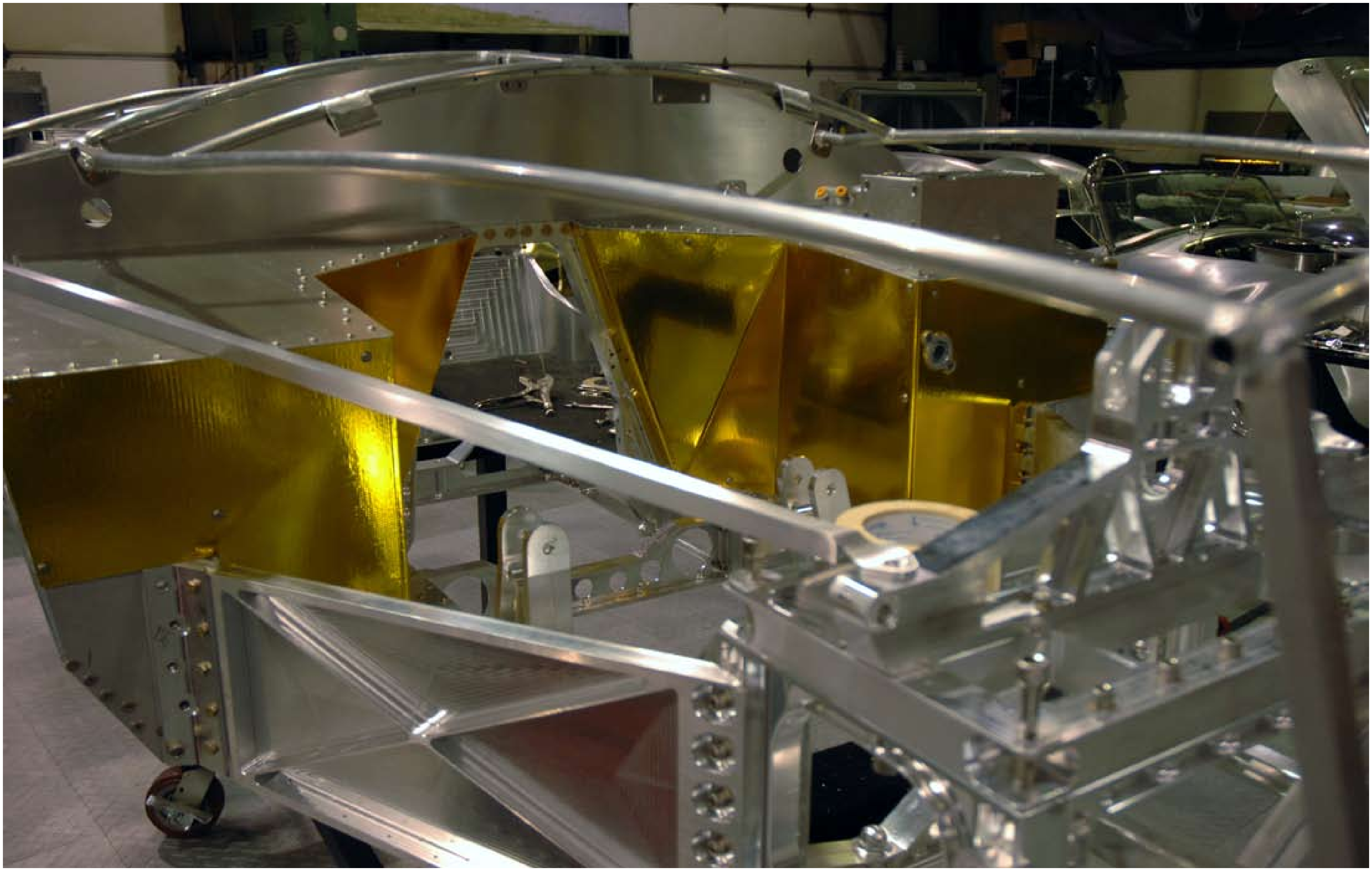
FOOTBOXES

Everything is theoretically impossible, until it is done.

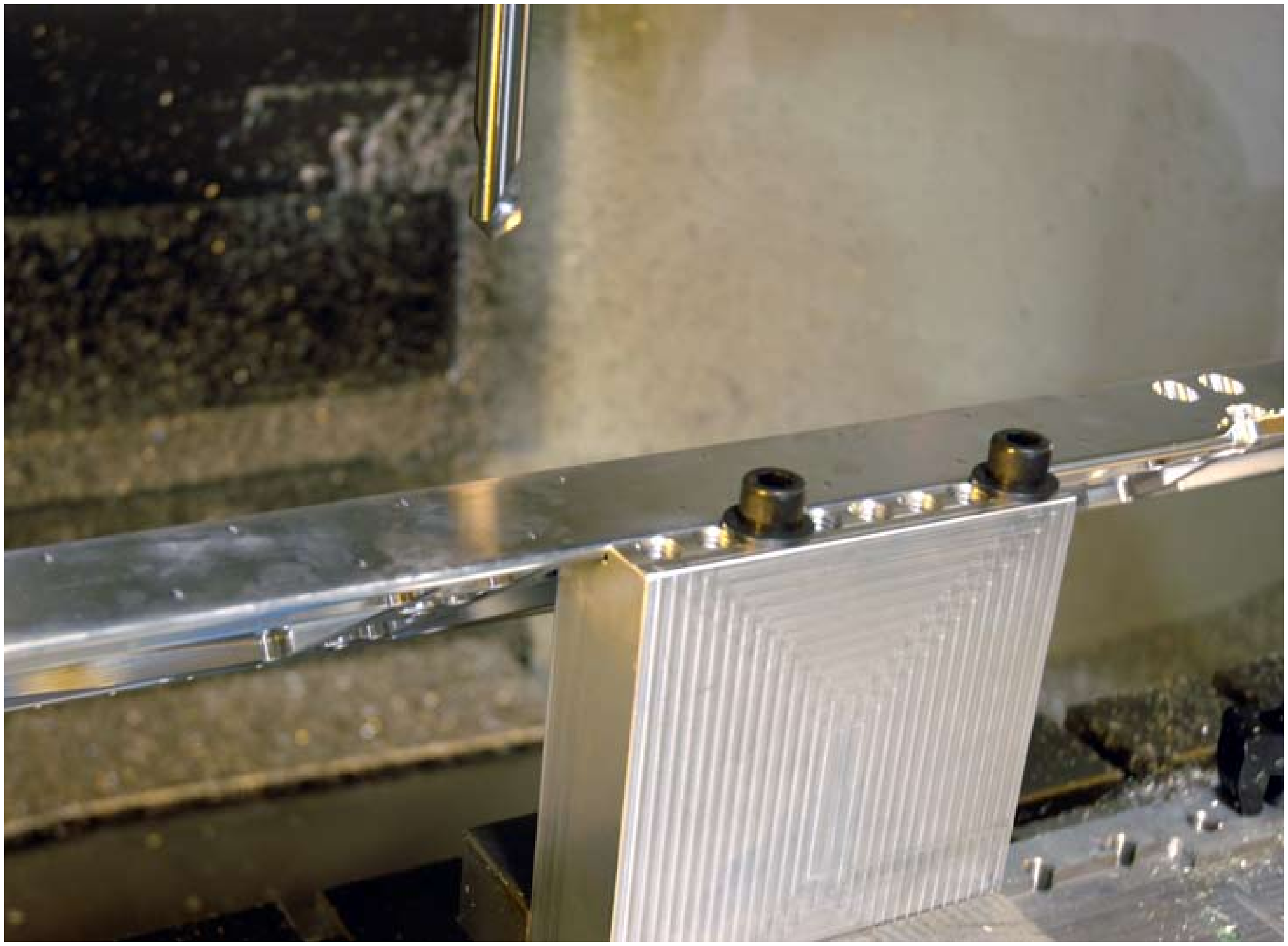
Robert Heinlein



In an original Cobra, the footboxes are not stressed. For this car, the footboxes have to perform many, varied functions. They are critical to connecting the loads from the front suspension to the rear suspension—through the chassis. Our objective was to transfer all these loads around the huge engine right in the middle of the car as efficiently as possible.

Heat from the exhaust pipes on the driver's feet is a problem in an original Cobra. To combat the heat, we looked to the very latest in aerospace material science. Our first line of defense is the Kevlar-backed gold foil you see here in the picture—identical to what is used in F1 race cars and the McLaren F1. This foil is extremely light and reflects approximately 80% of the heat radiated from the pipes. Behind the gold foil is a polished stainless steel backing plate. Stainless steel has the lowest coefficient of thermal conductivity (heat passes through it very slowly) of almost any metal. Behind our stainless shields is a layer of Aerogel—the substance with the lowest thermal conductivity known. All these modifications completely tamed the intense heat from the pipes.

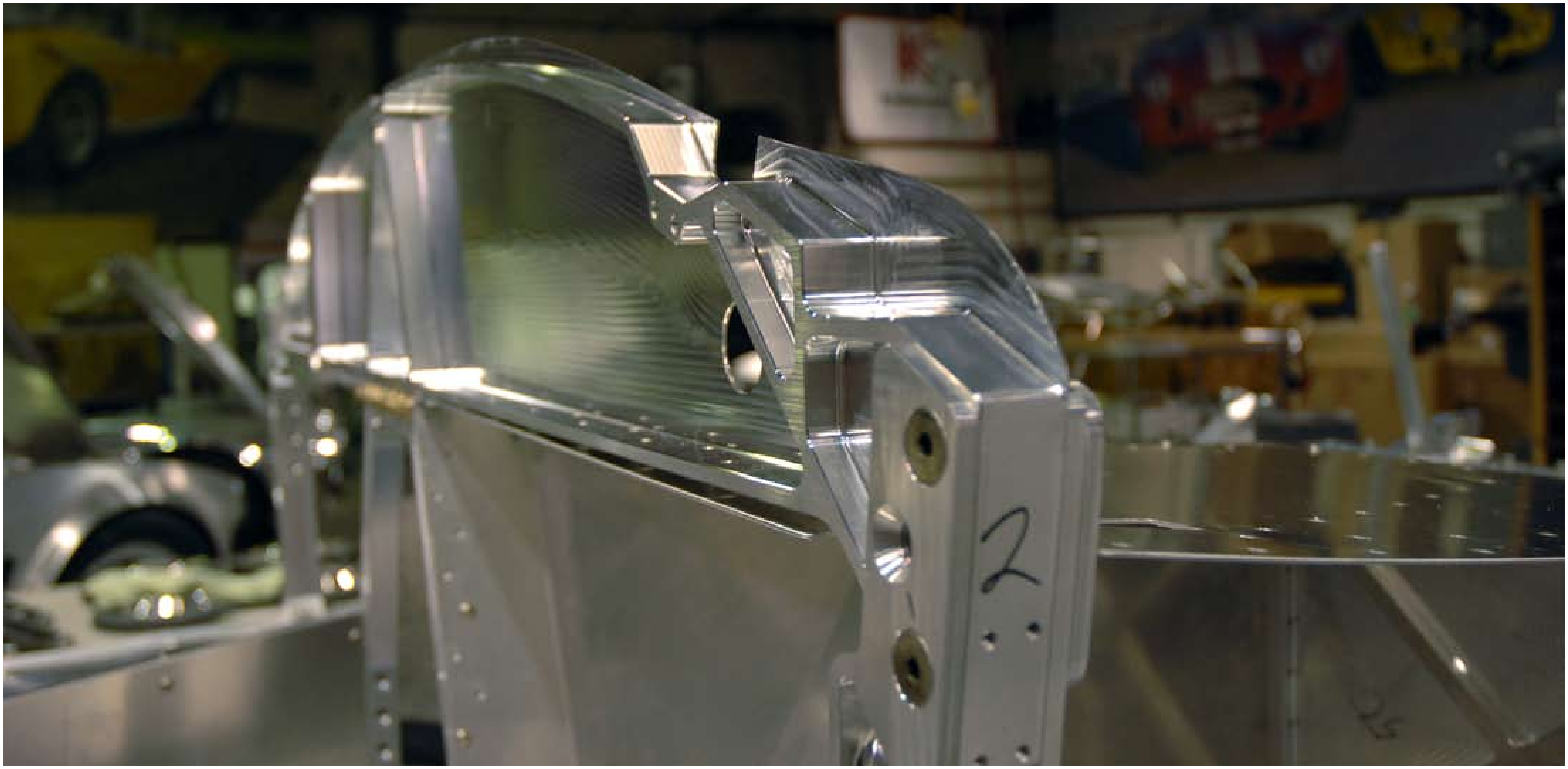
Many holes in the floor pans were at off angles that could not be drilled and tapped by the CNC mill —they were done by hand on the prototype.

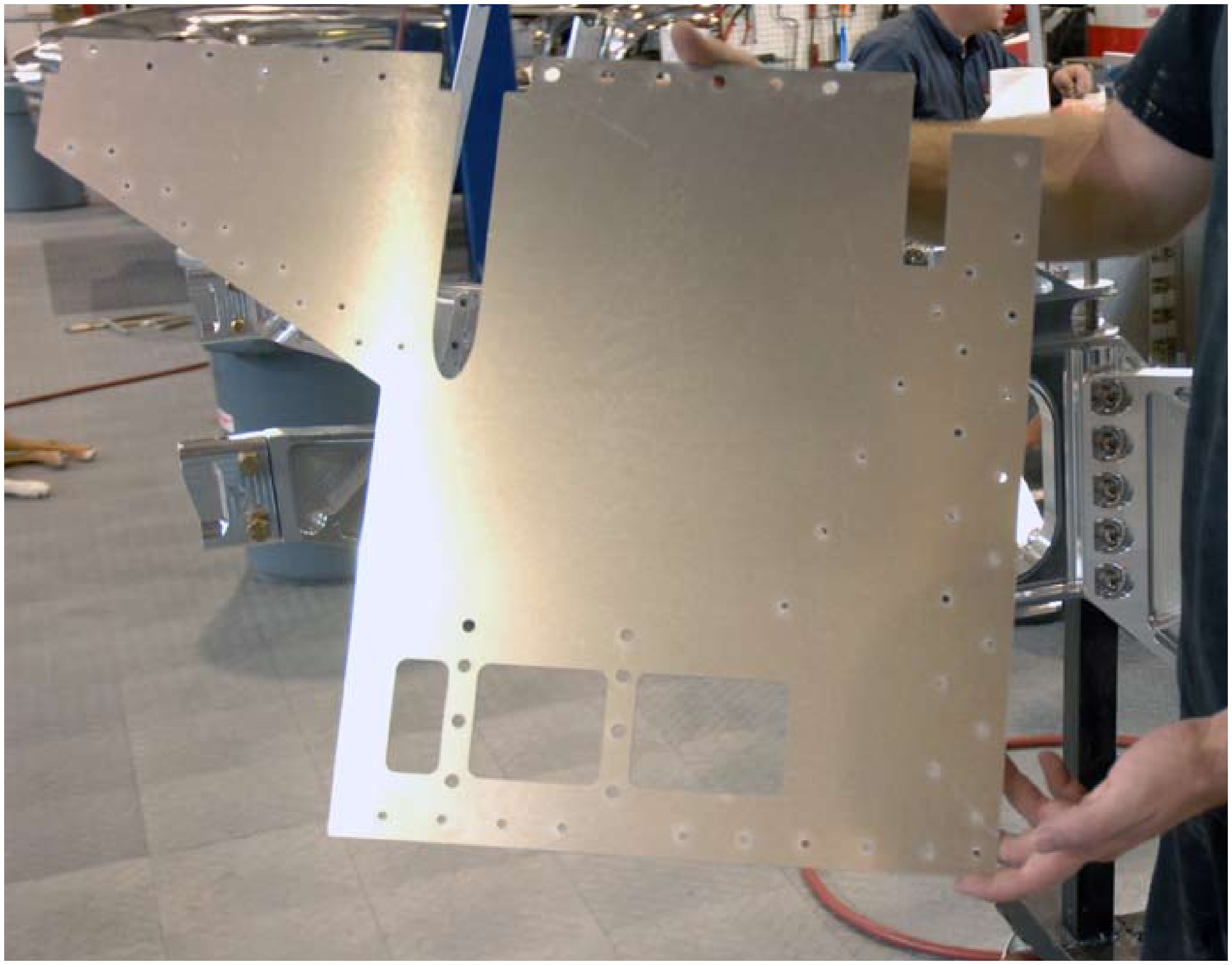


We made special fixture plates to do the drilling and tapping at the correct angles in the delivered car.

The door sill plate does not sit orthogonal to most of the chassis as it had to be tilted to extend up as far as possible under the door. The further we could extend it up, the stiffer the chassis would be. The door sill plate is extremely long. It ties the rear wheel well all the way to the front of the footbox.

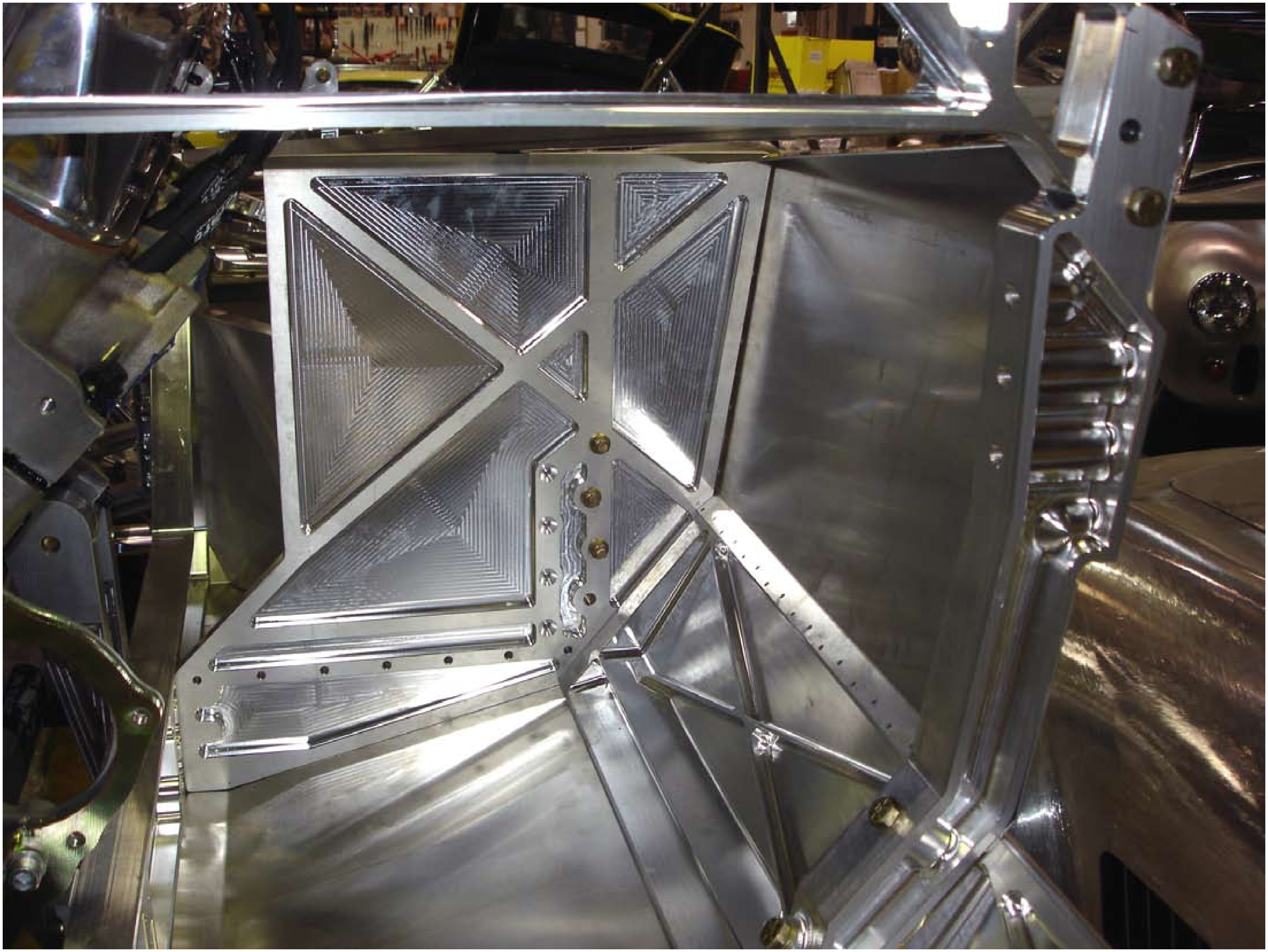
From this angle, you can see we milled the firewall "sheet metal" right into the part to save weight and increase the stiffness. Notice we even removed all the material around the bolt threads to reduce weight as much as possible. The hole is for the wiring harness. The large 1 inch plate (shown with 2 out of 6 bolts) supports the brake, clutch, and accelerator pedal assembly. The plate is thick to minimize brake pedal flex.



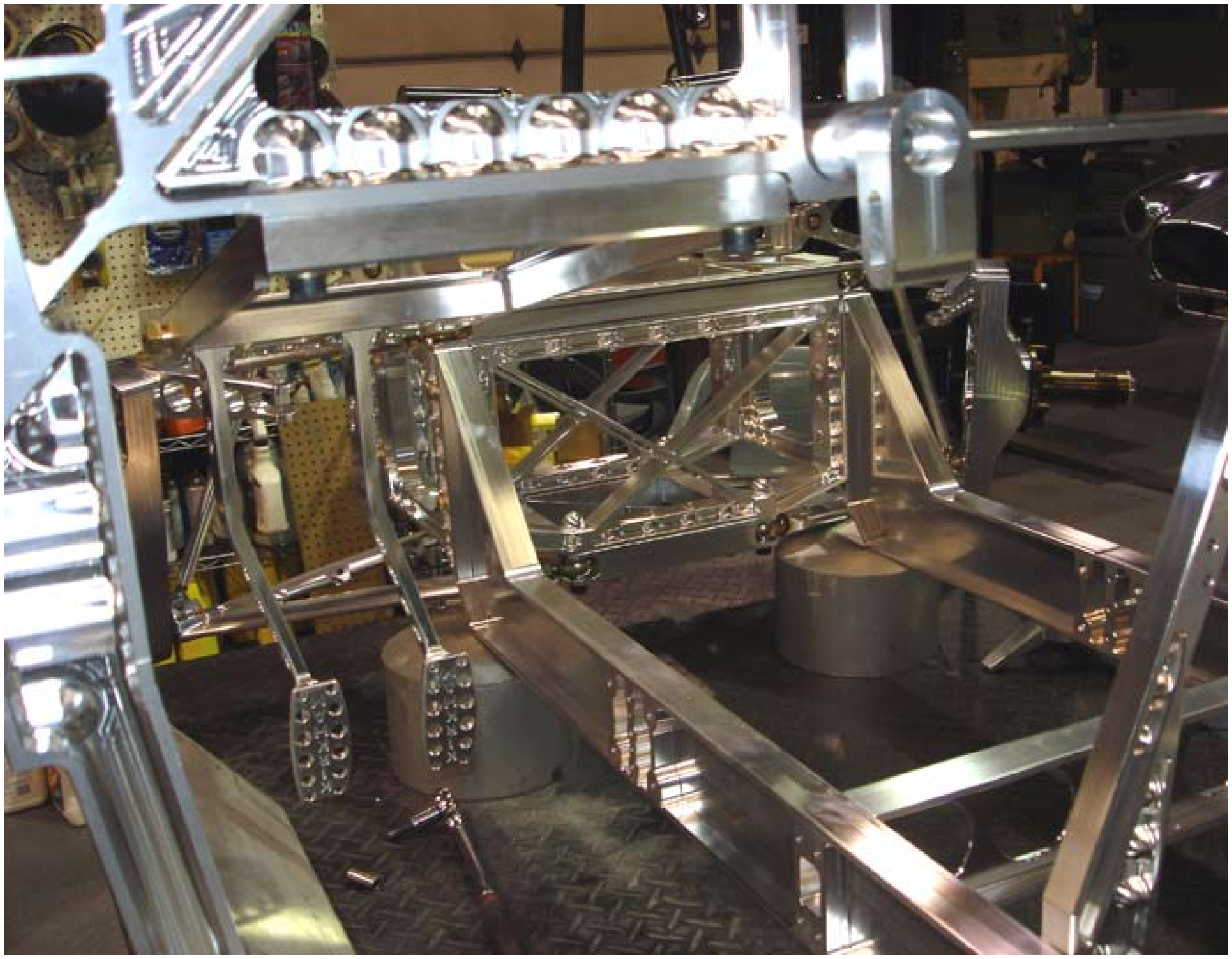


Above: The firewall was milled from a solid 1 inch plate of aluminum. It is extremely stiff—to minimize cowl shake.

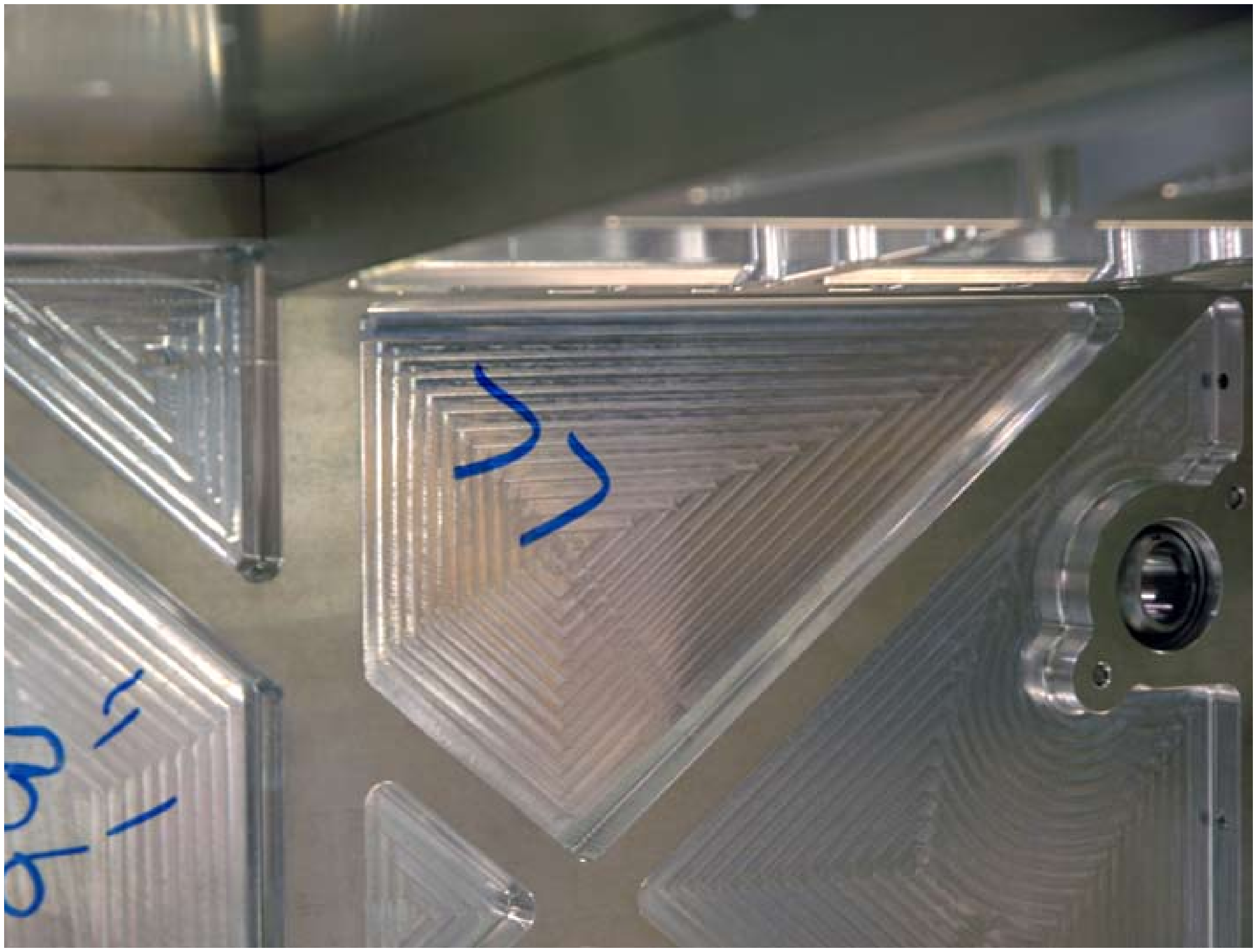
Here you can see some of the complexity of the foot-boxes. Notice the long cut-out for the steering shaft and the three holes in the bottom for the pedals.



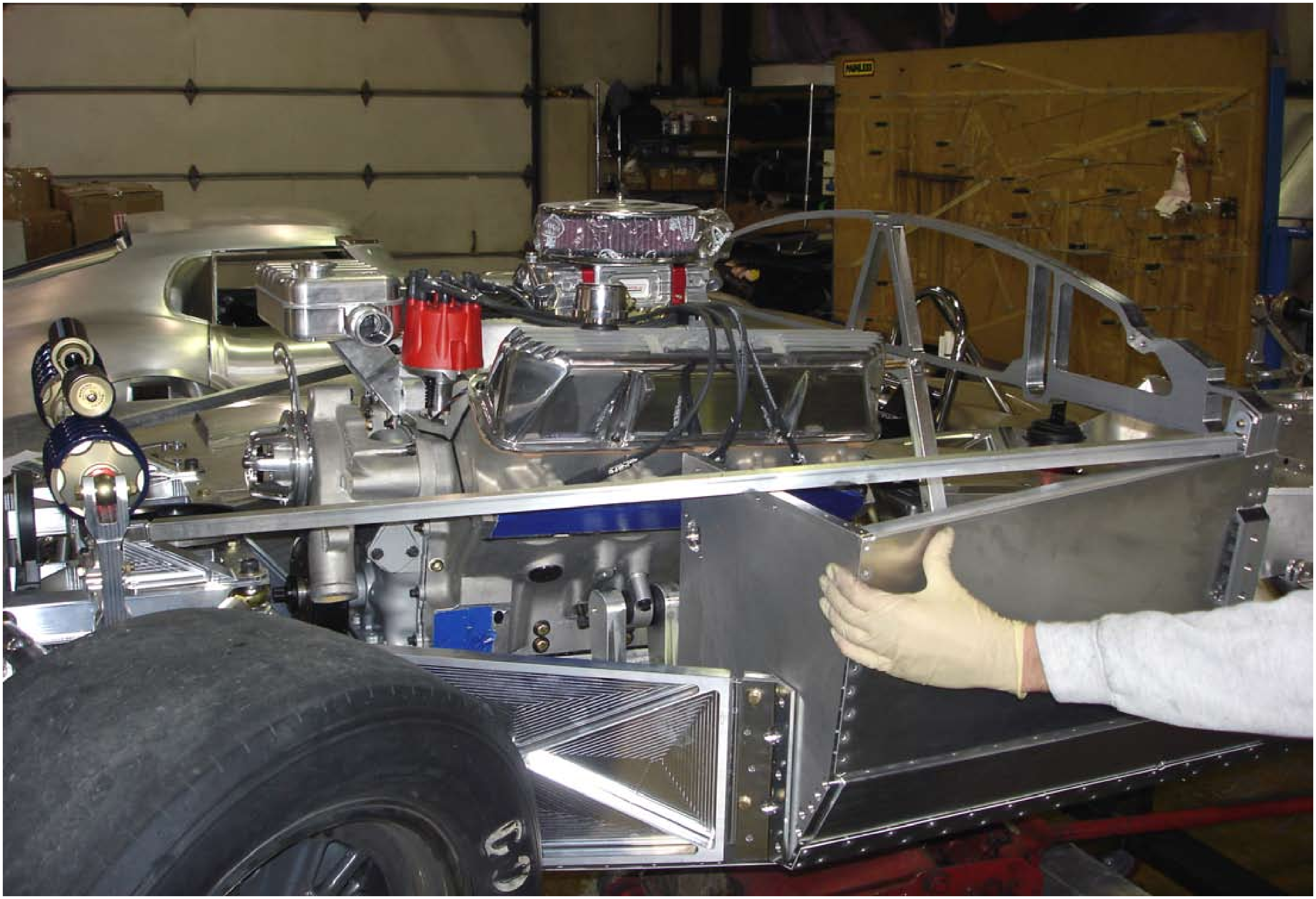
A look inside the passenger footbox during assembly. The footboxes are complicated structures that have to "hug" the huge 482 cubic inch motor. The front of the footboxes is made from 1/2 inch plate because it has to carry significant loads to and from the front suspension box.



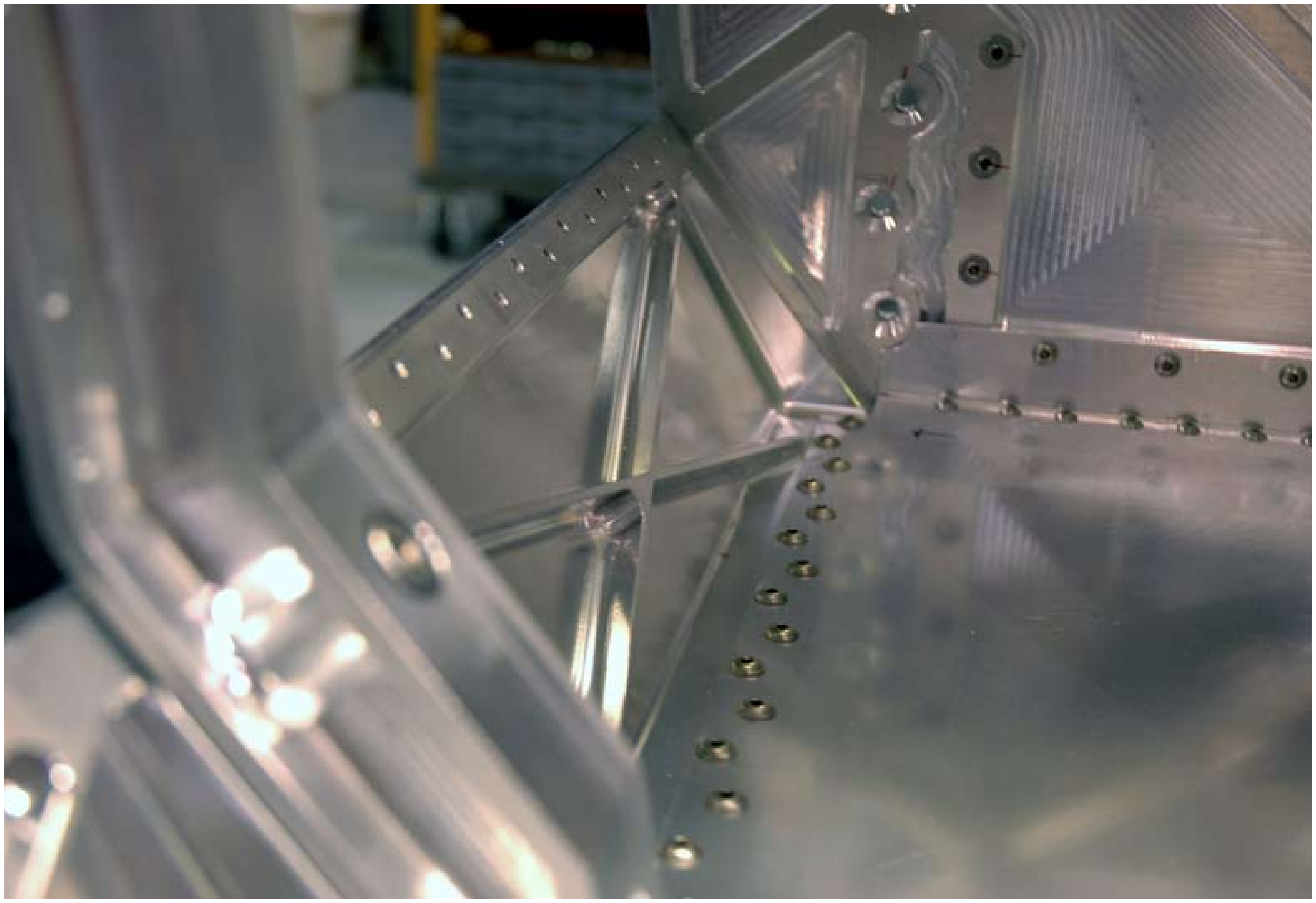
We took our original brake and clutch pedal and hung them upside down in the prototype chassis to evaluate pedal position. If you look closely, you can see the "KIRKHAM" lettering is upside down.



The footboxes were extraordinarily complex. The front plate of the driver's footbox alone had 77 holes drilled and tapped—in nine different planes.



The outer panel of the driver’s footbox being fitted on the prototype.

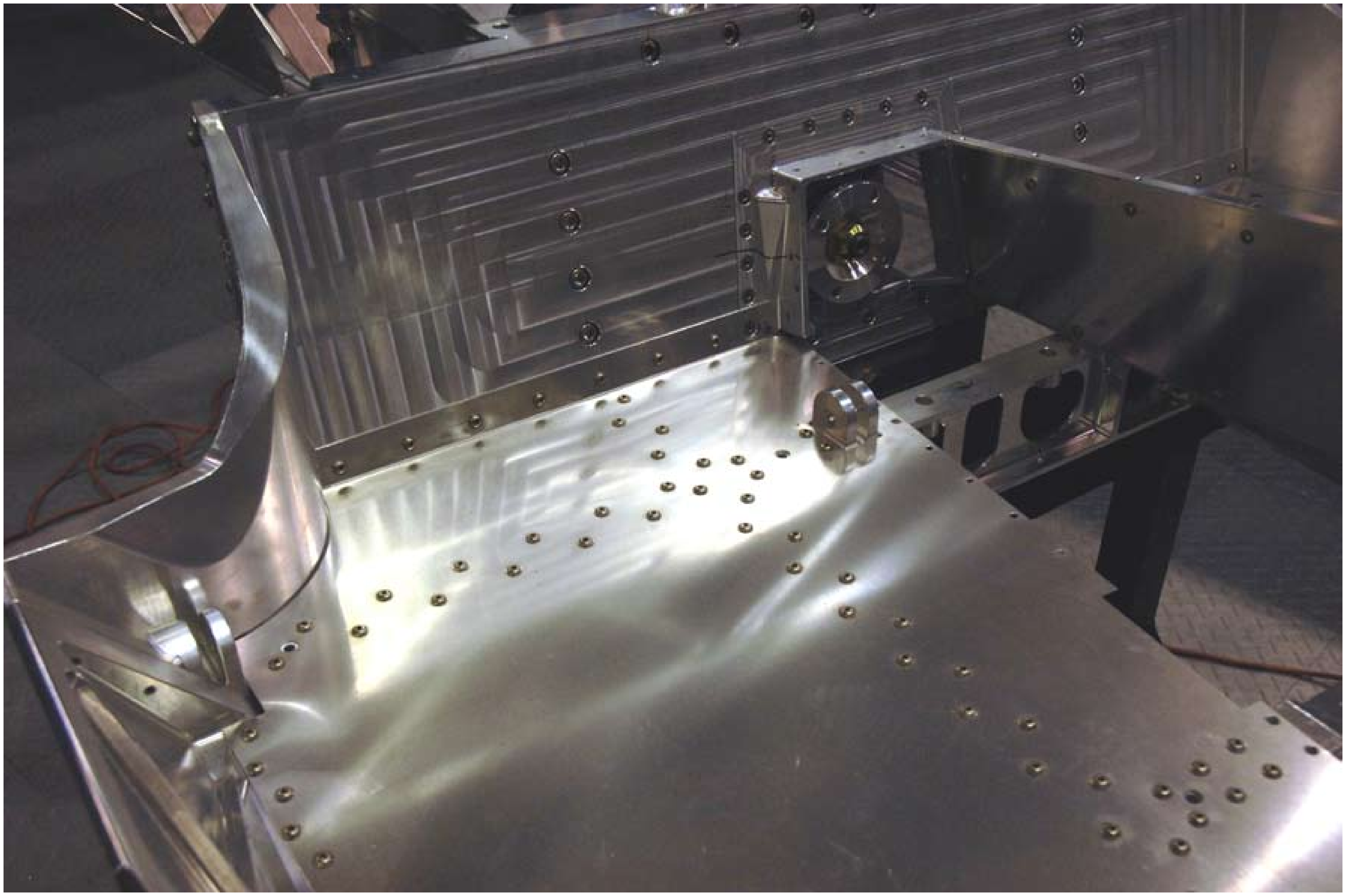


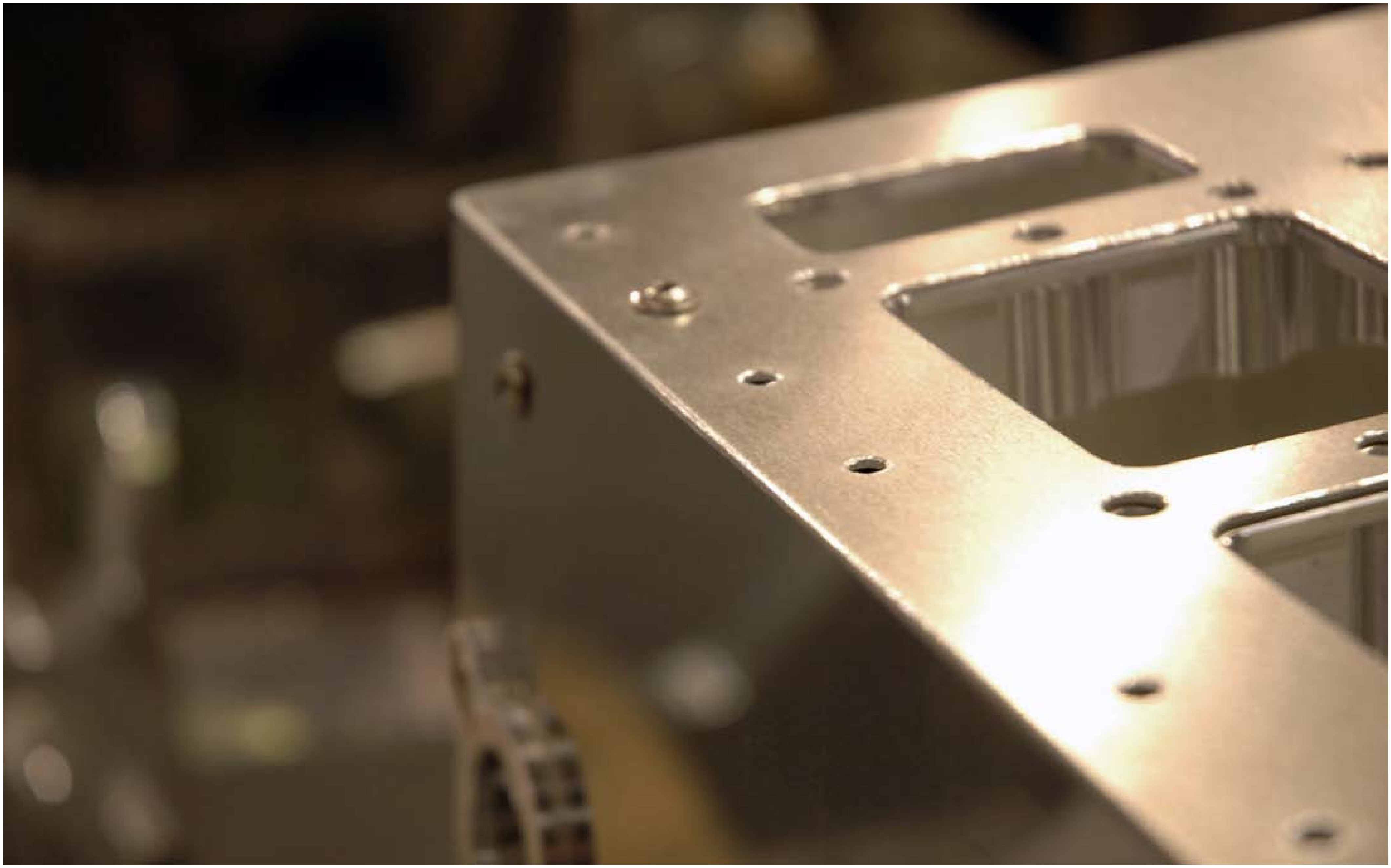
Inside of the driver's footbox on the final car we delivered to Larry. We used button head bolts throughout the interior to prevent the driver from snagging his feet.

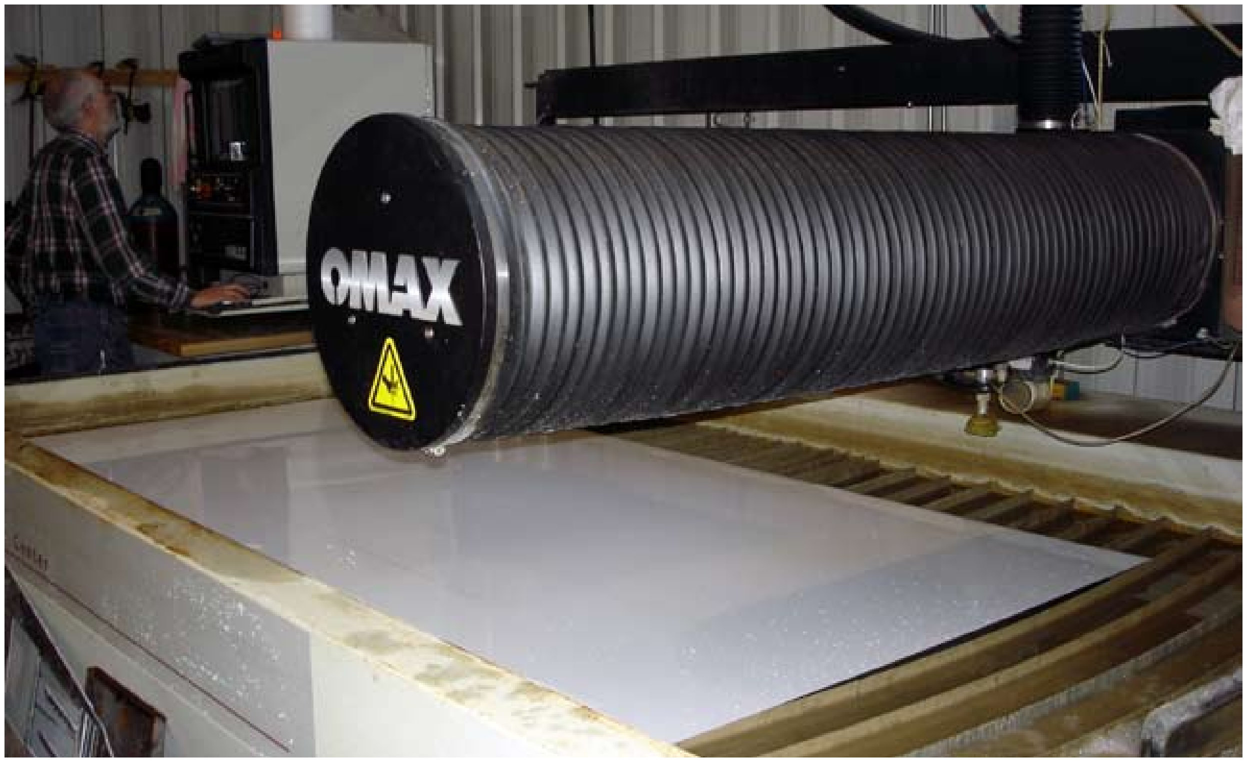
The inside of the passenger box as it was being assembled in the prototype.

The floor pans also provide a tremendous amount of stiffness to the chassis.

Below: Here the bowl shape of the tub is coming together. From this angle, you can see how far the rear wheel intrudes into the cockpit. Also, if you look carefully, you can see the seat belt mounting points sticking up out of the floor.



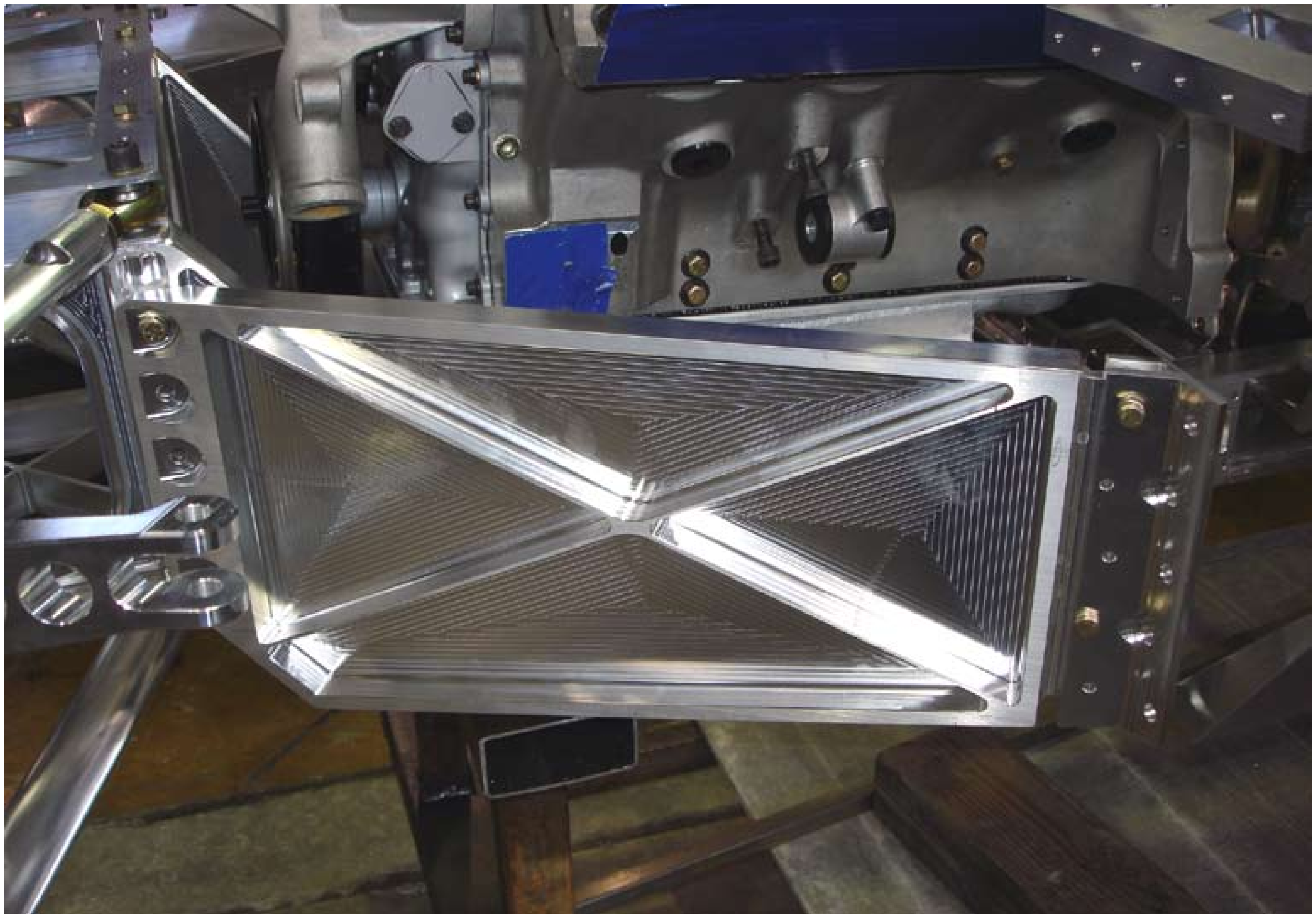




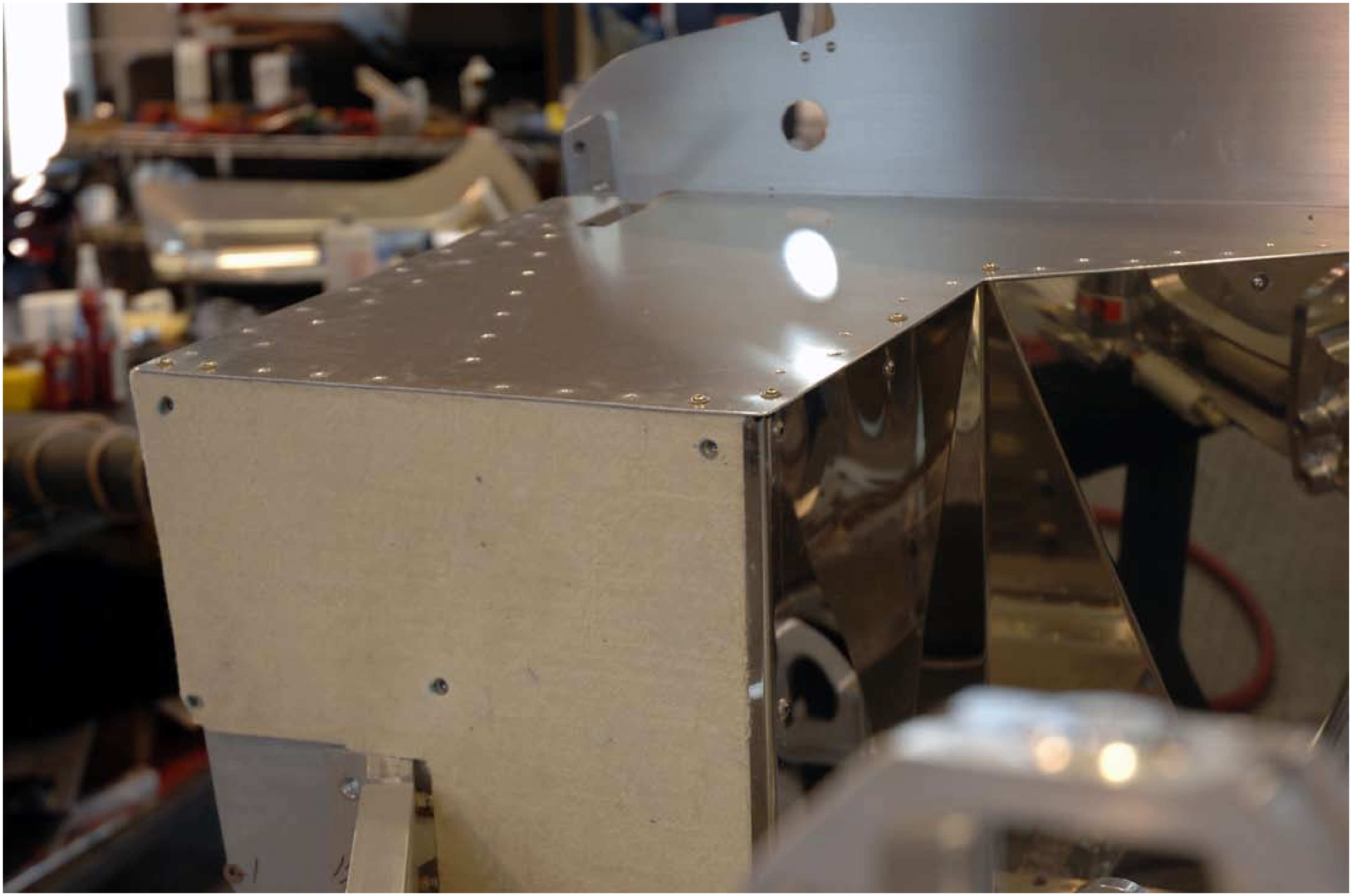
Above: Extreme care was taken during the design and execution of all the parts in the car. Notice that all the panels and holes line up perfectly with each other.

All sheet metal was cut out on our OMAX water jet cutter. A water jet uses a 50,000 psi pressure jet of water mixed with fine garnet to cut metal (and almost anything else). The precision of the machine is incredible.

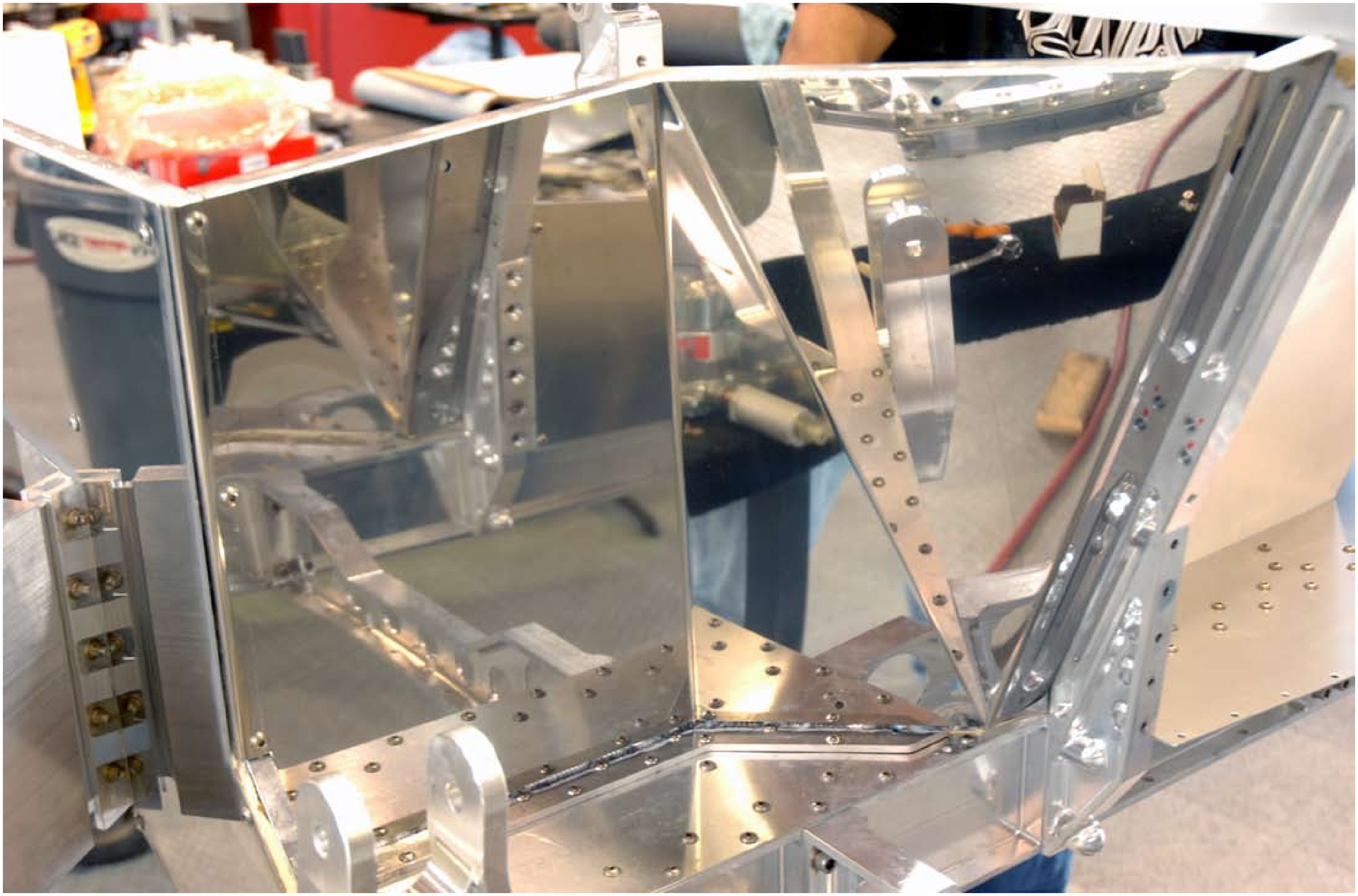
The driver's footbox supports the steering column. If the steering system is not adequately secured to the chassis, it can cause wheel shake. We used a bearing to hold the shaft firmly. Also, the steering shaft—indeed the entire steering shaft system—is made from stainless steel to prevent corrosion over time.



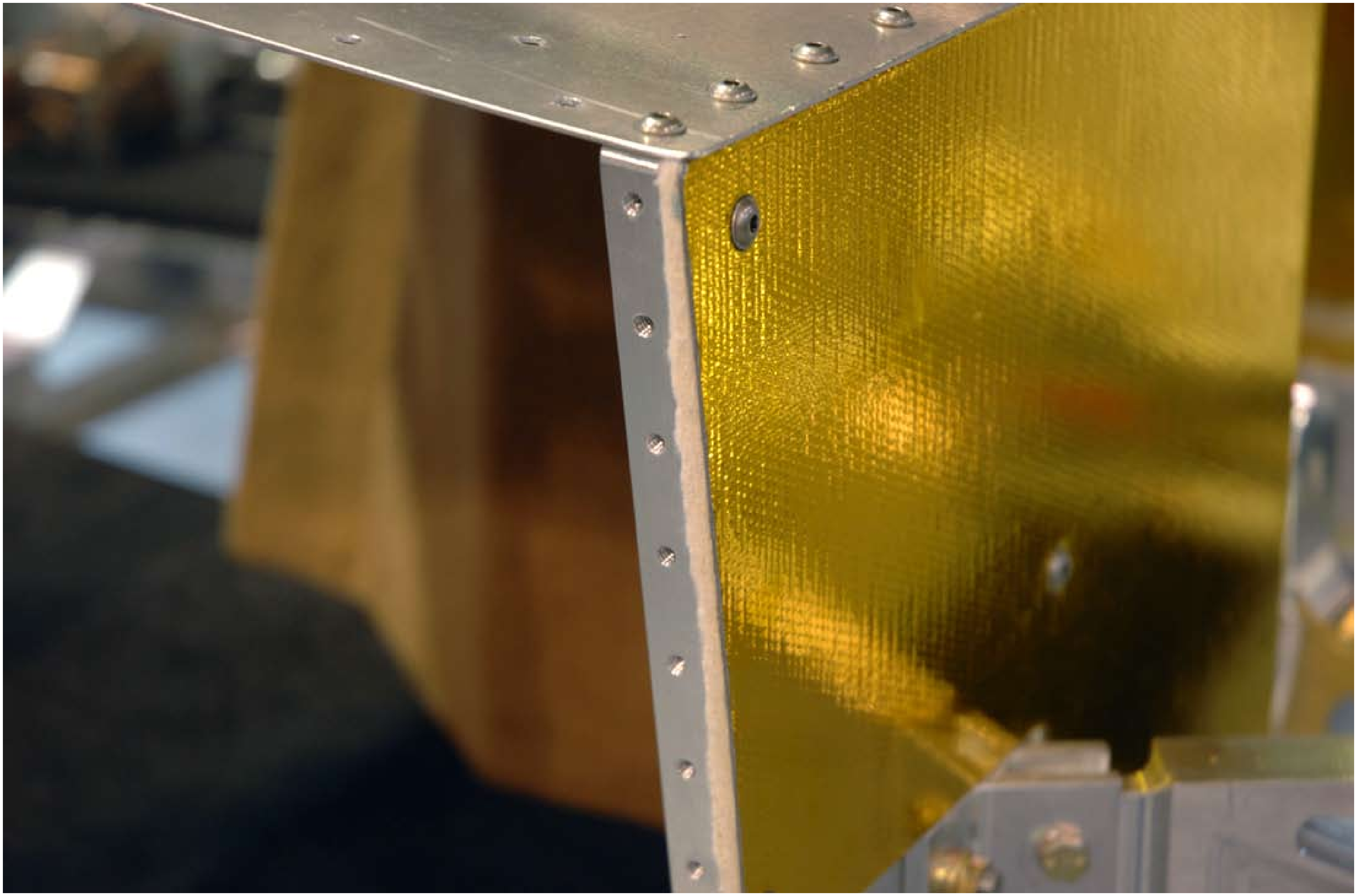
This plate transmits loads from the front suspension box to the footboxes.



The footboxes were lined with Aerogel-impregnated insulation. Aerogel is the lightest material known. It also has the lowest coefficient of thermal conductivity known. It is used in the Space Shuttle, Formula 1, and other demanding situations where temperatures must be controlled.



The Aerogel matting covered by a polished stainless steel heat shield. Stainless steel has the lowest coefficient of thermal transfer of all common metals.



Last, we covered the stainless steel with a Kevlar backed gold foil that reflects 80% of the heat radiated by the exhaust tubes. The foil uses a special high-temperature glue to fix it to a stainless heat shield. Also, notice that the top of the footbox and the front plate are not orthogonal to each other.