Installing Steeda's Cold-Air Intake - Power By Engineering

We Take A Deep Look At Steeda's Cold-Air Intake And Unlock As Much As 25 Hp.

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By Pete Epple

When Ford Motor Company released the redesigned 2010 Mustang, the aesthetics were not the only thing reengineered. Horsepower numbers were raised to give owners a little extra power and the handling and comfort was also tweaked. Power was increased from 300 hp to 315 hp, thanks to a factory cold-air intake and a recalibrated ECM.

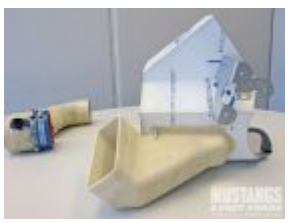
Steeda's cold air intake system

The factory cold-air kit is a great improvement over the intake system from the previous year. So much so that when the aftermarket first got its hands on the 2010, companies had trouble improving on the factory design. But after months of research and development, Steeda has not only designed a kit that makes more power, but it looks great too.

Rapid prototype created on Z Corp 3D Printer

For over 20 years, Steeda Autosports has been one of the top manufacturers of Mustang performance parts. Intense R&D, along with hours of track testing and actual racing in competition, go into every part Steeda manufactures, and its cold-air intake system for the 2010 Mustang GT is no exception. In fact, Steeda works with Ford Motor Company on many parts it manufactures. "Steeda uses Ford-supplied models for much of the design process," explains Aric Pogel, engineer for Steeda Autosports. "We start with Ford's drawings and 3-D models, and make our improvements from there. Once our designs are complete, the 3-D models are loaded into our rapid prototyping machine where the first physical parts are made."

Rapid prototyping is a process that allows Steeda (and many other manufacturers) to quickly produce a part for visual inspection, fitment, and in some cases, testing purposes, prior to building a finished version. The rapid prototype machine builds parts one paper-thin layer at a time in an 8x10x8-inch tank. The tank is filled with a composite plaster powder, and has an elevator-style floor, which lowers as each layer of the part is laid out by the machine. A print head from an ink-jet printer applies a thin layer of glue onto the powder in the shape of the 3-D model. Once a layer of glue is applied, the floor of the tank lowers and an arm spreads a new layer of powder over the previous layer. This is repeated at a rate of one inch per hour until the part is complete.



More 3D printed prototypes used for fit checks and flow testing

Fresh out of the rapid prototype machine, the new part is very fragile. A layer of epoxy is sprayed on to give it strength so the engineers can test it. Larger parts, like the intake elbow on the 2010 cold-air kit, are made in two sections due to size restraints. Once both pieces are fabricated, fiberglass is used to join the sections, making one complete part.

From here, the Steeda engineers can test for fit, flow, clearances, and even dyno tests are done with some parts made this way. "Due to the fact that rapid prototype parts are primarily made of powder, road testing is too risky," Pogel adds. "If you hit a large bump on the road, a part like a prototype cold-air intake could break apart and damage the engine."

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Rapid prototyping also affords the ability to alter the design, and to make minute changes quickly and efficiently, during the testing or developmental stages. Parts can be manufactured and ready for action in a few hours as opposed to a few weeks.

Installation Prior to installing Steeda's 2010 cold-air system, we strapped its 2010 Mustang GT to the in-house Dynojet. With the engine temperature up, and the hood closed to simulate normal driving conditions, we let the Pony gallop. In stock trim, the 2010 laid down a respectable 274 rwhp with 299 lb-ft of torque.

After a few minutes of cool-down time, it was time to swap cold-air systems. Matt Bouyea made quick work of the factory cold-air kit. Steeda's cold-air kit was then installed quickly and easily.

The 85mm factory MAF sensor was replaced with a 94mm unit, which allows more airflow into the engine. The stock airbox was replaced with an open-element filter in a sheet metal enclosure to keep engine heat away from the intake stream.

The factory cold-air intake

The Steeda Cold air intake system

With the new cold-air system in place, Bouyea loaded the ECM calibration with an SCT handheld tuner and brought the 2010 GT back up to operating temperature for our after test. Not using a tune with a cold-air kit is said to cause a lean condition, but we didn't test this theory. After a few pulls, the 2010 spun the rollers to 287 rwhp and 304 lb-ft of torque, for a gain of 13 rwhp and 5 lb-ft of torque. Although these are good peak gains for a cold-air system, the gains are biggest (about 25 rwhp) between 4,500 rpm and redline. All too often we just look at peak numbers when assessing how well a part does, but since you don't drive constantly at the peak rpm, it's important to look at the overall or average gains (or losses), before deciding whether a part tests out to be a winner.

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