

Sound Deadener Showdown

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[Home](#)

Doors

Outer Door Skin



A door is complicated enough that we have to break it down into components for discussion. As with most things related to vehicles, inner, outer, front, rear, left and right are relative to a seated driver. The outer door skin is the painted exterior of the door. It's often one of the more resonant panels on the vehicle. In most cases you'll only need to install CLD Tiles on the outer door skin. Barrier layers may be appropriate if inner door skin placement won't work, you are concerned about your door mounted speakers being heard from outside of the vehicle or you are pursuing quiet deep into the realm of diminishing returns.

Inner Door Skin



This is the surface to which the trim panel is attached. To the extent that it has resonant areas, add some CLD Tile. You will seldom need more than 1 or 2, cut into smaller pieces. This where I want to hang the barrier layers. There are two significant advantages to inner door skin barrier placement in most vehicles:

Noise entering the door through the front, rear, top and bottom are **behind** the barrier.

If there are speakers mounted to the inner door skin, adding a barrier to the mounting plane will improve isolation between the front and rear waves produced by the speakers.

The disadvantages are that the barrier must be breached for the speaker, effectively making the speaker cone the barrier in that area and that it is a tight fit.

Trim Panel



You will probably know more about your trim panels when this project is done than you ever imagined there was to be known. How we treat a door is almost entirely determined by the trim panel and its interface with the inner door skin. For inner door skin barrier placement to work, there needs to be enough space to cover as much of the closed interior area of the inner door skin with a layer at least 1/8" thick. The goal is to bridge the door as much as possible.

If your trim panel has a lot of empty space on the side facing the inner door skin, it presents a great opportunity to use 3M Thinsulate™ Acoustic. The stiffer and thinner the trim panel, the more likely it is to benefit from a CLD Tile™ or two.

The Standard Plan for Doors

I've used this treatment, or variations of it, on dozens of vehicles. Customers have used it for hundreds more. It might be easier to list the vehicles I know **won't** work: Some 2005-2010 Volkswagens, modern Minis and late model Mazdas. Most luxury cars **will not** respond well to this treatment. They will have already used the space we are counting on. This treatment is really retrofitting luxury car characteristics to the doors.

1. CLD Tiles™ on the outer door skin.
2. If there is open space between the side impact protection beam and outer door skin, fill most of it with Extruded Butyl Rope.
3. CLD Tiles™ on the inner skin, as needed. Hang a layer of mass loaded vinyl on the inner skin, decoupled from the inner door skin with closed cell foam. Decouple the MLV from the trim panel with CCF as needed.
4. CLD Tiles™ on the trim panel, as needed. If there is space inside the trim panel, fill it with 3M Thinsulate™ Acoustic.

I almost always suggest treating the doors to those who want to just treat one area or at least start with a single area. Treating the doors is very likely to make an audible difference in noise levels. If there are speakers mounted in the doors, they should sound much better. I've had customers treat the doors as the first step in a planned audio upgrade decide that stock was enough after treatment. Since you handle a door every time you get in to or out of a vehicle, the improved tactile experience of a treated door is nice too. All and all, it's a good project that can be done without disabling the vehicle. It's among the most challenging material fitting areas to treat but that is balanced by ease of access and the experience you gain working your way through multiple doors.

CLD Tiles™ on the Outer Door Skin



The yellow shows how I would typically target the CLD Tiles. The black pieces are the side impact protection system and the blue is the stock vibration damper. I calculate the number of tiles I'll need to cover 25% of outer door skin (height * width in inches / 240). I take that number to the door and figure out how to fit them. Gotta have a plan.

CLD Tiles™ on the Inner Door Skin



Side Impact Protection Structure



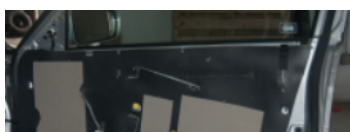
Modern vehicles have structures inside their doors to reinforce them. Frequently tubes or beams that run parallel to the outer door skin. In some vehicles the gap between the structure and the outer door skin has been filled. In others it is completely open. If the gap is 1/4" or less, stuffing some Extruded Butyl Rope in there is an easy way to brace the sheet metal at its weakest point. Also builds a vibration damper in place.

Extruded Butyl Rope in Place



Extruded Butyl Rope stays sticky forever. It's probably best to either paint the exposed surfaces or press plastic sheeting onto it to prevent it from becoming a dirt magnet. I use cut up plastic trash bags.

Bulding a Barrier on the Inner Door Skin

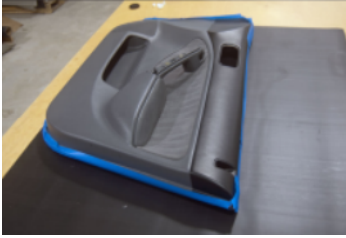


This is where we want to end up. There is a full layer of closed cell foam between the mass loaded vinyl and the inner door skin. The light gray patches visible in the photo are closed cell foam positioned to



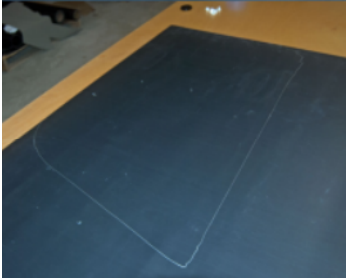
decouple the trim panel from the MLV. The trim panel goes back on snugly and all of the door's mechanism function without obstruction. Yeah.

Start with a passenger side door! In many cases the driver's side is a mirror image of the passenger's side – sometimes with one or two more wires. You can use the passenger side MLV as a template. It's possible that fitting the MLV to the first door will take a few hours. If you can copy that onto a second door, you can do it in a few minutes.



I start by tracing the outline of the trim panel onto MLV using a silver metallic Sharpie.

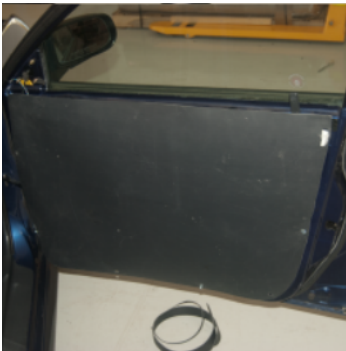
The tape is to prevent marking the trim panel where it sits on the MLV.



Traced.



Cut out.



Use two 2"x2" pieces of Velcro® to hang the MLV on the inner door skin from the top corners.



As always, I separate the hook and loop sides and press each down separately.

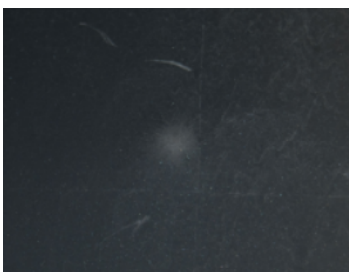


If your door uses push in clips like these, it's quite easy to maintain registration. A useful MLV trait is that it turns white when stretched. The trim



panel has balled up paper in it so the MLV will remain flat.

I've filled the hollow areas with crumpled paper to give a flatter working surface.



A really handy feature of MLV is that it turns white when stretched. Push down on the clip and it will mark the MLV.



Cut a small hole for each clip. When you return the MLV to the inner door skin, they should line up precisely with the holes. You'll need to make them larger when you get closer to the end, but while you're moving the MLV back and forth between the inner skin and trim panel, it's best to keep them small.



Some doors, like this Dodge Ram door, have hooks on the trim panel that slide into cutouts in the inner skin. Same principle applies for registration.

You want the trim panel to fit back on the door in the same position it was in before you added the MLV. You will test fit **many** times before you get it right. If your door uses push in clips, remove them until you get the trim panel to fit without them. Could save having to replace worn out clips.

If you have to throw your shoulder into the trim panel to get it back on, you aren't done fitting.

Any part of the trim panel that used to touch or pass through the inner door skin needs to be able to do that with the MLV in place. Many trim panels have steel brackets that get screwed or bolted into the inner door skin. You'll have to cut the MLV away for the bracket. Make sure you clear enough space around clips so that the whole clip can seat - many have shoulders that need to touch the inner door skin.

Don't give up. The biggest mistake people make is cutting away areas they don't need to. If you do, you can probably patch it with a scrap piece of MLV and HH-66. Study the interface between the trim panel and inner door skin. They get much easier after the first. Don't even think about adding the CCF until the MLV layer fits. CCF will compress. MLV will not.

You also need to pay attention to cables and actuator rods - anything that needs to move to operate. Make sure it moves freely into and out of every position.

Test Fit

It's really important to take the first door slowly. There's a lot of the 5 pound bag of sugar going on here. Study, trim, test fit, study, trim, test fit. Some doors - Toyotas come to mind - are really, really easy. Others will require rest breaks for a refreshed perspective.

Once the MLV fits it's time to think about decoupling it from the inner door skin and trim panel.

Before moving on, take the piece of MLV you've just perfected to the driver's side door (I'm assuming you started with the passenger's side). Flip it and see if it fits. There's an excellent chance the doors will be mirror images of each other. If it works, trace the trimmed piece of MLV onto fresh MLV. You'll thank me later :)

Decoupling the MLV and Inner Door Skin



I like to have as close to a full layer of CCF on the side of the mass loaded vinyl facing the inner door skin as possible. There may be areas where you can get more coverage with the CCF than you did with the MLV. You can see a black rectangle on the CCF in the photo that I didn't cut out. It's left over from tracing the MLV onto the CCF. Since it's where I had to remove MLV to allow a steel bracket from the trim panel to make contact with the inner door skin, leaving the CCF will act like a gasket, even though it will be completely compressed in spots.

That's a critical difference that will become apparent as soon as you touch the materials. Mass loaded vinyl will not compress. It's an 1/8" thick no matter what you do. Closed cell foam will compress - to almost nothing if you apply enough pressure. Don't let this knowledge make you over confident. CCF is easy to compress between two fingers, harder over larger areas. Too much CCF will stop you from getting your trim panels back on. I use the MLV as a template. Cut the outer perimeter of the CCF and then decide which of the interior openings to cut out or leave closed. Do the Velcro windows. Then tack the CCF to the MLV in one or two places. **Test fit!** Good? Tack it down in a few more.

Decoupling the MLV and the Trim Panel



I add closed cell foam to the side of the MLV facing the trim panel where it will help decouple and stabilize the trim panel. This is less important if I will be lining the trim panel with 3M Thinsulate™ Acoustic.

Finishing with 3M™ Thinsulate™ Acoustic



3M™ Thinsulate™ Acoustic is a fantastic material that's finding its way into more and more luxury cars. I do my best to get a layer in the trim panel. This absorbs sound, prevents most rattles and buzzes within the trim panel and between the trim panel and inner skin/MLV. It adds significant thermal insulation

I use a few drops of hot glue to tack the Thinsulate to the trim panel – glue applied to the black side.

Estimating Materials



Two sets of measurements should give you all you need to estimate what you'll need.

You really want to measure the smallest rectangle that will fully enclose the outer skin or trim panel. Many doors aren't rectangular but it doesn't pay to estimate that. The area cut away isn't large enough to be worth much and you do not want to seam pieces of MLV together for the doors – space is tight enough already.

Assuming all measurements are in inches:

Outer skin height * width / 240 gives you the number of tiles needed to cover 25% of the area.

Add 1 or 2 CLD Tiles (depending on size and inner skin configuration), to be cut into smaller pieces, for the inner skin.

Add 1 CLD Tile, to be cut into smaller pieces for the trim panel.

If you'll be hanging the barrier layers on the inner skin, trim panel height * width / 144 gives you the number of square feet of MLV you'll need for one door. This number should be pretty good for 3M™ Thinsulate™ as well. Use this area, or 1.5 times this area if you will be adding it to the trim panel side of the MLV, for CCF.

If you'll be hanging the barrier layers on the outer skin, $\text{outer skin height} * \text{width} / 144$ is the area for both CCF and MLV.

Allow 2.5 or 3 Velcro® Strips for inner skin barrier layer placement. You'll want to use somewhat more for outer skin placement.

One roll of Extruded Butyl Rope will be enough for everything but very large vehicles.

If you will just be treating the doors, don't forget an 8 oz can of HH-66 Vinyl Contact Cement.

Just Treating Your Doors?

It's really important to start with a single piece of MLV for each door. The project is tricky enough when you don't have to worry about seams. MLV comes on a 54" wide roll. I can cut any length (in even inches) you need.