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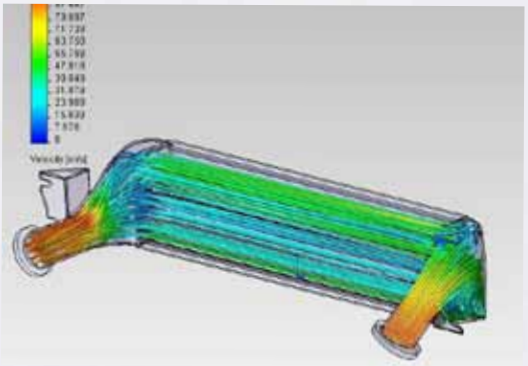
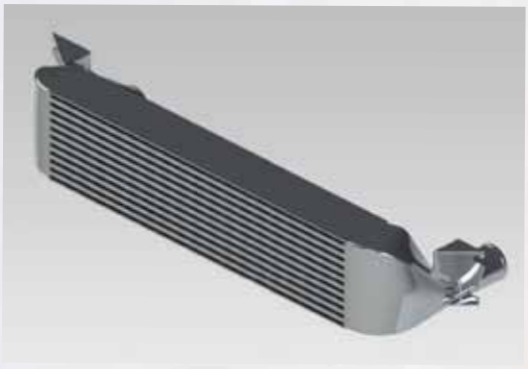
MISHIMOTO ENGINEERING REPORT

Testing of the 2003-2005 Dodge Neon SRT-4 Intercooler





This new Mishimoto intercooler was designed specifically for the Dodge Neon SRT-4 and is a direct replacement for the stock unit. It fits in the front grille with the factory crash beam and without the need for any modifications to the vehicle. The engineering team went through a few iterations while designing the end tanks; they used CFD software to make sure that the air flow was just right.

Test Vehicle
2003 Dodge Neon SRT-4

Modifications:
Cat-back exhaust

Objective:
To make a direct fit intercooler for the SRT-4 that retains the use of the crash beam.

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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.

Intake air temperatures were taken from both the inlet and outlet of the intercoolers using PLX K-type thermocouples. Boost pressure was also tested to ensure that no dramatic pressure drop occurs due to the larger Mishimoto intercooler.

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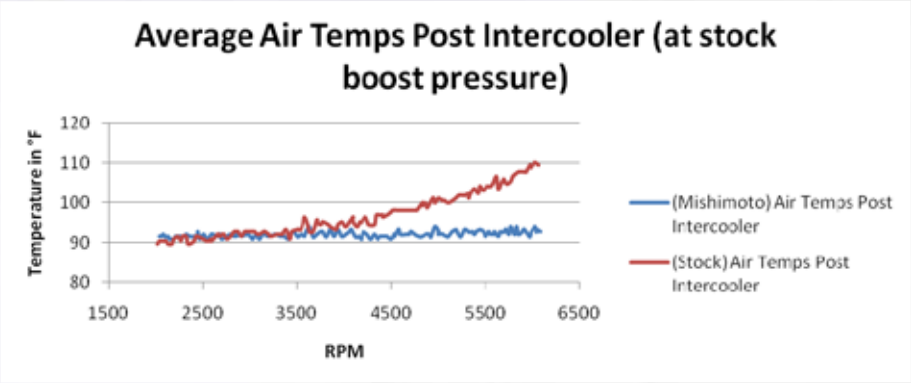
Testing conditions

Testing took place on a dry, humid day. Temperature range: 85-89°F

Experiment

The test compares the stock front-mount intercooler (FMIC) with the Mishimoto SRT-4 intercooler. The engineers tested both setups under the same conditions. To conduct the test we made three runs with each setup, taking 5-minute intervals between runs to ensure that each run started with similar temperature conditions. Every test was conducted with the hood up and a blower fan placed directly in front of the FMIC core. Wind speed hitting the ambient side of the intercooler core was approximately 15 mph. The SRT-4 was strapped down once, and the intercoolers were swapped on the dynamometer so that all three tests had exactly the same conditions.

Results



The graph above compares the average air intake temperatures after the air has passed through the intercooler. The Mishimoto unit kept the air at a nearly constant temperature of 93°F, whereas the stock unit's outlet temperature continued to climb as engine RPM increased. Comparing the maximum temperatures recorded from both intercooler tests, we found that the Mishimoto intercooler cooled the air roughly 15°F better than the stock intercooler. The reduction in temperature is credited to the increased core thickness of the Mishimoto intercooler, an increase of 20mm.

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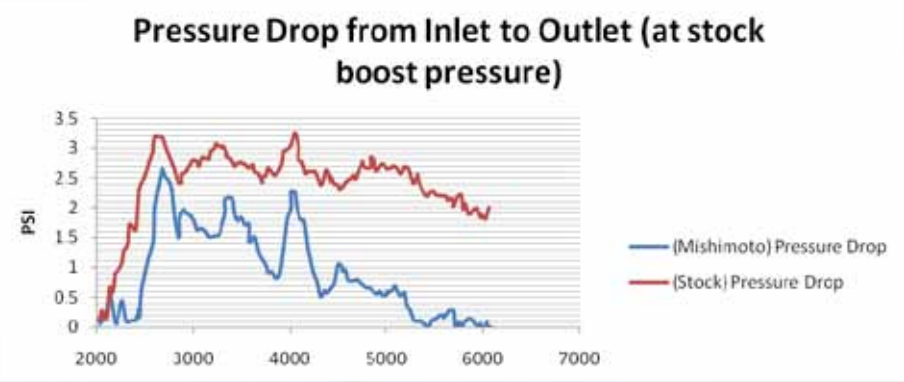

The graph above shows the difference in boost pressure from the inlet to the outlet of the intercoolers. The stock intercooler has 1.5 - 2 psi more pressure drop over the Mishimoto intercooler. This means that the turbo doesn't have to work as hard to create the power numbers that the vehicle's computer is looking for when the Mishimoto intercooler is installed.

Engineers' Notes

When we tested the intercoolers on the SRT-4, we found that the vehicle's computer controls many of the components in the turbo system. Most vehicles use manifold pressure to actuate the waste gate, but with the SRT-4, a computer-controlled vacuum/ boost solenoid controls it. The ECU monitors a variety of systems and sensors, including elevation, load, and intake air temp. The gathered data is used to determine the amount of boost the engine needs to meet a preset torque curve/power band.

The results of these calculations are compared in the graphs above. The air intake temperature (AIT) graph shows that as RPM increases, so do the AITs . The pressure drop graph shows that the pressure drop stays at about 2.5 psi for most of the RPM values. Comparing this to the Mishimoto intercooler results shows that the AITs were lower throughout the dyno test, and the pressure drop was also less than stock. This occurs because the computer is reading the lower AITs and calculating that it does not need as much boost to meet the power requirement it's looking for.

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What does all this mean?

The Mishimoto intercooler gives the car the potential to make more power. All that's needed is a tune, but with supporting mods there are even more gains. The stock SRT-4 computer is set to make a certain amount of power and torque, regardless of how much boost is required from the turbo. By removing this restriction with a tune, the lower pressure drop of the Mishimoto intercooler immediately allows for higher flow with minimal pressure loss. HP gains have even more potential if a boost controller is installed. What's more, the stock crash beam is retained, so there are no added concerns from a safety standpoint.

Summary

The testing results show that the Mishimoto intercooler has less pressure drop than the stock intercooler and that it lowers air intake temperatures.

Dan Tafe, Product Engineer, Mishimoto Automotive