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RESEARCH & DEVELOPMENT**MISHIMOTO ENGINEERING REPORT****Testing the Mishimoto 2015 WRX Radiator**

Figure 1: Test vehicle

Test Vehicle:

2015 WRX with CVT transmission

Test Vehicle Modifications:

No modifications, all stock

Testing conditions:

Temperature range 79°F-81°F (26°C-27°C) with 59% humidity

Additional Notes: 100% pure distilled water was used for all tests.

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Apparatus:

For temperature monitoring Mishimoto chose the 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. Sensor locations were installed inline with the upper and lower coolant hoses.

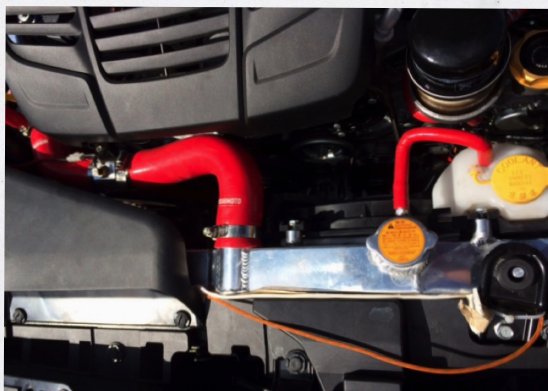


Figure 2: Mounting locations for temperature sensors. (Sensor reads approximately 10 times per second.)

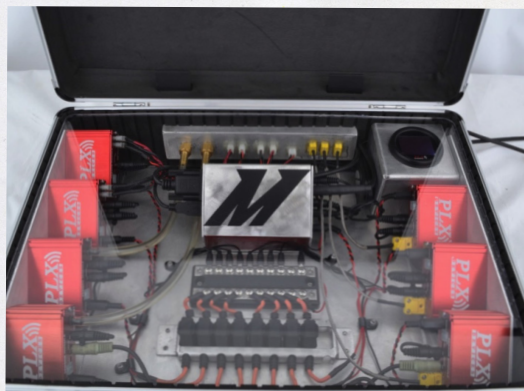
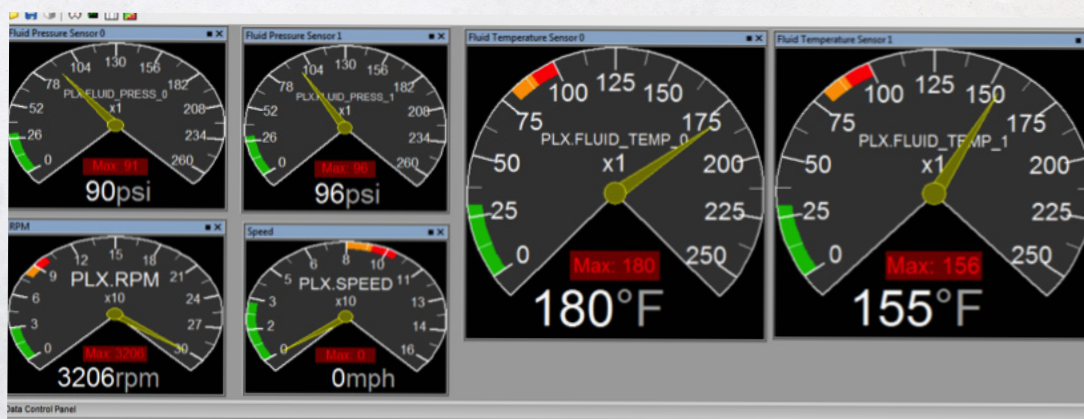


Figure 3: PLX sensor modules were used to monitor engine pyrometers.

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RESEARCH & DEVELOPMENT**Background and Experiment:****Core Information**

Compared to the stock core, the Mishimoto core has several changes that improve the conductance of the radiator. Improvements include decrease in fin height, which allows for more coolant tubes, and increase in overall core thickness. Figures 4 and 5 below represent these improvements. Overall capacity in terms of volume for the stock radiator is 0.39 gallons, while the Mishimoto radiator shows a 117% increase to 0.84 gallons.

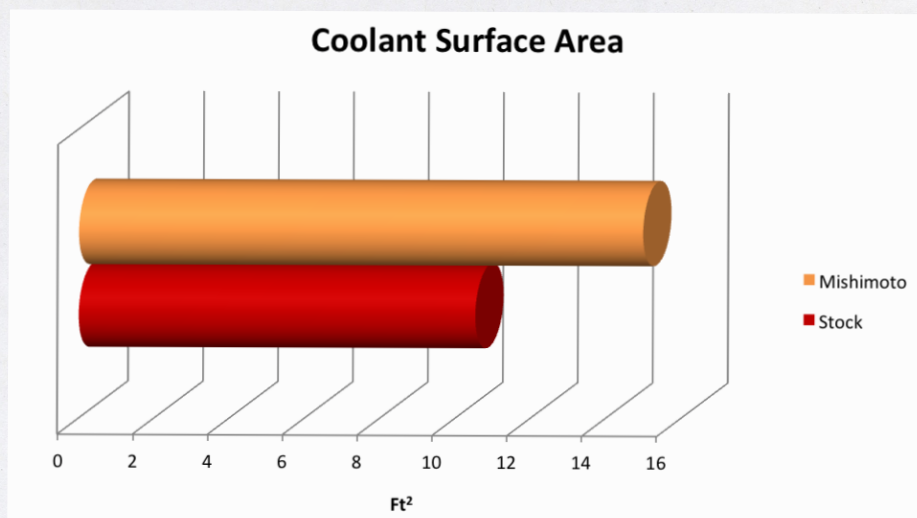


Figure 4: Coolant surface area (tubes) of the Mishimoto radiator was increased by 42%.

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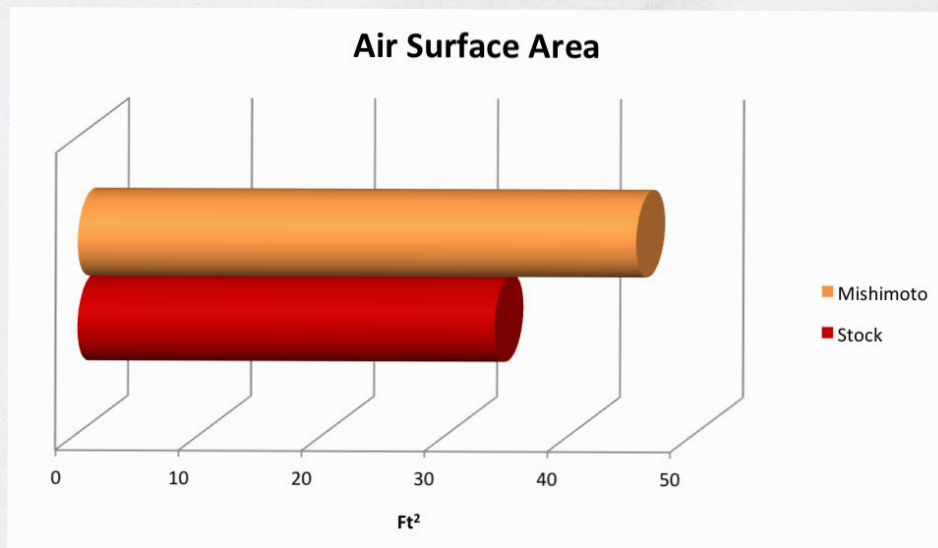


Figure 5: Air surface area (fins) of the Mishimoto radiator was increased by 34%.

Steady-State Testing (Highway Cruising)

The test took place on a normal highway with different grades including uphill, downhill, and flat stretches of road. The WRX speed was set using cruise control at exactly 60 mph for each test. Special attention was given to the space between the WRX and the vehicle in front of it to ensure that an unobstructed wall of air entered the WRX radiator. The results of both tests are shown below in Figure 6.

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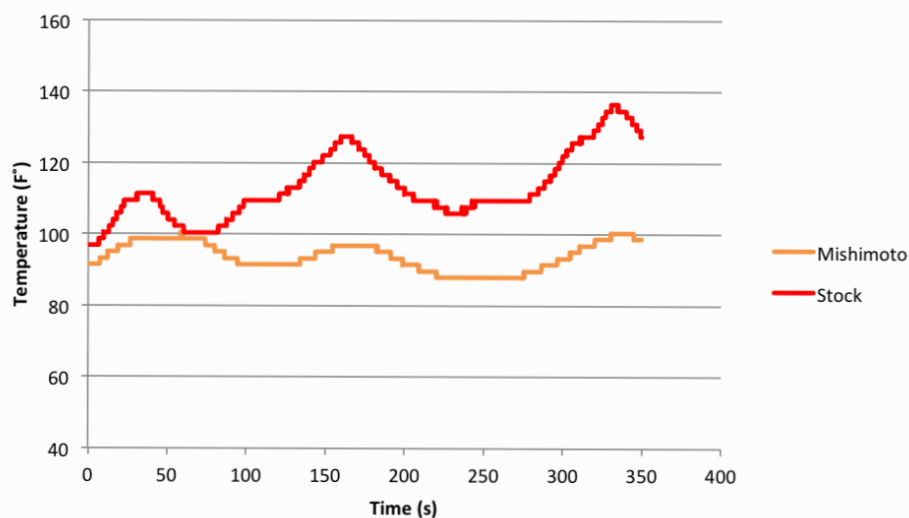
2015 WRX Radiator Outlet Temperature

Figure 6: Radiator temperature data.

In Figure 6 you will notice three distinctive spikes in the graph. These spikes are due to the highway going uphill, which requires more engine power and consequently increases the amount of heat being introduced into the cooling system. Inversely, the lower dips in the graph are from the highway going downhill, which requires significantly less power from the engine, so less heat is introduced into the cooling system. The data in Figure 6 show that the Mishimoto temperatures are averaging about 20°F (11°C) lower than the stock radiator.

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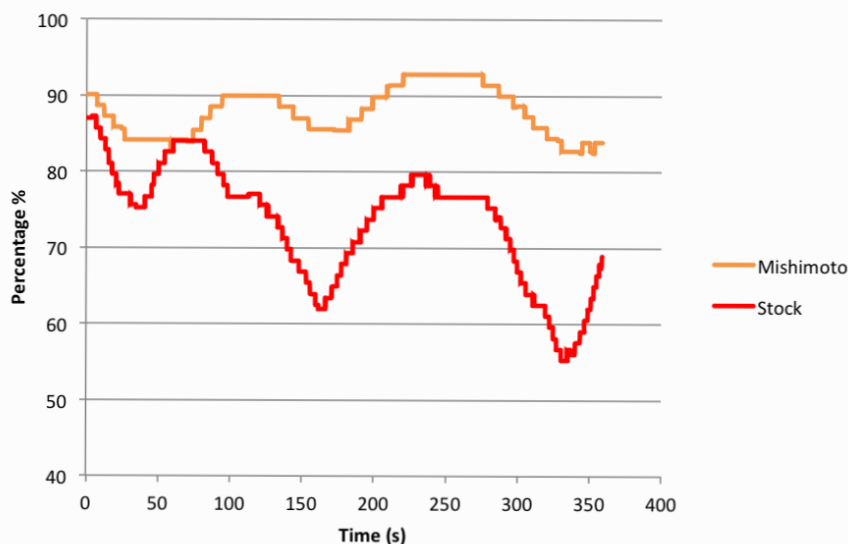
TOP SECRET**MISHIMOTO****2015 WRX Radiator Efficiency**

Figure 7: Radiator efficiency calculated using testing data.

Figure 7 shows that the Mishimoto radiator is about 15% more efficient than the stock radiator under the stated testing conditions. Efficiency of a radiator is important, because it is a performance value that represents how well the radiator can reject heat (reduce temperatures) under a given testing condition. In this testing scenario, the Mishimoto radiator was more efficient, because it had a larger temperature change between the inlet and outlet of the radiator when compared to the stock radiator.

Conclusions:

The new Mishimoto WRX radiator was designed to increase efficiency without taking up too much precious space in the engine bay. This radiator features increased efficiency, larger fluid capacity, as well as a more durable all-aluminum construction. All these features will help your WRX perform better when driving in hot weather or under track conditions, or both.

Kevin McCardle
Product Engineer

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