



Ford Mustang is off to the Races with Eaton Supercharger

Location:
Dearborn, MI

Segment:
Vehicle, performance car,
fuel efficiency

Problem:
Develop a technically advanced,
benchmark engine that meets market
demands while maintaining
racetrack-like acceleration

Solution:
The Eaton TVS supercharger
combined with a 5.8 liter V8
increases boosting volume making
the vehicle more fuel efficient

Results:
The Eaton TVS supercharger adds
100 horsepower while maintaining an
18 mpg EPA rating

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technology and takes
muscle car performance
to new heights,”*

*Hermann Salenbauch, director of Ford's
Advanced Product Creation*

Background

The Ford Mustang has come a long way since it was conceived in 1961 by Lee Iacocca, who at the time was vice president and general manager of Ford Division. More than nine million of the iconic pony cars have been sold worldwide since the first Mustang rolled off the assembly line in early 1964 – and the car's success continues to grow.

Iacocca's vision called for a four-seat design that stretched no more than 180 inches long, weighed less than 2,500 pounds and carried a sub-\$2,500 sticker price. Billed as “the car to be designed by you,” the original Mustang was an instant hit and its mass appeal has continued to thrive as the car has been updated over the years.

Styles have changed, but one thing about the Mustang has remained constant: its all-out thoroughbred performance. And if the base muscle car wasn't enough, a stable of high-performance variants have revved up the excitement level even more.

Leading the charge was Carroll Shelby, whose name has been synonymous with the Mustang almost since the car's beginnings. The legendary race car driver, automotive designer and entrepreneur built the first Shelby Mustang in 1964 for Ford through his Shelby American Inc. company. These “Cobra” models, which were sold through 1970, offered racing packages with high-output engines that kicked out more than 300 horsepower.

Challenges

The oil crisis of the 1970s triggered an industry shift toward fuel-efficient designs and powertrain systems. The move, which had been progressing relatively slowly, has accelerated considerably in the last decade.

Stricter fuel economy and vehicle emissions standards in the U.S. and international markets call for drastic improvements in efficiency. At the same time, however, consumers don't want to sacrifice any performance, comfort, safety or other driving characteristics and advanced features to which they've grown accustomed.



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While developing the fifth-generation Mustang, Ford engineers were tasked to strike a balance between these seemingly contradictory objectives. The goal was to create a car capable of racetrack-like acceleration and handling along with improved fuel economy and overall vehicle efficiency.

The 2005 Mustang delivered on all cylinders and tweaks in subsequent years have made the venerable nameplate a true tour de force. For the 2011 model year the entire engine lineup was overhauled, including a 3.7-liter V6 that generated 305 horsepower and had a U.S. Environmental Protection Agency rating of more than 30 miles per gallon for highway driving – making it the first production vehicle in history to achieve such a combination.

The Ford-Shelby Mustang partnership returned with the 2007 Shelby GT500, which was powered by a 500-horsepower, 5.4-liter supercharged V8. This was followed by several other Mustang performance models that were even more powerful. But could the ever-increasing horsepower trend continue while still improving fuel efficiency?

Solution

Ford and Shelby upped the performance ante for the 2013 GT500 with a 5.8-liter V8. In addition to larger bores, the system gets a higher compression ratio, high-lift cams, a larger oil pump, piston squirters, new fuel pumps, larger injectors and an upgraded cooling system.

One of the keys to the package is Eaton's TVS (Twin Vortices Series) supercharger. The fifth-generation 2300 TVS is larger and more efficient than the previous blower. Creating 2.3 liters of displacement, the GT500's supercharger is designed specifically for the car's 5.8-liter V8 engine.



The TVS features twin four-lobe rotors that are twisted 160 degrees and have a drive ratio that spins 2.64 times faster than the previous model. This is completely different than the previous construction that had three lobes angled at 60 degrees. The fourth lobe and increased angle creates a more efficient flow into the engine when combined with the TVS' revised inlet air outputs, increasing volume by 33 percent. Boost has been increased to 14 psi from 9 psi.

Results

The lightweight aluminum-block engine with the next-generation Eaton supercharger helps the 2013 Shelby GT500 generate an awe-inspiring 662 horsepower and 631 pound-feet of torque. With a top speed of 202 mph, the car is the fastest and most powerful Mustang ever built, and is powered by the highest-horsepower engine ever produced in North America.

While the GT500's output equals or beats that of many of the world's top exotic "supercars," the Ford pony car is just a fraction of the cost of its exotic competitors.

It also is much more fuel efficient. In fact, the 2013 model's 18 mpg EPA rating (15 mpg city/24 mpg highway) bests that of its predecessor, despite adding 100 horsepower. This also allows it to avoid hefty gas guzzler taxes in the U.S.

Developed by Ford's Special Vehicle Team (SVT) and licensed by Carroll Shelby, the new GT500 follows Shelby's mantra of "stuffing the most power possible" into the lightest package. The car marks the 20th anniversary of SVT, which began with the SVT Mustang Cobra.

That vehicle featured a 235-horsepower 5.0-liter V8 engine, further demonstrating how far—and how fast—the Mustang has evolved in recent years.

"The Shelby GT500 is on the cutting edge of technology and takes muscle car performance to new heights," said Hermann Salenbauch, director of Ford's Advanced Product Creation. "We encapsulated every aspect of performance in this car... the daily driver also will find this car perfectly fits his or her need."



The supercharger's twin four-lobe rotors are twisted 160 degrees to maximize efficiency.

GT500

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