Mustang Engine Swap - Stock Exchange

Going Beyond The Engine Out/Engine In Basics Of A 4.6 Modular Swap

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Horse Sense: Projects like this, presenting a series of reality-based, non-exotic performance enhancements that, over time, will morph a stock, modular 'Stang into a bonafide Two-Valve street hitter, are a big part of what the Mustang hobby is all about.

Most of our faithful readers are familiar with our in-house '02 Mustang GT and the various projects we've done with the car, in our seemingly never-ending effort to make it better, stronger, and, of course, faster.

For those of you just joining us, during the last year we've been on a mission to present new tech concepts for the modular Two-Valve engine. A lot of our focus has been on upgrades for the '99-'04 Mustang GTs, mainly because the aftermarket now offers a robust selection of products that makes modifying New Edge 'Stangs relatively easy and, in most cases, affordable.

Throughout the years, we've covered this same upgrade bonanza for '86-'93 EFI Mustangs. While the Fox will probably forever be the 5.0&SF staff's favorite 'Stang to modify, we keep an open mind when it comes to 'Stangbanging as a whole, and we let you know the real deal about making changes on post-Fox-era 'Stangs as well-especially the '99-'04 New Edge cars.

We have made quite a few changes on our once-stock, 45,000-mile '02 GT, ranging from giving the car a cool stance and profile to greater stopping power with new wheels, tires, and brakes ("Becoming Bullitt," Feb. '06, p. 84), to enhancing exhaust flow with long-tube headers ("Volume Two," May '06, p. 80), to adding a ProCharger Stage 2 P-1SC supercharger and intercooler system ("Beyond Bolt-On," June '06, p. 78), to dyno tuning the whole works to efficient performance (horsepower and torque).

We also dyno tested our mule Mustang a few months prior to the engine swap we're about to detail here. With the aforementioned ProCharger and exhaust, and a set of Granatelli Motor Sports' high-output coils, being the '02's only engine-related mods, its OEM Two-Valve blazed the dyno's rollers to the tune of 373.51 rwhp and 390.80 lb-ft of torque at the rear tires. These numbers are a shade below what many engine builders (and 'Stangbangers) have determined to be a power threshold for predominantly stock (rotating assembly), Two-Valve 4.6 mod motors. Making 430 rwhp is definitely doable with pump gas, a power adder, and about 16 degrees of timing. But as we explained in our report on tuning the GT's P-1SC setup, bigger is not always better when it comes to pushing the limits of a basically stock Two-Valve.

Since stepping up street performance whenever and however possible is a major objective for most hard-core 'Stang enthusiasts, we thought it would be cool to do just that with our own ride. We'll share with you the things we're doing to get the '02 Mustang GT deeper into the big-power zone-namely 500-plus daily driveable horses on California's rot-gut 91 octane fuel.

What we needed to do right away was get the new bullet into the car. We called on Ricardo and Gonzolo Topete of GTR High Performance in Rancho Cucamonga, California, for their help with an out-with-the-old/in-with-the-new swap of our original engine and new Super MODular 4.6.

One thing we've noticed in a lot of tech articles about engine swaps is that there are usually a few interesting elements of the procedure that are left out. We're not saying the omissions are intentional, but we think enthusiasts should know exactly what goes on when they drop off their modular Mustangs at a trusted 'Stang shop to have a new engine installed.

It's also important to show you what type of additional improvements should be made to the car itself, before and after the swap is performed. Replacing various stock drivetrain and chassis components at this time is a great idea, as it helps ensure your 'Stang will be capable of handling its new power. We'll also be stepping up to a bigger blower as part of this ongoing upgrade series, and hopefully a lot of new power.

While the engine is out, we're taking some of the weight off the GT by installing a Maximum Motorsports K-member kit (PN MMKMP-28; $1,811.46), which includes A-arms with Urethane bushings, a K-member brace, tie-rod ends, rack bushings, sway bar end-links, and Hypercoil coilover springs (350 lb-in rate) with Tokico adjustable struts (PN BB3140; $163.95). An 11-inch, Centerforce Dual-Friction clutch and pressure-plate kit (PN DF800075; $467.79) with an internally balanced aluminum flywheel (PN 900205; $721.40) and FRPP's aluminum driveshaft (PN M-4602-J; $280.00) are also some of the dietary elements that will help the new bullet meet its potential. Maximum's full-length subframe connectors (PN MMFL-3B; $119.00) were welded on to control the chassis flex the car will undoubtedly have as we start to go beyond its previous performance levels.

One quick note about the prices on the flywheel, exhaust pieces, and other components in this article and many of our tech articles. Many companies do not sell their products directly and instead work with authorized distributors to get the products throughout the marketplace. We always try and give you the manufacturer's suggested prices for the parts we use, but keep in mind that much lower prices for these components are usually available through local or Internet performance retailers.

We followed along (and helped out) as GTR exchanged engines in our Mustang. A mod-motor swap typically follows the same procedures as a basic 5.0 replacement. In doing this project, however, we learned there are a few nuances about modular engines. We also want to point out some of the dos and don'ts, and situations that can arise when you're attempting this type of project.

So, read on and see what our 4.6 swap was all about. We strongly recommend that newcomers or those with limited tools seek the assistance of GTR High Performance or their local, reputable Mustang shop. While this is project that can be tackled at home, the convenience of a twin-post hoist, air tools, and a lot of space to work just can't be beat.

This difference in timing-chain covers set us back a little bit, as we had to swap the cover from our original engine (right/above) onto the D.S.S. Super MODular 4.6, which was built with a front cover from a '96-'98 Two-Valve engine (left/below). The change required removing the Innovator's West dampener from the new motor, as well as grinding down the crank-sensor housing on the '02's cover for proper damper clearance. If you find yourself needing to make a similar front-cover swap on a 4.6, a new "V gasket" (PN F6AZ-6020-BB) will also be required for your '99-'04 cover. The other gaskets in the front cover are interchangeable.

The crew at GTR guides our new D.S.S. Super MODular 4.6 into the engine compartment-from the top-with the transmission and headers attached. It's best to attach the transmission to the engine and install these parts as a one-shot combination. The drivetrain package needs to be lifted fairly high initially and then positioned in a few different angles on the way down, but it works out well. With our engine, everything fit so well that even the arm of the Steeda shifter seated perfectly into place in the shifter boot. The tubular K-member also makes this type of installation easier, as there's more room for the headers to clear than there would be if the stock frontend was still in place.