Automotive Foams
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Module 1 - Overview Of Automotive Foams
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Foam Uses

Reasons For Foam In Vehicles
Noise vibration and harshness (NVH) may be caused by vehicle __________, texture of the driving surface, or air passing along the vehicle.

Foam is also used in vehicles to repair water leaks, __________ the body structure and help control twisting and flexing of the vehicle, provide collision energy management, and provide additional crash protection for occupant safety.

Structural Enhancement (cont’d)
Structural foam increases the strength of a part, is typically used between engineering changes, is highly __________ material, and has minimal expansion.

Impact Absorption
Solid foam energy absorbing blocks are typically available as a __________ part, making it more cost effective to replace than repair. Solid foam energy absorbing blocks used in door assemblies must be reinstalled if they are removed, and replaced if damaged.

Vehicle Maker Application and Curing Methods

Vehicle Maker Application Methods
During vehicle assembly, drop-in _______-activated material, or two-part expandable foam that expands and cures by a chemical reaction may be used.

Set-In Foam
Set-in position foam consists of a __________ material that is set into position and clipped or bolted to the door shell assembly. These flexible foam blocks may be located anywhere on the vehicle.

Heat-Activated Foam (cont’d)
Heat-activated foam may expand up to 10 times when baked in the ___-_______ baking cycle.
Vehicle Maker Replacement Materials
Vehicle maker replacement materials may include set-in position _______ parts such as pre-cut foam.

A service part may have __________________ foam already installed.
Module 2 - Automotive Replacement Foam Types
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Collision Repair Foam Materials

Collision Repair Foam Chemistry
If a urethane-based material is opened and resealed, the shelf life of the material will be ____________ than unopened material. Both materials are closed cell.

Some product makers listing the product chemistry on the material label.

Non-Expanding NVH Material

Sound Dampening Material
Sound dampening material does not ____________ like a two-part foam.

It can be used as an adhesive to attach existing NVH foam to replacement panels, is designed to be applied to gaps less than 1/2", and has a ____________ work time than traditional two-part expanding foam.

Sound Dampening Material Uses
Sound dampening material may be used to ________________ original foam that is being reinstalled.

Sound dampening material may also be used between the quarter panel and the fuel pocket or to fill small gaps, up to _____ ".

Flexible NVH Foam

Flexible NVH Foam Characteristics
Flexible NVH foam is _____ strength, with a high compression rate, extremely flexible, and does not permanently deform when compressed. It is typically able to expand up to _____ times its liquid volume.

Flexible NVH Foam Characteristics (cont'd)
Flexible NVH foam is _________________. It is typically urethane based, has a short foam time, has no structural enhancement capabilities, is commonly referred to as anti-__________ foam, and has a visible cell structure.
Rigid NVH Foam

Rigid NVH Foam Characteristics
Rigid NVH foam is packaged under many different names. These names include semi-rigid, ________, and rigid foam.

Rigid NVH Foam Characteristics (cont’d)
Rigid foam provides limited chassis reinforcement, is not a replacement material for structural foam, is not as strong as structural foam, and typically has a ____________ cell structure.

Rigid NVH Foam Uses
Rigid NVH foam is commonly used for NVH control, such as absorbing sound, blocking air, and helping control _______________ of body parts and panels. It also is used for _______________ adjacent parts.

Rigid Foam Locations
Common locations where rigid foam may be found includes _______________, rocker panels, dog legs, _______________ panels, rails, and front or rear roof bows.
Module 3 - Foam Safety And Repair
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**Safety When Working With Foam**

**Safety Equipment**
When working with expandable foam, specific safety equipment that should be used includes a respirator, __________ resistant gloves, a fire extinguisher, and eye and face protection.

**Safety When Working Near Foam (cont’d)**
When cured foam begins to melt, it generates toxic chemicals, including carbon monoxide and __________ gas.

**Identifying Vehicle Maker Foam**

**Vehicle Maker Foam Identification (cont’d)**
Some ways of identifying foam that has been installed by the vehicle maker include visually inspecting the materials _______ structure, texture, brittleness, and ___________________ resistance of the foam.

**Determining Replacement Materials**

**Vehicle Maker Recommendations**
The vehicle maker provides information on the proper materials to be used in service manuals, ________, websites, and with parts information.

**Product Maker Recommendations**
Product makers will provide recommendations and tips through their website or in the _______________ product sheet.

**Making Foam Samples**
Making foam samples from multiple product makers of different foam types will help find the _______________ match for the repair. Cut the samples to create a viewable _________ section.

**Material Placement**
There is a relationship between the location the replacement material is introduced into the part and the _______________ location. This relationship will have an influence regarding which material should be used and the _______________ for installation.
Module 4 - Preparing Parts For Foam
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Part Preparation

General Part Preparation Considerations (cont'd)
When preparing a part for foam ensure areas that will receive foam are ___________ and dry. Prime all ________ metal areas to reduce the chance of corrosion.

Foam Removal
Some tools and techniques used for removing foam include chisels, ________________ for rigid and structural foam, heat, scrapers, ___________, and rolling the foam off by hand.

Installation

Reusing Flexible Foam
Do not reuse foam that is damaged, use ________________ adhesive, or NVH sound dampening material to attach existing material to replacement parts.

Installing Foam
When installing foam, locate access holes where material can be installed into the part, have an estimate of how much material should be installed in the part, select the appropriate material for the application and use the appropriate ________________, and purge the air from the tubes and level the plungers. This should be done while the cartridge is held with the dispensing end ________.

Installing Foam (cont’d)
When installing foam, install the mixing nozzle on the cartridge using only the nozzle supplied by the product maker for the ________________ being used. Using the incorrect mixing nozzle may result in the product ____________ in the nozzle or be under-mixed.

Positioning Replacement Foam
When installing foam, the relationship between the access hole and ____________ location of the foam must be considered, along with dams that may be required to retain the foam at the intended location.

A pillar foam with a high flow rate and slow foam time can be dispensed ____________ and allowed to run into the bottom of a pillar before expanding. If the dispense rate is too slow, the foam may begin to expand and cure in the mixing tip.
Creating Dams
When making a dam to retain foam, various materials can be used. These materials include solid dams such as, steel, plastic, or foam blocks.

Other materials include soft dams such as compressible foam, ______________, or two-part foam.

Expansion Rate Variables
Expansion rate can be affected by __________ life of the product, the rate it is dispensed, and _________________.

Suspending Foam Without Dams
The dispense rate of foam should be slow on a ____________ surface. It typically requires practice and good technique.

Part-Specific Considerations

Applying Foam To Door Skins
When applying foam to door skins, apply the foam to the area between the door skin and the intrusion beam while the door is _________________.

Applying Foam To Roof Skin Bows
When applying flexible foam to a roof bow, use a _______ _________ to protect the inside of the vehicle from any material that may fall. If foam begins to drip or fall, allow the material to cure before cleaning or trimming.