LS7 + Solstice = Excitement! The GM Performance Division Builds a HOT ROD Test Car

The HOT ROD Solstice Buildup Continues

GM Performance Division and HOT ROD Work Together to Build the Ultimate Test Car. Check out the continuing math data studies and heavy duty fabrication now underway.

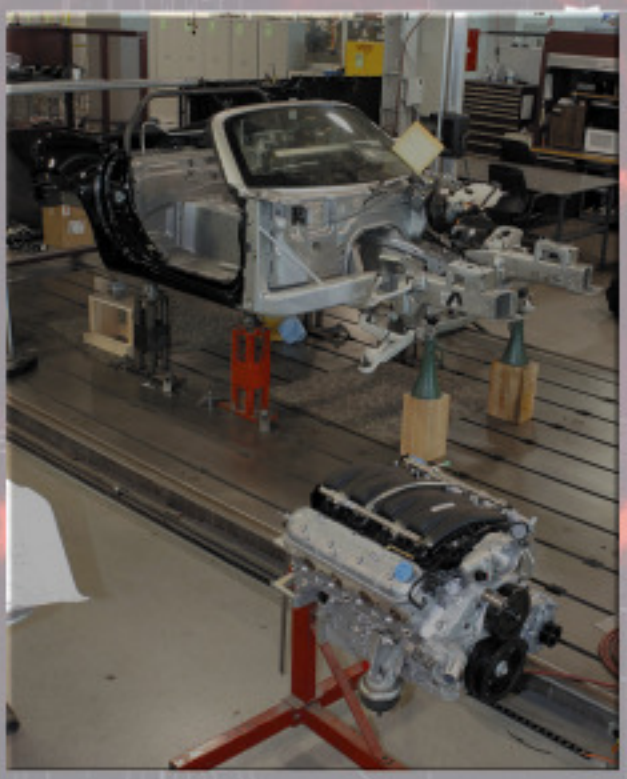
HOT ROD Solstice Buildup: The Real Work Begins

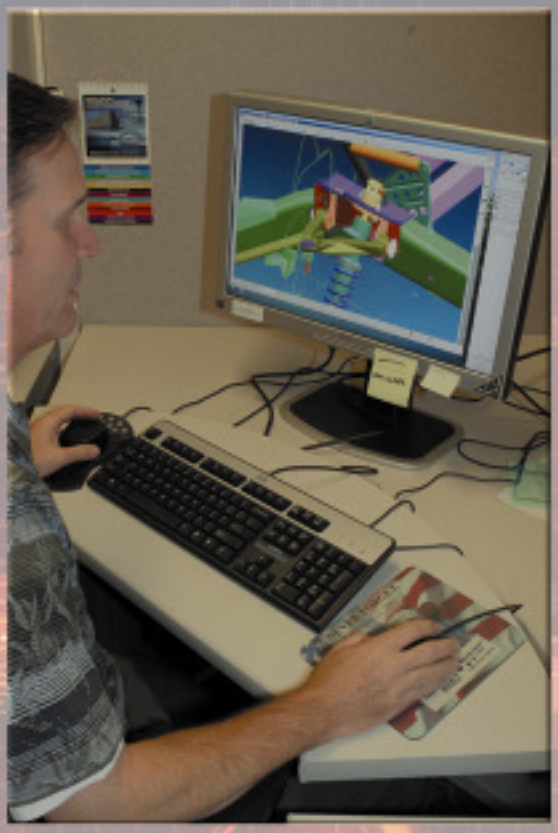
The buildup of this incredible Solstice is underway at GM Performance Division. Building a car is done a little different inside GM than at your local hot rod shop. First of all, the initial step in a vehicle buildup is always building the vehicle 'virtually' in what the engineers refer to as a 'math model'. A math model is a three dimensional (3D) representation of the physical vehicle. These are used to engineer the physical appearance and properties of each part, test their strength and durability, project vehicle weight, determine material requirements and also predict costs, among many other aspects.

While most shops still rely on the 'cut-and-paste' method to fabricate, install and integrate components, GM uses these math data files to guide them down to the thousandth of an inch as to how components should be built, installed and operate together. It really is a fascinating method to build a car-even though reading about it might not sound that compelling.

That's why you're going to get a chance to 'see' through a myriad of photos how this all takes place-and we believe that will be compelling. So sit back and look through this overview (and look for more in-depth articles on every corner of this vehicle) showing how the HOT ROD Solstice was built the 'GM Performance' way.

1.
The building of the HOT ROD Solstice into a 2900 lb, 600+ hp, 10 second car that looks great and is at home on the street, road race track or dragstrip started here, on a surface plate in the GM Concept Vehicle Integration facility in Warren, Michigan. Notice the large arms hanging over the vehicle on each side, they are precision measuring instruments used to locate holes, components and welds to within 0.001 inch on the vehicle as called out in the 'math data'! Like we said, GM builds cars at a different level! Also, check out the LS7 engine on the stand in front of the vehicle-it makes 505 hp from the factory and is truly the biggest reason this car is an absolutely brutal performer.





2.
To handle the impressive power without any durability or traction issues (like tire spin or wheel hop), Designing Engineer Mike McCann (shown) and the rest of the math data team did substantial work revising the suspension geometry and components. This was part of a larger overall plan-the HOT ROD Solstice is a testbed for various ideas GM Performance engineers have on how to handle substantial amounts of horsepower in a street able package.

3.
Also, the frame rigidity was evaluated via finite element analysis (FEA) testing using the math data to make sure it would handle the stresses of the LS7 and improved traction and handling capabilities. Here, DE Mike McCann runs a test on the front framerails. From this testing, McCann determined the front framerails needed some stiffening rails, which he has added to the file shown here and that we'll show actually being fabricated and installed on the vehicle by GM fabricator Tom Wiszowaty in a later update.

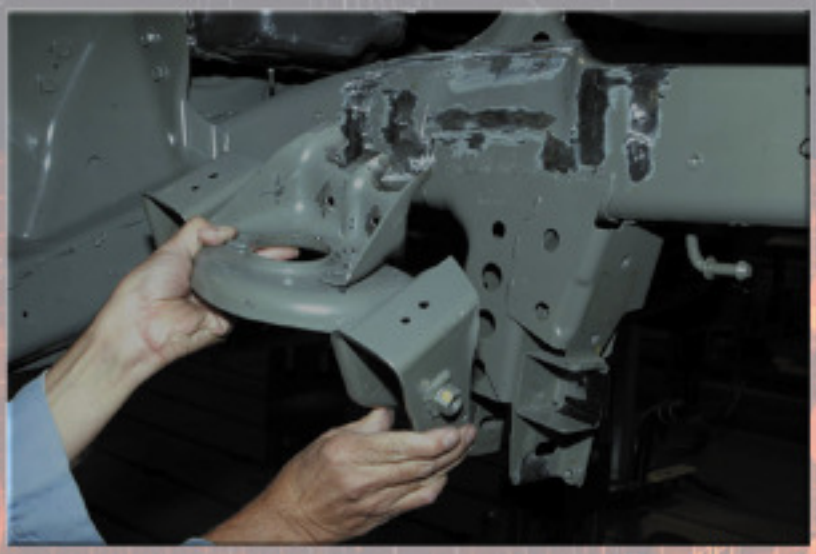
4.
We'll get into much more detail on these in later installments, but the HOT ROD Solstice has these one-off upper and lower a-arms on the rear suspension.

5.
Here, the bushing holes are being bored out to accept the stock bushings. These arms are CNC-machined from a large block of 7071 billet aluminum using the math data files as a guide. This is some of the incredible work that can be performed with the aid of math data.

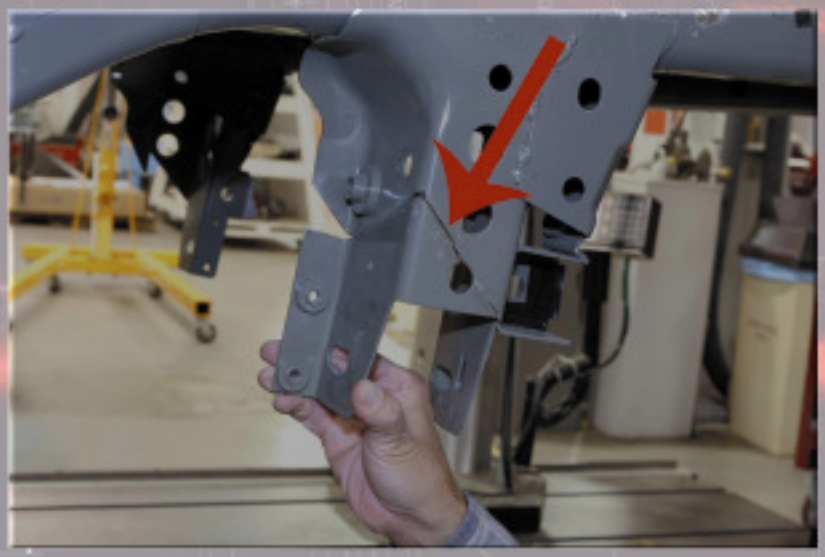
6. & 7.
As we showed in the last update, the T56 transmission shifter comes up through the transmission tunnel opening a little further forward than the stock Solstice manual shifter, so a new closeout panel had to be created. The panel you see being installed here, by fabricator Tom Wiszowaty, looks like the stock piece, but is actually a lightweight piece (it weighs less than a 1/3 of the stock closeout) that has a relocated hole. Here's a peek at what building something like this looks like inside GM: math data is created to represent the new panel, a CNC-machined stamping die is created (male and female), metal is stamped to test the dies and changes are made to refine them (some test pieces are shown), then the part is stamped in a 300 ton press and drilled, cut and fit to the vehicle.

8.
In the continuing "lightweighting" of the HOT ROD Solstice, the entire HVAC (heating, ventilation, air conditioning) system was removed and lightweight closeout panels (arrows) created and epoxied in place (this saved the weight of welds or fasteners). A small blower was installed later to act as a windshield defroster.

9.
In some of the more heavy-duty activity, GM fabricators Tom Ebi and Jim Ostrand were busy cutting the rear suspension mounts off in preparation for relocating them. Here, the rear upper mount for the independent rear suspension is coming off the frame after the welds have been ground off.



10.
The lower a-arm suspension mounts were also cut off in preparation for them being relocated. The angled cut line (arrow) was strategic- GM fabricator Tom Ebi, working with very tight tolerances on the math data and the locator arms on the surface plate, determined if he made these cuts, installing the modified brackets would be a lot easier and stronger. Another reason working with robust math data files results in a much better vehicle.



11.
Here's the new lower a-arm rear suspension bracket Ebi created to weld into the HOT ROD Solstice. While this might look like the piece he just cut out, and that's his goal, it is a fully fabricated component (that's how good the GM fabby's are). He's pointing to a piece of clear flimsy he taped to the part as a guide. He has scribed two holes and lines connecting them to guide him in the creation of an adjuster slot. He'll drill the holes and cut the resulting material out of the middle to create the slot, then file the edges smooth so it will look like it was stamped.

12.
Another great advantage of math data is that the GM fabricators can 'see' what the engineers want before it is actually built. Now, oftentimes the resulting part or system doesn't end up exactly as it is represented in math data-GM doesn't manufacture math data cars, we build physical cars from metal, rubber, plastic, glass and more-but at least the math data is a near physical representation that can be used to created something that works in the physical world. This photo shows GM super-tech Jim Ostrand getting some guidance on the creation of the HOT ROD Solstice front suspension mounts.

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13.
You'll see more on this in the future, but the rear framerails were tied together with a 2x3 inch 0.090 inch wall thickness mild steel beam to add rigidity, provide a place for the rearend to mount and a few other things. This hole was cut on both sides of the rear framerail (located via math data) to slide the beam through before it is welded in. As a note, whenever you can, it is better for rigidity, strength and other aspects to cut a hole in a tube and run an adjoining tube through both walls, welding the adjoining tube at both ends instead of butt-welding the tube to the face of one wall. Running the tube through both walls is more difficult, but the results are well worth the effort.