

# Upscale Housing

**Need a Solid Rear End?  
Don't Settle for a Nine-Incher.**

**CHRIS ALSTON'S**  
**Chassisworks**  
THE HOME OF HIGHER TECHNOLOGY



OK, let's get this over with right up front. Brace yourself, perhaps grab a seat if you're standing, and take a deep breath.

As awful as it seems to soil the hallowed pages of Super Chevy with this particular four letter word, please remember that, disgusting though it may be, it is still only a word. Unfortunately, there is just no way to talk about the subject of this feature without using it so here goes:

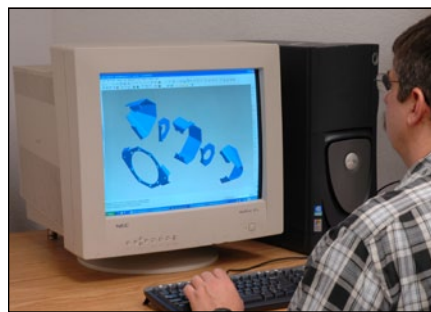
Ford. That's right, Ford. Ford Ford Ford Ford Ford! However, before the General starts calling in the heavy bombers, let us hasten to add that what we're going to show you is how to avoid the sort of compromise that has led many of the, Bow-Tie Brigade to allow the Blue Oval to contaminate their cars.

Specifically, we're talking about the Ford 9-inch rearend, which has found almost universal acceptance as the differential of choice for both drag-race and serious Pro Street use. But rest assured, we come not to praise the Ford; rather, we are pleased to provide the first detailed look at the latest offering from Chris Alston's Chassisworks. What we have here is a fabricated, affordable, race-bred replacement for the venerable 9-inch Ford housing that goes by the name of FAB9™.

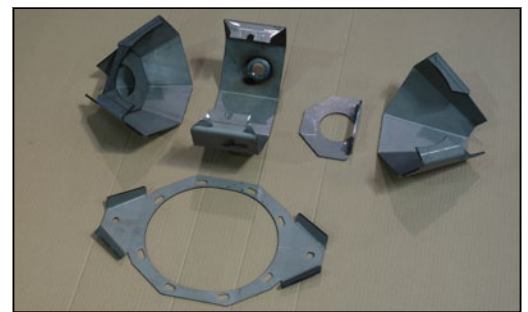
Now custom-built housings compatible with the 9-incher have been available for a while. The drawback is that these are put together one at a time, in an extremely labor-intensive manner that helps generate sticker shock while ringing the cash registers to the tune of \$2500-\$3000. Obviously, this is well beyond the range of what most of us consider to be a prudent allocation of funds, and many horsepower-liberal but dollar-conservative Chevy guys have had to slink into the Ford boneyards to find the preferred housing. Even if all of the other parts stuffed inside of it are produced by the aftermarket, there's still that ugly old OEM Ford axle housing, glaringly obvious to anyone positioned behind an otherwise-manly car.

The FAB9™ provides a viable alternative to this unpleasant scenario. Stronger, lighter, slicker, trickier and a whole lot easier to work with in the installation process than the stock housing, it comes with a price tag,

▲ Here's the latest innovation from Chris Alston's Chassisworks, the FAB9™ rearend housing. This state-of-the-art unit provides a high-tech substitute for the popular Ford 9-inch housing, while also keeping it within the financial reach of just about everyone.



▲ Computer simulations saved countless hours and dollars during the development of the FAB9™, essential factors in keeping it affordable. Here we see the housing's components as they appear on the monitor's screen...



▲ ...and this is how they look in real life, before the welding robots get to work. In Chassisworks terminology, we have the left- and right-side cones, the inner bulkheads, the center plate, and the face plate, along with the threaded inspection filler and drain ports that will be welded into place.



▲ Multiple sheets of plate steel are loaded onto the automated sheet feeding unit of the Apelio CNC turret punch/laser combination manufacturing center. The Apelio feeds single sheets into the turret area where the individual pieces that make up the FAB9™ center section are laser cut and punched. The parts then dropped onto the conveyor system, which conveniently loads them into a basket for sorting. The computer control system then catalogs the remnant sheet for possible use of the material on a small-part job or sent to recycling bin. Another sheet is automatically unloaded and the process starts again.

# Upscale

## Housing

for the basic housing and the appropriate ends, that is roughly a tenth as much as the other fabricated units to be found in the marketplace today! Plus, it can be absolutely, positively guaranteed that nobody wearing the Ford logo has ever even gotten close to the thing...

Designed and extensively analyzed with the use of a cutting-edge CAD program on a sophisticated computer system, the FAB9™ case is available in one of two materials; 3/16-inch mild steel or 4130 chromemoly. In either case, the six separate pieces that comprise the case are formed on a giant combination laser-cutter and punch-press, then robot welded together.

The mass-production capability that enables the FAB9™ to be uniquely affordable did not come easy or cheap, requiring huge commitments of time, energy and money to achieve. In fact, by the time each completed housing is ready to be sent to the warehouse, it will have been massaged by CNC-machinery costing well over three-million-dollars.

The majority of this equipment resides within the 55,000-square-foot Chassisworks facility in Sacramento, California, where massive truckloads of steel and aluminum are transformed into state-of-the-art chassis and suspension components. The same parts and pieces that are shipped to racers throughout the world are also routinely pulled off the shelves and delivered to the in-house chassis shop, which annually turns out a whole slew of doorslammers and pro-touring cars destined for the street, strip, or road course.

This hands-on experience in building vehicles from casual Pro Streeters and g-Machines to completely outrageous Pro Mods - has provided the impetus for just about all of the Chassisworks' innovations, and the FAB9™ is no exception. Every car that rolls out of the shop requires a rearend, and just about all of the cars require one that is somewhat narrower than the stock dimensions. After years of fulfilling customer requests to narrow the Ford 9-inch housings, the folks at Chassisworks are well aware of the drawbacks of the factory units.

According to Chris Alston, there are two major problems with the Ford housings, having to do with the diameter of the axle tubes



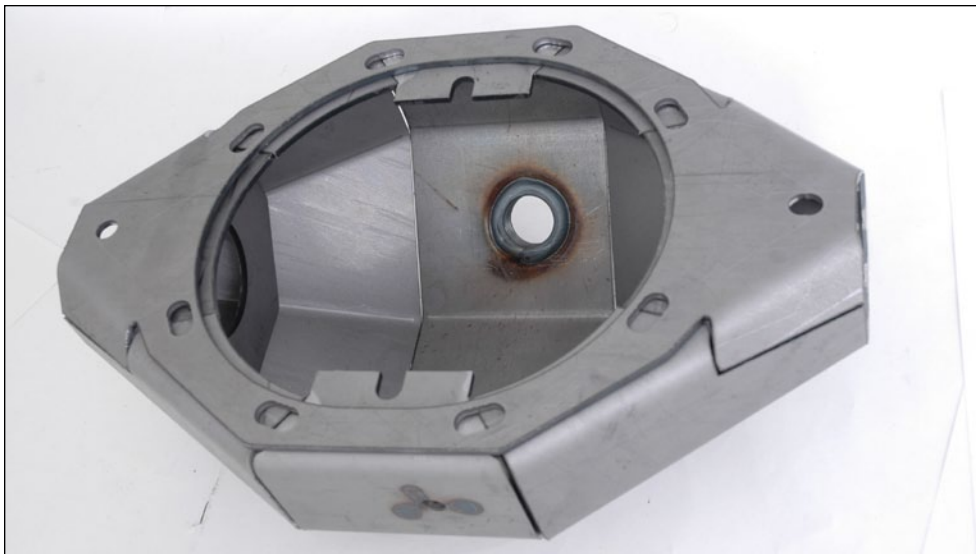
▲ After the individual FAB9™ components have been laser-cut they must be bent on Chassisworks CNC Amada HDS press brake. This piece of equipment allows the original computer model to be bent into an exact replica of the intended design.



▲ The automated back stops move to various positions and allow the same bend die to be used on parts with multiple angle bends or varying degrees.



▲ Each part is QA checked using measurement devices or a physical-fit gauge. Any variances will be corrected before moving on to welding.



▲ The bent center-section parts simply fit together like a well-made puzzle. All seams are tight and consistent, eliminating any weak or difficult to weld areas. The image shows the double-walled front face and the internal tube gusset which all help to stabilize the third member.

# Upscale

## Housing

and the width of the center section ... along with a few other annoyances.

To start with, virtually all aftermarket rear suspension brackets are designed for use with 3-inch-OD axle tubes. The trouble is that the junkyard 9-inch housings come in two versions, neither of which has tubes that are actually three inches in diameter. One is too small at 2.75 inches, while the other, more desirable one that is most commonly used is a bit too big. This factor combines with the stock housing width of about 23 inches to cause headaches for all concerned.

"The factory Ford housing uses a 3-1/2-inch tube that is swedged down to 3-1/4 inches," Alston explained. "By the time you get that swedged-down tube in a 23-inch case, it's really about 26 inches, and it is very rare to build a drag-race or Pro Street car with rear-suspension brackets wider than 26 inches. Often a builder needs a housing under that width, so they have to trim the hell out of the brackets to make them fit. Often, because they're so narrow, the brackets end up welded to the factory case itself."

According to Alston, another problem is that the tubes are not actually round. They're formed and are flat on top, then they get partly round, and then they get flat on the front. They change diameters, too, making it extremely hard to attach the brackets. Every bracket has to be ground separately.

As for the FAB9™ housing, it's only 17-inches wide. "The axle tubes, which are made of the same material as the housing, have a true 3-inch OD," said Chris. "This means that the bracket width can go down to 20 inches; you just have to slide the brackets onto the tubes, line them up, and weld them on. Then you use a housing jig to weld the ends on, and away you go."

Speaking of the housing ends, Chassisworks manufactures ten different varieties to match up with just about any type of brake backing plate that one is likely to be using, whether GM, Mopar, or Ford. Giant billet bars, up to five inches in diameter, are cut into sections, which are then sucked into one of the shop's Mazak CNC robot-fed milling centers. Then about four minutes later, a trick piece of hardware is gently deposited back onto the conveyor.

Instead of using studs, these ends are all threaded so the brake backing plates or caliper brackets can be bolted on for a lighter, simpler installation. The ends destined for use on street machines are a bit longer than those used for drag racing, which allow for the use of the



▲ To best control the quality and consistency of the welds on an assembly with extremely high performance demands such as the rear end center section of a drag-race car, Chassisworks puts to use an array of robotic spray-arc welders with auto-rotating fixture tables. This marvel of manufacturing technology creates perfect welds every time and significantly reduces the amount of man-hours that factors into the cost of the final product.



▲ The robot is used to weld all internal and external seams of the FAB9™ center section. Chassisworks is able to consistently maintain a maximum depth of weld penetration at a rate that would be difficult for an experienced human welder to match.



▲ This close-up of the center-section filler port clearly shows the quality and accuracy of the welding found throughout the FAB9 center section.

# Upscale

## Housing

stock axle seals behind the wheel bearings. The race-only versions are intended for use with sealed bearings, and feature a precision radius on the back that reportedly not only helps keep the end from distorting during welding, but also acts as a sort of self-locking device for the bolts.

There are a couple of reasons that the FAB9™ is substantially stronger than the stock item, even though it is actually five pounds lighter. Along with the computer-designed, inherently superior conical shape of the housing, a major factor is that the axle tubes are supported in two places: at the outboard end of the housing and also at the inboard bulkhead. This bulkhead additionally serves to support the center-section mounting flange, which is, naturally, considerably beefier than the original.

Every FAB9™ comes with welded-in drain and inspection/filler ports, whose threaded plugs are also produced in-house; an axle-housing vent on top of the tube is also available. As its name implies, the filler port is positioned so you can visually check out the condition of the gear teeth without getting the tenaciously offensive gear-lube all over everything.

According to Alston, most of the 9-inch Ford housings don't have any provision for draining the fluid, and a lot of them don't even have a way to get it in. Unfortunately, many aftermarket third-members don't have filler ports in them, either, leaving one to visualize the car being tipped up on its side to get the lube in through the axle flange.

The installation of a back brace on the housing is a requirement whenever massive amounts of horsepower are coupled with greatly enhanced traction capabilities, and Chassisworks has this area covered, too. But instead of just hacking up a piece of box tubing to do the deed, as is common, the optional FAB9™ back braces feature a lighter, tapered design that is completely contoured to fit the profile of the case.

These braces are formed out of the same mild steel or 4130 as the housings, and are available in various lengths. The only cutting required is to notch the braces to clear the suspension brackets, and to trim them to fit inside of the housing ends, if necessary. The shortest braces are each 12-inches long and



▲ After the housings are welded up, they make a pass through this giant Mazak Palletech manufacturing cell for the final machining steps. Weighing well in excess of 30 tons, which doesn't even include the robot-loading conveyer components, this monster required its own rubber-isolated, two-foot-thick, 12-foot by 24-foot concrete foundation. Along with occupying a fair amount of the Chassisworks facility, it also pretty much dwarfs its operator.



▲ The FAB9™ housing is automatically loaded into the machine's huge working area. After being rotated into position, this ruby-tipped sensor verifies its location before the work commences.

can accommodate a housing length of up to 29 inches, and a housing that's 60-inches long will need the 25-inch version.

Well, at this point you're probably ready for more of the fine-print-type details. The basic unassembled FAB9™ housing package will arrive at its destination complete with factory-welded center section and axle tubes with all necessary hardware. The desired set of housing ends will also be in the box, but

there are two good reasons why they won't be attached to anything. The most obvious is to facilitate the process of suspension-bracket installation, while the other is a tad more subtle.

It seems that in the process of welding up all the brackets, it's not uncommon for the axle tubes to deform a bit; when the ends are the last items to be welded on, it's much easier to ensure that the axles themselves

# Upscale

## Housing

will wind up straight and true. Chassisworks also manufactures a unique rearend-narrowing jig that can be used by any competent home builder to help in attaining professional-quality results.

As one who hates to waste material almost as much as he hates to have his customers work any harder than necessary, Chris Alston has chosen to provide unassembled housings in three different lengths. The shorter version measures 45-1/2 inches, while the longest one is 71 inches. The back braces must be purchased in pairs and vary in price depending on the length and material.

For those who would prefer to have the FAB9™ deposited on their doorstep in a somewhat more advanced state of completion, Chassisworks is more than happy to help. Given the details of a customer's rearend dimensions and his or her choice of suspension brackets and housing ends, these fully welded special orders are priced competitively, and can usually be delivered within a week.

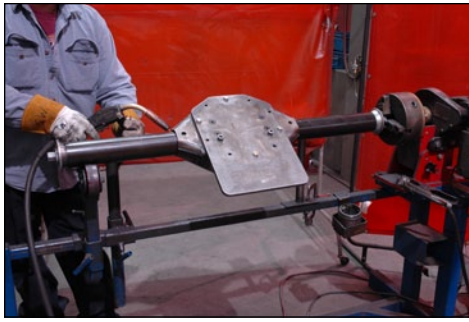
Any Bow-Tie that's currently using a 9-inch Ford is a candidate for the FAB9™. And, if you prefer a 12-bolt gearset, it's possible to use one with this housing by plugging in one of Strange Engineering's trick 12-bolt drop-out third members.

One of the reasons the FAB9™ was created was to keep all of us Chevy diehards out of the junkyard, scrounging around for used nine-inchers. Another was to prevent us from having to hand over large quantities of cash for a custom differential.

If you'll excuse a pun, we'll finish this story by just saying that this is definitely no longer the case...



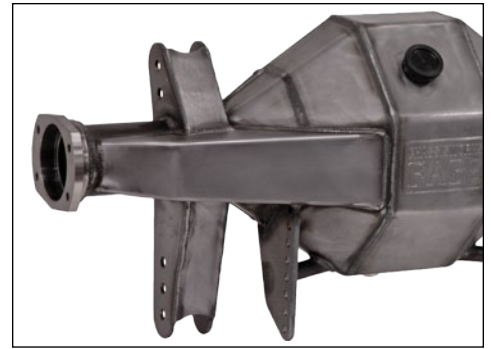
▲ This is an "unassembled" FAB9™ as it is delivered to the customer. The short-tube, mild-steel housing is fully welded and comes complete with all necessary hardware, including the threaded drain and filler plugs, and a pair of housing ends appropriate for each particular application.



▲ Once a pallet is full of machined housings, a forklift brings them into the welding area. The use of this rotating fixture helps in achieving perfect alignment and sanitary welds.



▲ Welding the axle tubes to the inner bulkhead, (arrow) as well as to the end of the housing, results in unprecedented strength, as does the FAB9™'s beefy, fully supported gearset-mounting flange.



▲ The tapered back braces for the FAB9™ accurately follow the contours of the housing and are both stronger and lighter than the box-tube braces that are commonly used. An open folded design cuts the installation hassle to an absolute minimum and requires only notching around the suspension brackets. Braces are available in four different lengths.



▲ These are some of the housing ends manufactured in-house at Chassisworks and available off the shelf. The sealed-style ends (upper group) allow the use of the stock axle seals and wheel bearings. Drag-style ends (lower pair) are intended for use with sealed bearings to allow narrower housing widths.



▲ This is one of the supertrick, robot-fed CNC machines that are used to turn billet-steel "hockey pucks" into ready-to-use housing ends. Amazingly, it takes just about as long for the automatic saws to cut each blank as it does for this Mazak Multiplex to transform it into a finished part.