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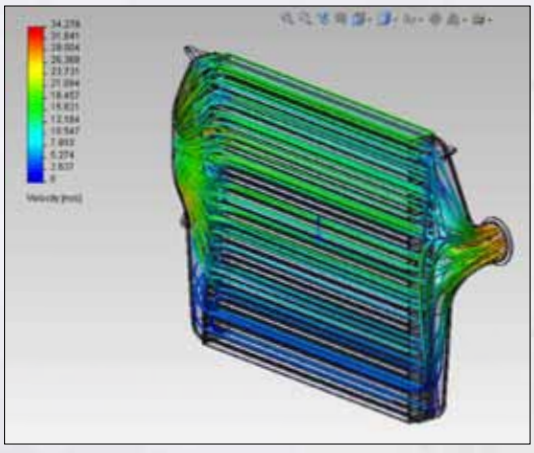
MISHIMOTO ENGINEERING REPORT

Subject: 2003-2009 Dodge 5.9L/6.7L Cummins Mishimoto Intercooler

Mishimoto Disclaimer

We at Mishimoto would like to thank you for taking the time to read our Engineering Report. We know that many readers have questions regarding the efficiency of diesel truck intercoolers. Many companies make broad claims but fail to substantiate them with proven testing data. Each Mishimoto product has been tested in-house on our Dynojet 424LX dynamometer. Testing results were obtained using PLX K-type thermocouples and analog pressure gauges (0-100 psi range). The sensors were kept in the same location, from factory intercooler testing to Mishimoto intercooler testing, to ensure consistency in data collection. This controlled experiment allowed us to isolate the intercooler, so that we could determine the performance of the product alone. No variables such as intakes, exhausts, or tunes were changed or modified during testing. Performance results will vary from vehicle to vehicle depending on modifications.



2003-2009 Dodge 5.9L/6.7L Cummins Mishimoto Intercooler

The engineering team went through multiple iterations while designing the end tanks using CFD software to make sure that the flow was optimal for the Dodge 5.9L / 6.7L Cummins. This intercooler is designed with a 31.5% thicker core than the stock intercooler, giving it 30.1% more volume in the core.

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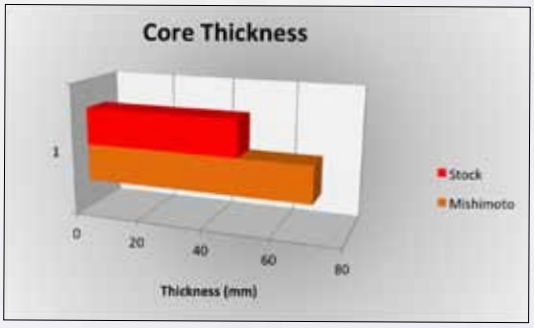

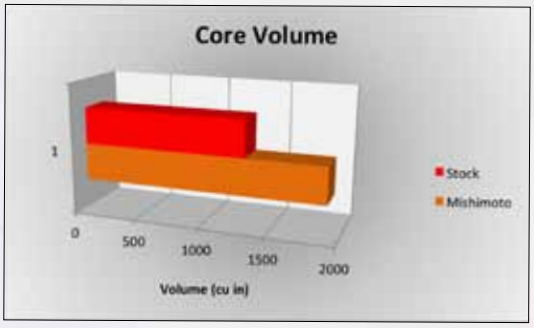

Testing of 2003-2009 Dodge 5.9L / 6.7L Cummins Intercooler

Test Vehicle

2003 Dodge RAM 2500 with 5-speed auto transmission

- Aftermarket air intake
- Aftermarket turbo back exhaust
- Tune

Apparatus

For hardware Mishimoto chose PLX sensor modules 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.

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Air intake temperatures (AIT) were recorded from the inlet and outlet of both intercoolers using PLX K-type thermocouples. Boost pressure was also tested to ensure that no dramatic pressure drop occurs when installing the larger Mishimoto intercooler. Mechanical gauges were used because of the high boost levels.

Sensor locations

1. Pre-intercooler air intake temperature (data logger)
2. Pre-intercooler boost pressure (mechanical gauge)
3. Post-intercooler boost pressure (mechanical gauge)
4. Post-intercooler air intake temperature (data logger)

Testing Conditions

Outside temperature range: 60°F to 63°F

Experiment

The test compares the stock intercooler with the Mishimoto intercooler under exactly the same conditions. To conduct the test we made three runs from 2000 rpm to 3400 rpm, with each setup in 5th gear. Between runs, a 3-minute break ensured 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 core. Wind speed out of the blower was 20 mph. The truck was strapped down once, and the intercoolers were swapped out on the dynamometer to ensure exactly the same conditions.

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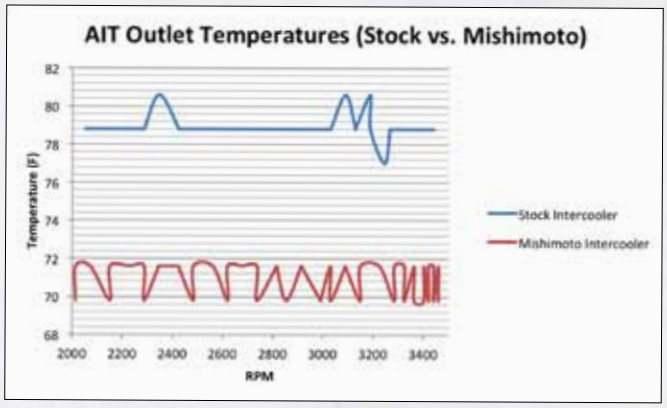

Results

The results for the post-intercooled AIT temperatures are shown in the graph. The outlet temperatures for the Mishimoto intercooler averaged about 10% lower than that of the stock intercooler.

The screen shots shown below are from the video we made of the mechanical boost gauges. We noticed a drop in pressure of 1.5 psi from the stock intercooler unit, and only about a 1.0 psi drop from the Mishimoto unit. The Dodge Cummins engine is computer controlled to achieve a specific power outlet. Both units had the same outlet pressure of 24 psi, but the turbo had to work harder with the stock intercooler to reach the desired boost level.

Stock Intercooler

Mishimoto Intercooler

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Conclusion

The dyno testing indicated that the stock intercooler is a good unit for normal everyday driving. However, under strenuous driving conditions the stock intercooler would not be able to keep up with the cooling needs of the Cummins engine. The Mishimoto intercooler handles higher temperatures and pressure much better than the stock unit. Also, for highly modified or upgraded turbo trucks, the Mishimoto unit with its casted end tanks and bar-and-plate core would handle much higher boost levels than the factory tube-and-fin core of the stock unit.

Dan Tafe
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