make sure you check the structural foam manufacturer’s recommendations first.

Go to the vehicle maker’s Web site for the appropriate recommendations for procedures and materials. Above all, DO NOT substitute rigid, semi-rigid or pillar foam for structural foam.

• **Consumer Foam** — What’s consumer foam? It’s generally a one-part foam sold in aerosol cans that requires moisture to cure. It may never cure completely in an automotive application because of the dry location in the body of the vehicle. This can cause problems due to voids in the material, inadequate filling and the potential for corrosion. Not recommended! This is generally purchased at your local big box for curing drafts around doors and window jams in your cabin. Be careful. My buddy used it around the door jamb in his garage and couldn’t get the door opened after it expanded fully.

**Ordering Foam: Time It Right**

As soon as you realize the vehicle you’re repairing has automotive foam in the repair area that needs replaced, order it immediately. If you have some unopened foam on hand, determine what type it is and what the shelf life was supposed to be.

It’s a sad time of life when you’re ready to add some structural foam to the pillar of a vehicle and find that you can’t get it out of the tube because its shelf life expired a year ago. Of course, that was just after the salesmen who you see once every five years came through your shop and overstocked you with a bunch of stuff that’s now obsolete. Then you call your jobber to order some new product and he tells you that it’s three days away because they don’t like to stock it due to shelf life problems.

Order it before you’re going to use it, but not before you need it. Fresh chemicals always work better.

**Mixing Tip Considerations**

We like to use catalyzed, two-part seam sealers because they work. Consequently, we have a surplus of mixing tips available for when we use up the second tip that comes with the sealant.

**Question:** Can I use the sealant mixing tip for my foam application, since I’ve used the two tips supplied with the cartridge of foam for previous applications? It fits on my tube okay, even if the length of the mixing tip is different.

**Answer:** Don’t do it! You’re asking for curing problems, which, considering the location of the foam, isn’t all that attractive. Imagine a wad of uncured foam inside a rocker panel, drizzling out on the customer’s garage floor. How would you clean that out of the inside of the rocker? Flush it with lacquer thinner and a flash source of ignition?

http://www.bodyshopbusiness.com/Contents/PrinterFriendly/PrinterFriendly.aspx
Sounds a little dicey to me. I’d rather use the right mixing tip. It’s quicker, cheaper and safer in the end.

Let me ask you this: If they make different mixing tips for different products, doesn’t it follow that to cure the material as designed by the chemical engineer who created it that you should use the exact mixing tip designed and supplied with the product?

Yes.

If you use up the mixing tips for a particular product, order more and don’t listen to the local salesman when he tells you, “Don’t bother, just use your extra seam sealer tip.” Be precise and be diligent.

Application Methods
Foam application in an enclosed area requires some preplanning. No, it’s not like applying seam sealer, even though the application equipment and products may look the same. Make sure you have the proper applicator gun for the product you’re using. Many of the products use a product specific applicator gun for their specific foam. They range from simple and cheap to complicated and expensive. Make sure you have the appropriate gun for the job.

But before we start pumping foam into the pillar, we need to think about a few things:

1. What’s the expansion rate of my foam?
2. What’s the approximate volume I’m filling?
3. What’s my access?
4. Do I need a dam?

Let’s take a closer look at each ...

• Expansion rate and volume to be filled — Read the label or tech sheet that’s provided with your foam. If it’s a rigid pillar foam and the expansion rate is 1 to 10, that means if you pump one ounce of foam out of your tube, you end up with 10 ounces by area of foam cured in the pillar! Calculate the volume you’re filling in advance. Determine what the plunger travel will be to dispense 1/10th of the volume you’re filling. Get some extra mixing tips when you order the foam. Be prepared.

• Access for filling — What’s your access for filling? Good question, and the answer takes pre-planning. How far in advance do you need to plan? It depends on the access. When you remove the part and find the foam, check for replacement access at that time. Some areas will have no access, so pre-installing the foam in your replacement part may be your only option. In that case, you’ll install the foam into the part, off the car, being careful to not overfill and to stay clear of the weld site. Attach the part after trimming off excess foam and sealing shaped areas.

Do not drill holes for access, unless recommended by the automaker. An access hole may be much farther from the end of the tip than is practical to reach. In that case, you can attach a hose to the mixing tip and achieve close proximity to the desired beginning of dispensing. In this method, it’s necessary to pull the hose toward the access hole while continuously dispensing foam. You can’t stop or the hose will become entrapped and catalyze inside the foam. Keep moving.

It’s like walking and chewing gum at the same time. Do some practice runs dry to get the feel of the process. Be completely aware of what you’re filling. Is the seatbelt carrier in the area?

If you foam it, you won’t be able to move it after!

Are there holes where the foam can drip out and eat into the leather seats or dash pad? Tape drip holes.

• Damming — When you took your damaged part off and found the foam, did you find plastic or metal attached to the foam but clipped to the inner part? If you did — and it’s probable that you did — that was a carrier that had a packet of heat-activated foam attached to it during the assembly process. During the bake cycle of the e-coat, the foam expanded to its engineered location. Forget it. These aren’t available to us, and we couldn’t use them even if they were because of the elevated bake temperature it takes to activate it. But keep the carrier so you can use it as a dam to prevent the foam from going where you don’t want it to go. This is important because the position of the carrier is usually the bottom end of where the
foam is, and it rises from there. If your “fill” is on the vertical, you’re probably going to need a dam as the starting point of your “fill.”

If there is no carrier or it was obliterated in the collision, you’ll need to create one. There are several things you can use to create a dam, in addition to the original carriers. Balloons can be carefully blown up in position and tied off and then popped after filling. Less nerve wracking is the flexible foam packing that we all throw away. It can be tightly wadded up and shoved into a hole to expand once inside the desired location. If you’re going to install a dam and have to leave it, make sure that it’s properly corrosion protected (primed) if it’s steel.

Really, you’re only limited by your imagination, and we already know you’re creative or you wouldn’t be in this business.

Foam Smarts
To obtain thorough and complete training regarding automotive foams and their applications and uses in the collision repair industry, I recommend taking I-CAR Class FOM01 Automotive Foams. It’s an excellent course.

The proper application and replacement of automotive foams used in the modern automobile are essential to occupant safety, the structural integrity of the vehicles that use these foams, and the noise, vibration and harshness standards engineered into the vehicles by the manufacturers. It’s crucial and essential that these materials be reinstalled.

Writer Mike West, a contributing editor to BodyShop Business, has been a shop owner for more than 30 years and a technician for more than 40 years. His shop in Seattle, Wash., has attained the I-CAR Gold Class distinction and the ASE Blue Seal of Excellence.

Question 2.
Is it included?
2. Is the removal and application of corrosion protection foam included in any other labor operations?

Answer: No, the removal and application of corrosion prior to repairs is not included in any other labor operation.

Answer Documentation:

1. The Information Providers state that the removal and application of corrosion protection foam is not included in any other labor operation.
   – AudaExplore
   – CCC/MOTOR

   Mitchell makes no reference to the removal or application of corrosion protection foam in its estimating guide.

The original source documents from the leading Information Providers follow.

2. There are several DEG Database Task Force inquiries that say the removal and application of corrosion protection foam is not included in any other labor operation.
   – DEG Database Inquiry - #2481
   – DEG Database Inquiry - #5223

The original source documents follow.

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AudaExplore

Section 4-2 Labor Exclusions
Labor Exclusions – continued

- R&I of injected / Structural foam

Source: © 2014 AudaExplore North America, Inc. V: DBRM0114, Page 54
Section 4-2 Labor Exclusions

Labor Exclusions – continued

- Drain or refill fuel tank.
- **Drain, refill and/or top off transmission fluid.**
- Evacuate and recharge air conditioning system (‘Additional Labor’).
- Filling and finishing of unneeded holes.
- Glass or other collision debris cleanup (Standard Manual Entry M69 is available).
- Hazardous waste removal (Standard Manual Entry M60 is available).
- Labor for drilling necessary to attach parts (e.g., ornamentation, antennas, etc.). (Standard Manual Entry M61 is available).
- Lock cylinder coding (Standard Manual Entry M73 is available).
- Manual or electronic aiming of headlamps (‘Additional Labor’).
- Recover, evacuate and recharge air conditioning system (‘Additional Labor’).

**Refinish Materials are not included in Audatex refinish labor values.**

- Removal of bed liner materials on repaired panels.
- Removal of bed liner materials on replaced panels for access to welded areas.
- Removal of panel bonding adhesive material.
- R&I of audio and video components and optional computers.

- R&I of injected / Structural foam.

- R&I of non-standard equipment not identified as options.
- R&I of wiring harness, fuse box, and relay box.
- R&I or masking of mouldings and ornamentation (e.g., nameplates, emblems, ornaments, tape, etc.). For exceptions, see specific sections.

*Any printed copy of this document may not contain the most current information. For the latest version, please refer to the Database Reference Manual accessed through the Help Menu in the current release of Audatex Estimating, PenPro or Shoplink. The current version of the Database Reference Manual may also be found at [www.twining.audatex.com](http://www.twining.audatex.com).*

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### Section 4-3 Replacement & Recycled Operations

Refer to the Audatex Labor Report for Operations Specific to the Vehicle Being Repaired

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Source: © 2014 AudaExplore North America, Inc. V: DBRM0114, Page 91
### Section 4-3 Replacement & Recycled Operations

Refer to the Audatex Labor Report for Operations Specific to the Vehicle Being Repaired

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<td>√ Wiring harness R&amp;I</td>
<td>√ Corrosion protection</td>
<td>√ Body insulation (e.g., foams, pads)</td>
</tr>
<tr>
<td>√ Fuel door release cable R&amp;I</td>
<td>√ R&amp;I of non-standard equipment not identified as options</td>
<td>√ R&amp;I of mouldings, emblems, nameplates and ornaments</td>
</tr>
</tbody>
</table>

*Body structure foam*

*Any printed copy of this document may not contain the most current information. For the latest version, please refer to the Database Reference Manual available through the Help Menu in the current release of Audatex Estimating, PenPro or ShopLink. The current version of the Database Reference Manual may also be found at [www.anaudatex.com](http://www.anaudatex.com).*

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Source: © 2014 AudaExplore North America, Inc. V: DBRM0114, Page 91
LABOR TIME PREMISE
LABOR TIME DOES NOT INCLUDE

SPECIAL NOTATION:
The items listed below apply to all labor procedures.

- Structural foam removal or application

Source: CCC/Motor Guide to Estimating, Rev. 9-14, Page G10
Corrosion Protection – Foam Negotiation Tool

Version 3.0, January 4, 2016

GUIDE TO ESTIMATING

LABOR TIME LISTINGS

All operation times are listed in hours and tenths of an hour. A time listed as 3.5 indicates three and one half hours.

LABOR TIME PREMISE

The times reported in this publication are to be used as a GUIDE ONLY. Reported times include normal align procedure to insure proper fit of the individual new part being replaced. Reported times do not apply to vehicles with equipment other than that supplied by the vehicle manufacturer as standard or regular production options. If other equipment is used, the time may be adjusted to compensate for the variables. Removal and replacement of exchanged or used parts is not considered. If additional aligning or repair must be made, such factors should be considered when developing the estimate. Items not listed under the INCLUDED/DOES NOT INCLUDE heading for any given procedure have not been considered in the estimated work time development for that procedure, unless specified by a footnote. All included/not included items for labor procedures listed between pages G10 and G35 are for component R&M and R&M procedures unless otherwise indicated in operation heading.

OPERATION TIMES LISTED ARE BASED ON NEW UNDAMAGED PARTS INSTALLED ON NEW UNDAMAGED VEHICLES AS INDIVIDUAL OPERATIONS. TIME HAS NOT BEEN CONSIDERED FOR ALIGNMENT PULLS, DAMAGE-RELATED ACCESS TIME, DAMAGED, USED, REMANUFACTURED OR AFTERMARKET PARTS. SOME OPERATION TIMES ARE APPLICABLE AFTER BOLTED, ATTACHED OR RELATED PARTS HAVE BEEN REMOVED. REFER TO SPECIFIC FOOTNOTES ATTACHED TO OPERATION TIME LISTING.

LABOR TIME DOES NOT INCLUDE:

SPECIAL NOTATION:
The items listed below apply to all labor procedures.

- A/C System, Evaporate and Recharge
- Aftermarket & OEM accessories
- Alignment: check or straightening related parts
- Alignment check of front or rear suspension/steering
- Anticorrosion material restoration/application
- Battery D/R/charge
- Brackets & brasie transfer
- Broken glass removal or clean up
- Brakes, bleed and adjust
- Caulk (non-OEM), sound insulate or paint inner areas
- Clean up or detailing of vehicle prior to delivery
- Computer control module D/R/repair
- Conversion Vans (special components, equipment and trim)
- Cutting, pulling or pushing collision damaged parts for access
- Damaged or defective replacement parts
- Drain & refill fuel tank
- Drilling, modification or fabrication of mounting holes
- Fabricate templates, reinforcing inserts, sleeves or flanges
- Filling, plugging and finishing of unneeded holes in new parts
- Information label installation
- Material costs
- Pinch weld clamp damage repair
- Refinishing

LABOR TIME PREMISE - Continued

- Reset electronic memory functions after battery disconnect
- Road test vehicle
- Rusted, frozen, broken or corrosion damaged components or fasteners
- Scan tool clear/reset electronic module
- Scan tool diagnostics
- Steering Angle Sensor recalibration
- Structural damage diagnosis and vehicle set up time
- Structural foam removal or application
- Undercoating, for or grease removal
- Unprimed bumpers, removal of mold-release agents
- Waste disposal fees (all types)
- Weld through primer
- Welded seam surface finishing finer than 150 grit sandpaper
- Wheel or hub cap locks R&I

FRONT BUMPER ASSEMBLY – R&I ALL TYPES

INCLUDED:

- Align to vehicle
- Face bar/bumper cover assembly R&I

DOES NOT INCLUDE:

- Air bag sensor
- Battery
- Emblems & nameplates
- Energy absorber, all types
- Lamp alining
- Lamps (when not mounted in bumper)
- Moldings & impact strip
- Stripe tape, decals or overlays
- Valance panel/spoiler (when not mounted to bumper)

FRONT BUMPER – R&R FACE BAR TYPE

INCLUDED:

- Align to vehicle
- Emblem & nameplate
- Face bar R&R
- Guard
- Guard cushions
- Lamps (when mounted to bumper)
- Molding & impact strip

DOES NOT INCLUDE:

- Air bag sensor
- Battery
- Distance sensor
- Energy absorber, if mounted to frame rail (all types)
- Lamp alining
- Lamps (optional equipment, or not mounted to bumper)
- License plate/bracket
- Stripe tape, decals or overlays
- Valance panel/spoiler (when not mounted to bumper)

Footnotes found in a chapter contain vehicle-specific information. The content of footnotes is in addition to, and takes precedence over, information in the Guide to Estimating pages for the operation indicated.

Source: CCC/Motor Guide to Estimating, Rev. 9-14, Page G10
ACOUSTICAL AND STRUCTURAL FOAM FILLERS

This type of product is used by some OEMs to control NVH (noise, vibration and harshness) or add structural integrity to the vehicle body. Acoustical foam is a soft to firm, pliable products while structural foam is a hard, dense, rigid product. Acoustical and/or structural fillers may be found internally on vehicle panels; therefore, identification of foam type and location may require an inspection after vehicle disassembly. Foam products must be removed within six inches of an open flame, excessive heat (600 degrees) or welding operation. Any foam damaged or removed during the repair process must be replaced.

SPECIAL NOTATION:

Not all vehicles contain foam fillers; others may contain foam fillers in one or more locations. Refer to OEM for specific repair recommendations/ procedures and replacement product(s).

Source: CCC/Motor Guide to Estimating, Rev. 9-14, Page G7
**GUIDE TO ESTIMATING**

**ACOUSTICAL AND STRUCTURAL FOAM FILLERS**

This type of product is used by some OEMs to control noise, vibration and harshness, and add structural integrity to the vehicle body. Acoustical foam is a soft, firm, pliable product with structural foam being a hard, dense, rigid product. Acoustical and structural fillers may be found internally on vehicle panels, therefore, identification of foam type and location may require vehicle inspection after vehicle disassembly. Foam products must be removed if within six inches of an open flame, excessive heat (600 degrees) or welding operation. Any foam damaged or removed during the repair process must be replaced.

**SPECIAL NOTATION:**

Not all vehicles contain foam fillers; others may contain foam fillers in one or more locations. Refer to OEM for specific repair recommendations/procedures and replacement product(s).

**ELECTRONIC SYSTEMS & ON-BOARD COMPUTERS**

Special caution should be taken when servicing vehicles due to the wide use of computer modules, electronic sensors and printed circuit boards. This type of equipment is very sensitive to high temperatures and voltage fluctuations, including electrostatic discharge. A few safety tips you should consider are:

- Disconnect battery cable
- Computer modules should not be exposed to temperatures exceeding OEM recommendations
- Remove component if necessary
- Discharge static electricity before handling component(s)
- Avoid touching electrical terminals of component

I-CAR's Uniform Procedures for Collision Repair states that electronic components should be removed from the vehicle if welding is to take place within 12 inches of the component. Refer to manufacturer's specific recommendations for each vehicle.

**HAZARDOUS MATERIALS**

Regulations and safety considerations may require protective clothing, respirator, protective eyeglasses, and/or ear plugs be worn in certain areas of collision repair facilities. Caution must be exercised when dealing with isocyanates, flammables, fumes, liquids and airborne particles.

**HYBRID/ELECTRIC VEHICLES**

**Warning: High Voltage Electrical System!**

These vehicles are equipped with high voltage batteries and are capable of causing electrical shock. Failure to use caution in the proper disconnection of this electrical system may result in serious injury or death. For safety and ease of identification, electrical cables carrying the high voltage are colored orange. Any orange-colored cable should be avoided until the high voltage electrical system has been disabled. Follow OEM safety precautions including wearing personal protective equipment rated for working on Hybrid/Electric Vehicles. Follow OEM service repair information for disabling the high voltage electrical system before beginning any repairs.

**OEM COLLISION REPAIR NETWORK**

Some OEMs manufacture aluminum vehicles that have an established repair network for these vehicles and require collision repairs to be performed at an OEM authorized aluminum repair center. Manufacturers with collision repair network are Audi, BMW, Jaguar, and Mercedes Benz. Refer to the OEM for complete information on collision repair network program.

**OEM COMPONENT REPLACEMENT - GENERAL**

The collision repair facility must have the equipment, training, and experience using the latest factory/industry information and procedures. Ultimately, the safety and quality of any repair will depend not only on the equipment that is used and the procedure that is followed, but also on the skill and knowledge of the repair technicians, the steps they take to control repair quality and how well they check the details of the repair.

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Source: CCC/Motor Guide to Estimating, Rev. 9-14, Page G7
DEG Database Inquiry - #2481

Rear Body Panel – Acoustic Foam – NVH

MissingPartName // NVH or acoustic foam

MissingPartDescription//slow expanding or pourable foam that is needed between the inner and outer walls of the replacement rear body panel.

MissingInformation // This foam is an OE item but is not shown anywhere in the estimating system.

IP Explanation

We have reviewed your inquiry with regard to the issue of NVH / Acoustic Foam and this would be covered in the reference manual, under Section 4-2 Labor Exclusions… R&I of Injected / Structural Foam. This would be a manual entry with labor determined by the estimator.

No changes are warranted at this time.

### DEG Database Inquiry - #2481

**DEG DATABASE INQUIRY**

<table>
<thead>
<tr>
<th>Track_#</th>
<th>Estimating Platform</th>
<th>Inquiry Category</th>
<th>Year Make Model</th>
<th>Resolution Status</th>
<th>Origination Date</th>
<th>Submission Date</th>
<th>Resolution Date</th>
<th>Total Time to Resolve</th>
</tr>
</thead>
</table>

**Inquiry Description**

- **Rear Body Panel - Acoustic Foam - NVH**
  - MissingPartName/NVH or acoustic foam
  - MissingPartDescription/slow expanding or pourable foam that is needed between the inner and outer walls of the replacement rear body panel.
  - MissingInformation/This foam is an OE item but is not shown anywhere in the estimating system.

**Resolution Description**

- **IP Explanation**
  - We have reviewed your inquiry with regard to the issue of NVH/Acoustic Foam and this would be covered in the reference manual, under Section 4-2 Labor Exclusions...R&I of Injected / Structural Foam. This would be a manual entry with labor determined by the estimator.
  - No changes are warranted at this time.

DEG Database Inquiry - #5223

Foam

Section4_AreaVehicle
Right Rear

Section4_PartName
Replacing Right Side Panel

Section4_IssueSummary
Shop is asking for labor to replace foam filler on right bedside. CCC says “Adhesive application if required (all types)” and “Caulk / seam sealer” are both included. It does not specifically address foam filler in CCC though. So is the labor to replace the foam included in the R&R side panel time?

IP Explanation

Estimated Release Date: Closed
Proposed Resolution: MOTOR stated:
According to the “Guide to Estimating, Labor Time Premise – Labor Time Does Not Include,” page G10:
“Structural foam removal or applicatio is not included.”
No changes required.

## DEG DATABASE INQUIRY

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### Inquiry Description

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### Resolution Description

#### IP Explanation
- Estimated Release Date: Closed
- Proposed Resolution: MOTOR stated:
- According to the "Guide To Estimating, Labor Time Premise Labor Time Does Not Include," page G10:
- "Structural foam removal or application" is not included.
- No changes required.

Question 3.
Are there pre-determined times?
3. If not, is there a pre-determined time for the application and removal of corrosion protection foam?

Answer: None of the Information Providers provide times for the application and removal of corrosion protection foam. However, if there is not a time, it does not mean that it is included. If there is not a time you may need to do a manual entry.
Question 4.
What is it worth?
4. If not, what is it worth?

Answer: The Estimator will have to use judgment times on these items since no database times are given by the Information Providers.

Answer Documentation:

The following items can be used as justification:

- Conduct your own time study:
  - Create a time study form
  - Create a video of the time study
Additional Thoughts
**Additional Thoughts**

- When removing foam consider materials, such as eraser wheels, roloc discs, wire wheels and other supplies.
- When replacing foam, be sure to consider foam materials and applicator tips.
- **TIP:** If you save the P-pages as a PDF and search for terms in the document by going to Edit, then Find or by hitting Ctrl+F

<table>
<thead>
<tr>
<th></th>
<th>AudaExplore Labor</th>
<th>CCC/MOTOR Labor</th>
<th>Mitchell Labor</th>
<th>Materials</th>
<th>Considerations</th>
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</thead>
<tbody>
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<td>Not Included</td>
<td>Not Included</td>
<td>Not Included</td>
<td>Eraser Wheels, Roloc Disc, Wire Wheels, Whatever Supplies Needed</td>
</tr>
<tr>
<td>Replace Foam Labor and Materials</td>
<td>Not Included</td>
<td>Not Included</td>
<td>Not Included</td>
<td>Not Included</td>
<td>Foam Materials, Applicator Tips</td>
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