AXLE DELIMMA SOLVED

On a mid-engine car build, whether it is any of the Lambo replicas or a GT-40 replica or any other mid-engine car, when you are attempting to mate the popular Corvette wheel hub or something similar to the popular Porsche/Audi transaxle or something similar, a set of custom made CV axles at about $1,500-$2,000 per pair have been the customary method. Years ago, Charley Strickland at Strickland Racing Inc. wondered if there might be a different approach.

He knew that the C-5 Corvette hub was commonly used in this type of build, and knew that it was a very acceptable hub solution and readily available at the local parts store for under $100. He also knew that it had 27 splines where the outer CV axle joint fit to it. On the other end, there are six major styles of inner CV joint where the axle mates to the transaxle, all of them rather complicated except the flange style, which is exactly as described, a flange on the axle and a flange on the transaxle that simply bolt together. The Porsche/Audi gearboxes popular for these cars all used a flange style to bolt up the inner CV joint, including the Porsche/Audi O1E, O16, and O1X boxes that SRI likes to use.

What if an “Of the Shelf” CV axle could be found that had a 27 spline outer joint for the C-5 and a flange style inner joint? It would not matter if the bolt patterns on the two flanges did not line up, a simple adapter plate could be made much easier than custom axles. Some of the cost of the plate could be justified because while they are machined, one of them can have the ring cut into it that sends the pulses to the Hall Effect sensor for the speedo. That ring is a necessary piece and somewhat high priced when purchased alone. Also, the plate thickness could be designed to accommodate and fine tune the length of the available axles.

Armed with this info and these thoughts, Strickland set out for the local O’Reillys where he spent the whole afternoon with their A-1 Cardone Catalog looking at every CV axle ever made. First he made a list of every axle with a 27 spline outer shaft, then he eliminated all of them that did not have a flange style inner shaft. After eliminating further the lengths that were nowhere close to reasonable, about 20 axles remained and a pattern became clear. All of them were BMW large sedan axles, plenty hefty, and under $100 each for new, not rebuilt, axles.

The plan (and the drivetrain) was coming together nicely but there was a small issue. When fit together, the splines on the axle did not engage the splines in the hub fully. It was adequate but not elegant. The bigger problem was that this put the attachment nut deeply countersunk so a new nut had to be machined rather than using the one supplied with the axle. This somewhat defeated the “Off the Shelf” attempt but was still much easier and cheaper than custom axles.

For their last many builds, SRI has used this drivetrain setup with the plates and nuts supplied by their friend Eric Martin at AE Auto, the undisputed world authority on engine/trans adapter plates and drivetrains for this type of car. At about $200 for a pair of axles, and about $300 for Eric’s parts, the axle solution is $700 with hubs, instead of $1,500-$2,000 for just the axles.

Now Strickland starts thinking again. That is an acceptable axle solution but can it be improved upon for his new Chupacabra car? The newer C-6 Corvette hub has 30 splines as opposed to 27. It costs about twenty bucks more because it has an ABS sensor, but what axles would fit a 30 spline hub and would they fit better? Could he make an even more efficient system and spend less money with his bud Eric? Off for an afternoon at O'Reilly's again and the same procedure and same process of elimination. Twelve axles of various acceptable lengths make the final cut and another pattern is clear. They are all Lexus sedan axles, again under $100 new and again plenty hefty.

Because of the ring gear on one side of the transaxle, usually one axle is shorter than the other and this is true for the O1 series gearbox used in the Chupacabra. Two axle lengths were selected to get the proper rear track width of the Chupacabra, they were ordered and arrived the next morning. Upon a test fit, the Chevy hub and the Lexus CV axle went together like they were made for each other. No more custom nut, $40 more for hubs but $150 less for nuts. Sorry Eric. At least as important as economics, the fit that was adequate but not elegant has now become excellent as well as elegant.

Now for the next great surprise. When they were measured to get an idea of the adapter plate design, it was discovered that the bolt pattern on the Lexus axle flange is the same bolt pattern for the Porsche/Audi gearbox flange! Chevy to Lexus to Porsche/Audi, who knew? Take the $150 adapter plates out and sorry again Eric but this may not be such a good thing for two reasons. Remember that the thickness of the plate was used to fine tune the axle length and the plate was also used to replace a $100 Hall Effect ring. There is about 1-1/2 inches of play in and out on the axle and it wants to ride in the middle of that play. Fortunately there are enough length selections to hit this "Sweet Spot" on both sides without needing help from the plate.

Unlike earlier builds, the Chupacabra uses the new GPS sensor by VDO for the speedo. Besides this GPS unit sitting just beside the speedo and not having to run several difficult wires from the speedo back to the Hall Effect sensor at the rear axle, there are economic advantages here too. The Hall Effect ring is about $100, the sensor is another $100, while the whole GPS system is about $100. Even with a free ring built into the adapter plate, the old technology Hall Effect is still the same price as the new GPS technology. Strickland is not sorry to see the plate and ring disappear, price wise it is a wash with the new GPS, and less wires to run for a nicer end product.

The two possible down sides to eliminating the adapter plate did not materialize. Money, time, and pieces have been removed from the build, which is always a good thing. SRI started with eight pieces at about $700 which were deemed adequate (and already superior to custom axles) and replaced them with four excellent pieces totaling about $440, and the entire axle assembly is now truly "Off the Shelf".

It does not seem absolutely necessary but a small "Index Ring" is CNC cut in house by SRI. It is made from scrap ¼ inch aluminum plate used on the Chupacabra chassis. The six bolts holding the axle flange to the gearbox flange will index the axle adequately, but both pieces have slight circular indents instead of one having the indent and the other having a shoulder that goes into it. This index ring goes between them and catches one indent on one side and the other indent on the other side, making a more positive index. It also gives a much better gasket seal surface on both sides, while the old adapter plates

had to use a more difficult O-ring to insure that the seal kept the axle grease inside. Economy, durability, availability, simplicity, we are well pleased with every aspect of this solution.

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