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MISHIMOTO ENGINEERING REPORT

Testing of the BMW 135i/335i Intercooler

Test Vehicle
2007 BMW 335i
Stage 2 ECU flash
High-flow intake

Apparatus
For hardware Mishimoto used the PLX sensor modulus driven by the Kiwi WiFi plus IMFD. This is a wireless system from the sensor modules to an iPad or laptop computer. The software used was the Palmer Performance Scan XL pro, which has full data logging capabilities.

Air intake temperatures (AIT) were taken from both the inlet and outlet of the intercooler. Boost pressures were also recorded to ensure that no increased pressure drop occurred.

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Experiment

Our engineers tested both the Mishimoto intercooler and the stock intercooler in constant conditions. The BMW was tested on our dyno, with constant load and 40 mph airflow hitting the front face of the intercooler. The vehicle was strapped down once and the intercoolers were swapped out on the dyno. Mishimoto tested a single 4th gear pull to show horsepower and torque differences. The second test was a 1st-4th gear pull to simulate heat soaking of the intercooler.

Results

Dyno data

The dyno data shown below in figure 1.1 clearly show that the Mishimoto cooler substantially outperformed the stock cooler. The greatest horsepower and torque gains occurred in the mid-rev range, where the Mishimoto cooler outperformed the BMW unit by **21 hp and 24.3 ft-lb Tq!** On average the Mishimoto intercooler performed about 13-14 hp higher than the stock intercooler, at 3700-700 rpm. The overall peak power numbers were improved by 8 hp and 14.8 ft-lb Tq.

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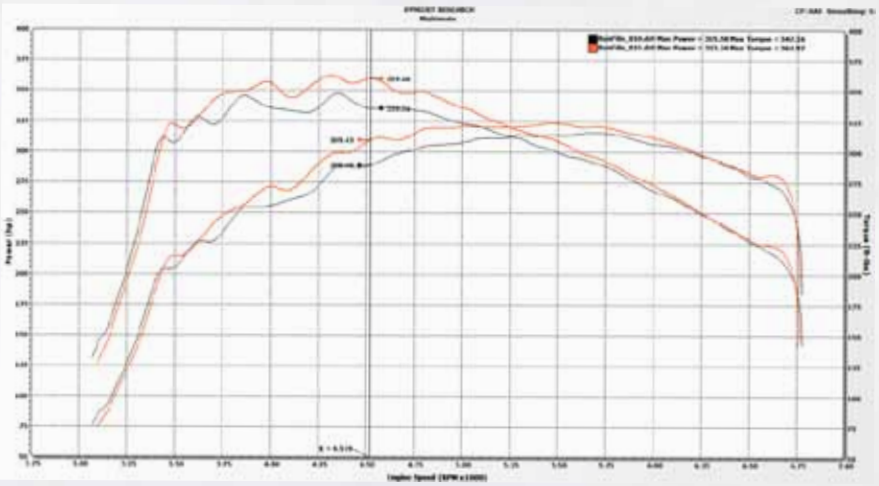

Figure 1.1

Temperature data

* *NOTE: All data are averaged from three dyno pulls. All temperatures are Fahrenheit (F). The graphs below present the various temperature data recorded during testing of the **BMW front-mount intercooler** (FMIC). Figure 2.1 shows pre- and post-intercooler temperatures during a 4th gear pull. The Mishimoto intercooler lowered AIT by about 20 degrees.

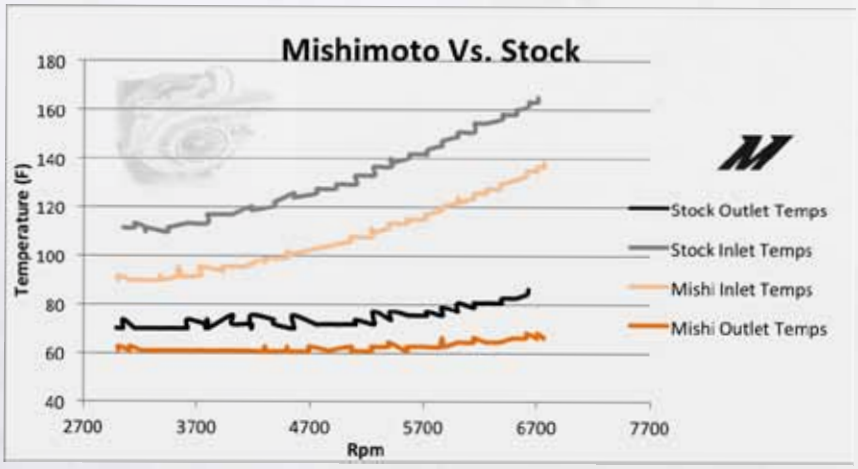

Figure 2.1

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Next we tested how the stock cooler performed in a 1st–4th gear pull. This test simulated heat soaking of the intercooler better than with just a single 4th gear pull. Figure 2.2 shows both the inlet and outlet temperatures of the Mishimoto and stock coolers. Both the pre- and post-intercooler air temperatures were significantly cooler when using the Mishimoto FMIC. This lower temperature of the air increases the amount of oxygen in the air that enters the engine. The denser the air entering the engine, the more horsepower and torque the engine can make. This is part of the reason that the Mishimoto FMIC gained so much power over the stock unit. Figure 2.3 is a close-up of the post-intercooler air temperatures. It shows that the Mishimoto unit cooled the intake air by 35 degrees by the end of the run.

Figure 2.2

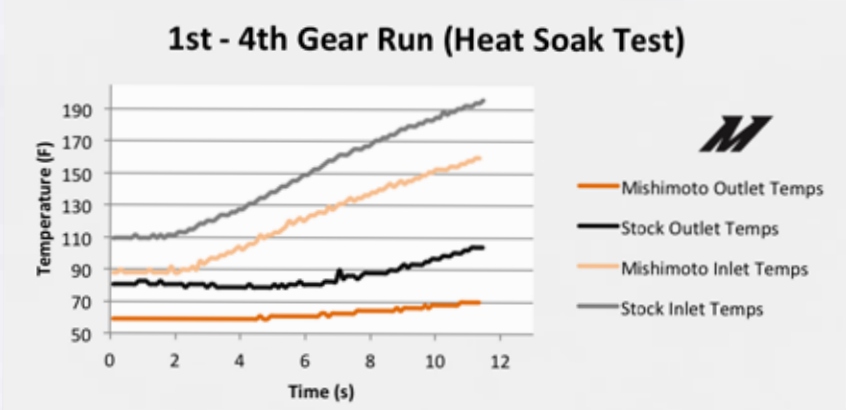
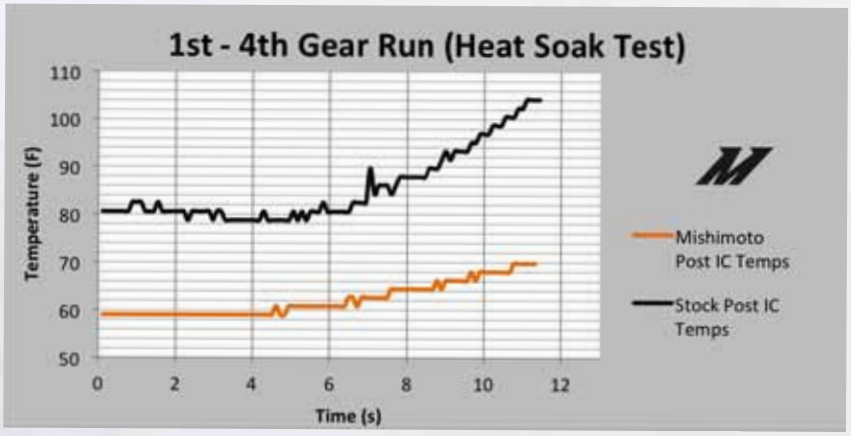


Figure 2.3



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Pressure data

Finally, the recorded pressure data show that no dramatic pressure loss occurred with the Mishimoto cooler. Figure 3.1 shows the pressure drop between the inlets and outlets of the intercoolers. Both performed equally in terms of pressure loss.

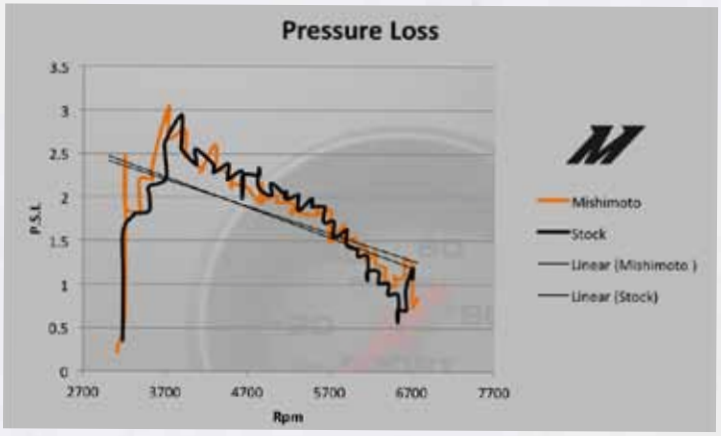

Figure 3.1

Product details:

The Mishimoto FMIC is 100% bolt-on. It is also plug-and-play with the stock connections, because the CNC-machined inlets and outlets match the OEM spec design. The Mishimoto intercooler also features CAD-designed, all-aluminum cast end tanks that are shaped to minimize the drastic sharp edges of cut-and-weld end tanks. The Mishimoto intercooler is as large as possible without requiring irreversible changes to your BMW. Notice in the pictures below how well the intercooler seals against the OEM fan shroud and front bumper. Tight fitment is important for keeping intercooler and radiator efficiencies at their highest levels.

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Core details

Three different prototypes were constructed for testing the Mishimoto intercooler. Each prototype received a different core configuration, and we tested each one to find the most optimum core for this vehicle. Engineers observed about a 10% difference in power and temperature numbers from one core to the next. We chose the top-performing core to use for production. The Mishimoto core uses a bar-and-plate design versus the stock's tube-and-fin design. Mishimoto engineers were able to increase the volume of the core from 423 to 543 cubic inches, a 22% increase over stock (see figure 4.1).

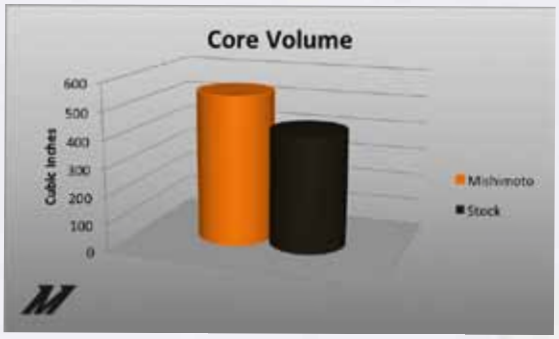

Figure 4.1

Summary

Mishimoto engineers are pleased with the overall design and functionality of this intercooler. Special attention to detail on the fitment of this product will definitely satisfy BMW owners. The performance numbers of the cooler far exceeded the stock unit. Intake air temperatures are reduced by 35 degrees during a 1st–4th gear pull. A maximum gain of 21 hp and 24 ft–lb Tq is quite impressive for simply upgrading the intercooler. The intercooler still remains a 100% bolt-on upgrade that takes less than an hour to install.

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