

ENGINEERING REPORT

2008—2010 Ford F-250 6.4L Powerstroke Transmission Cooler | SKU: MMTC-F2D-08SL

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REPORT AT A GLANCE

- **Goal:** To create a direct-fit transmission cooler that outperforms the stock option.
- **Results:** Mishimoto's transmission cooler showed an average of 15—20°F lower outlet temperature compared to the stock transmission cooler in both dyno and street testing.
- **Conclusion:** The Mishimoto transmission cooler is a valuable addition to the 6.4L Powerstroke, especially for heavy-load towing applications.

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DESIGN OBJECTIVES

The design requirements assigned to this project are as follows:

- Reduce transmission fluid temperature more than the stock transmission cooler
- Direct-fit without any permanent modification
- Must not significantly increase pressure drop across the cooler when compared to the stock transmission cooler

DESIGN AND FITMENT

The R&D process began with evaluating the stock transmission cooler and searching for potential room for improvement. The F-250 6.4L Powerstroke features a standalone fluid-to-air transmission cooler with 11 cooling plates and 10 rows of fins. The cooler is mounted on the front face of the radiator, behind

the intercooler and underneath the condenser. Approximately 33.5" in width and 5.5" in height, the stock transmission cooler volume is limited by the bottom of the condenser. To maximize the heat exchanger core volume, we designed the Mishimoto transmission cooler to angle forward, leaning away from the radiator to clear the bottom of the condenser. A comparison in cooler placement is shown in Figure 1. This allows us to increase the height of the core by approximately 10", stacking an additional 6 plates and 7 rows of fins compared to the stock cooler. The Mishimoto transmission cooler features a total of 17 plates and 18 rows of fins, and is about 60% larger than the stock transmission cooler by core volume as shown in Figure 2.

The two bolt-on brackets holding the cooler core in place also allow for some adjustment to the angle and position of the core, to work with thicker aftermarket intercooler and radiator.

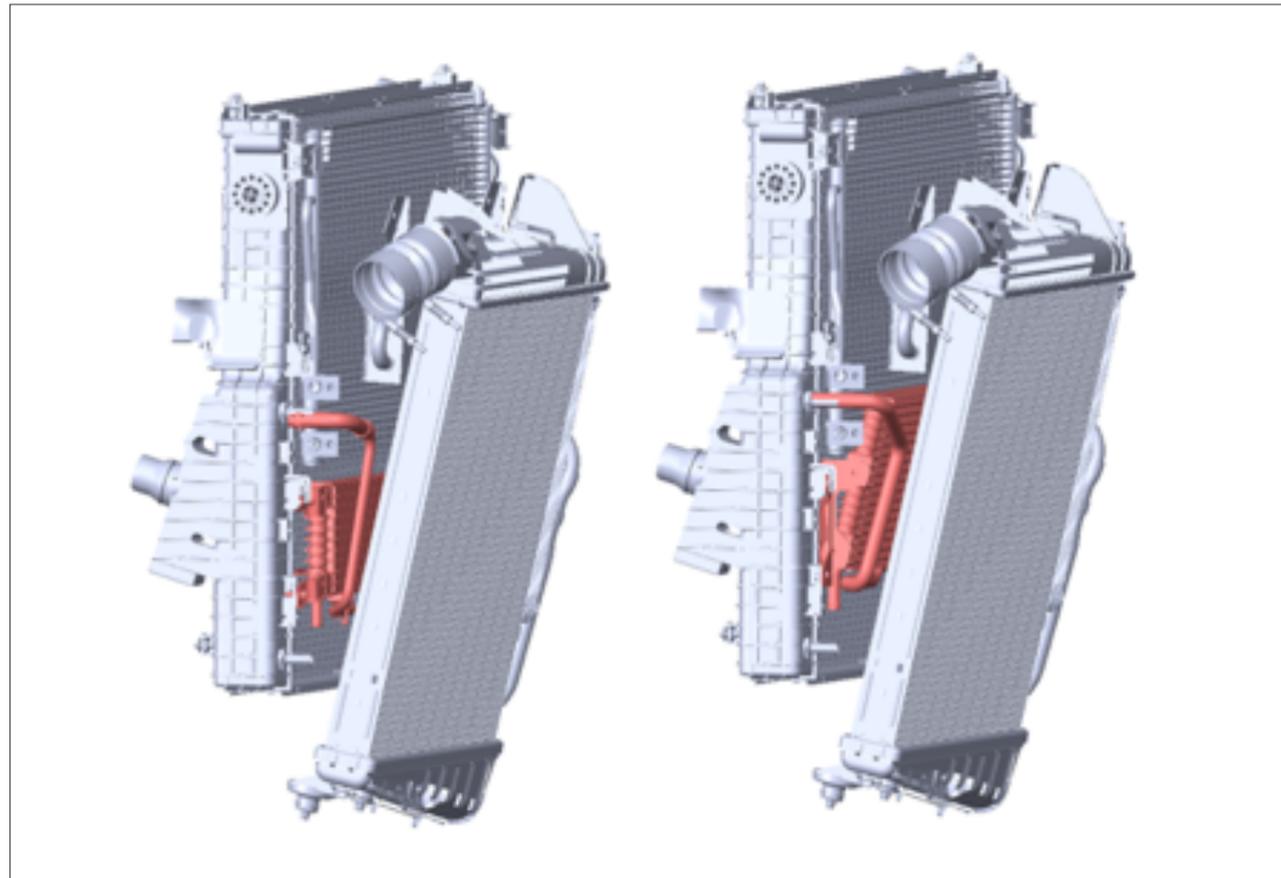


FIGURE 1: Stock transmission cooler mounting position (left) and Mishimoto transmission cooler mounting position (right).

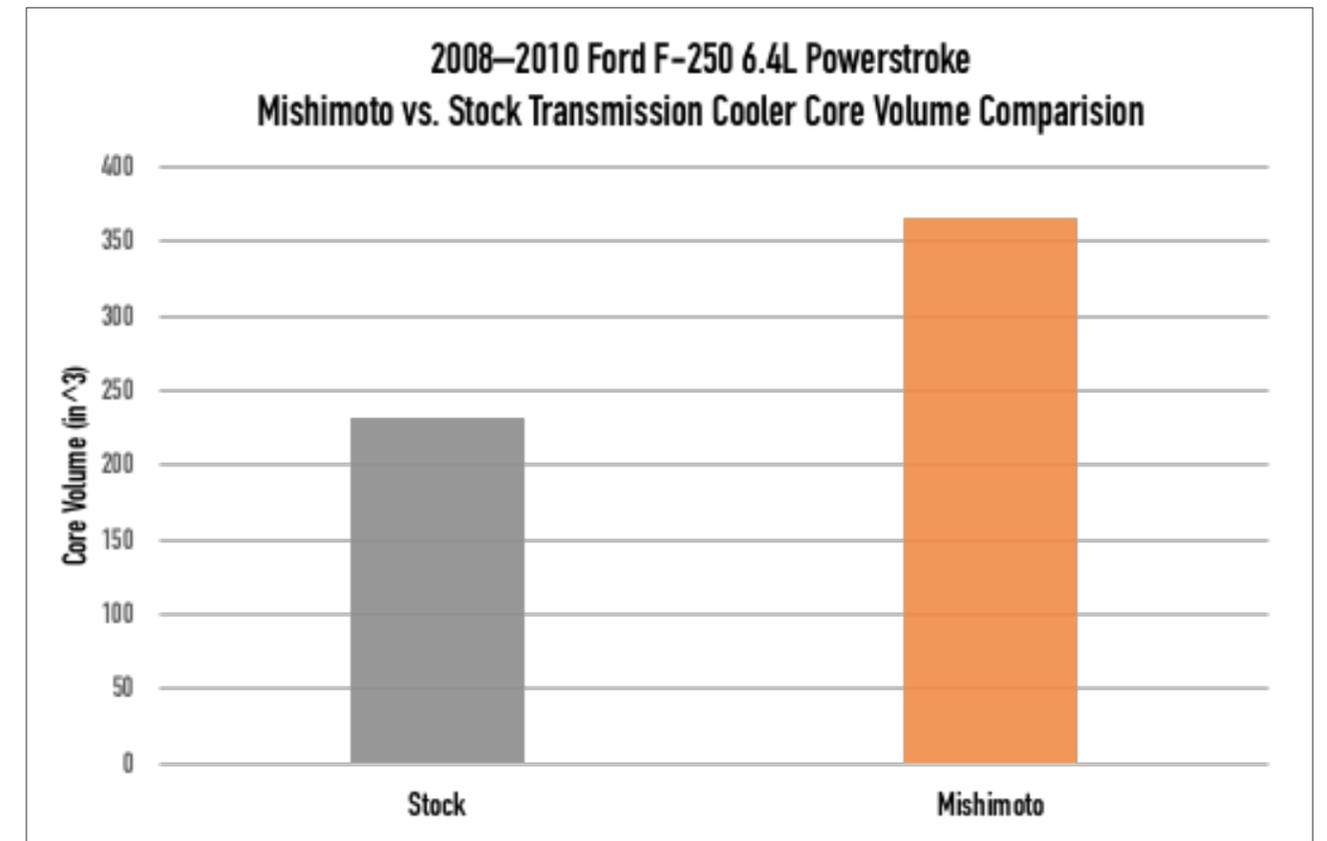


FIGURE 2: Core volume comparison.



FIGURE 3: Mishimoto transmission cooler installed (intercooler off).

ROAD TESTING

To test Mishimoto transmission cooler's performance in real world conditions and obtain baseline data for the ensuing dyno testing, our 6.4L Powerstroke test vehicle was hooked up with 8500 lbs of towing load and tested in a rolling hill area where the uphill roads ranged from 4%-7% grade. Same road testing was conducted for both stock and Mishimoto transmission coolers, with two

AEM fluid temperature sensors sampling data from the inlet and outlet of the cooler. Results of the road testing can be found in Figure 5. During the 3 minute towing test on the rolling hill road, transmission temperatures increase when going uphill, and decrease when going downhill. Compared to stock, the Mishimoto transmission cooler showed a 5-10°F drop in inlet temperature and 20°F drop on outlet temperature.



FIGURE 4: Mishimoto's 6.4L Powerstroke during road testing.

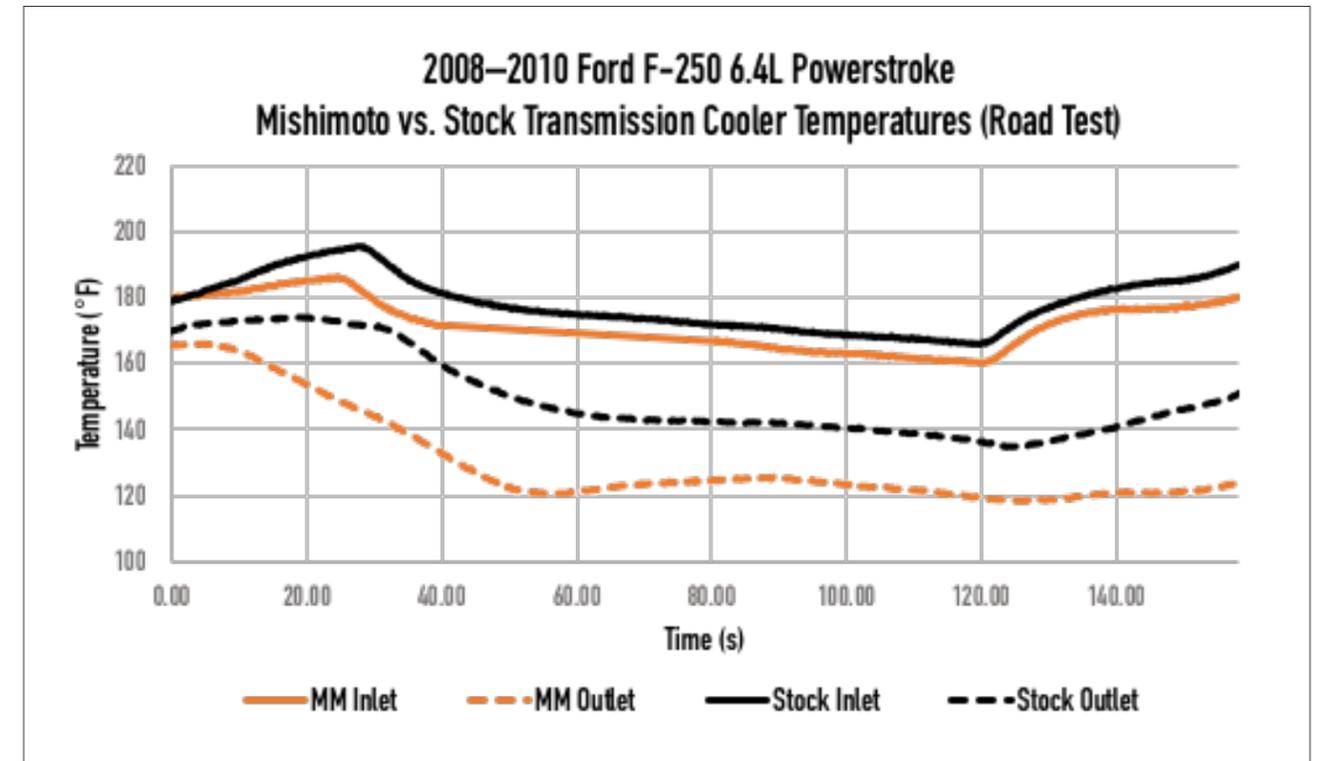


FIGURE 5: Road testing results.

DYNO TESTING



FIGURE 6: Mishimoto's 6.4L Powerstroke engineering vehicle during dyno testing.

Results of the road testing were further investigated and supported by dyno testing, where environmental variables such as ambient temperature, wind direction, wind speed, driving style, and traffic can be eliminated or much better controlled.

This type of dyno testing was made possible by our DynaPack™ dynamometer. Fundamentally different than the traditional inertia dyno, DynaPack allows us to apply a constant engine load to the truck while maintaining a constant average speed to simulate real world towing conditions. With data obtained from road testing, the dyno runs were setup at 70% engine load, 20 psi boost pressure, and a duration of 120 seconds after a full warmup for each cooler. Results of the dyno testing can be found in Figure 7. Both transmission coolers showed similar inlet temperature while Mishimoto outperformed stock with 20°F decrease in outlet temperature, which correlates well with road testing results.

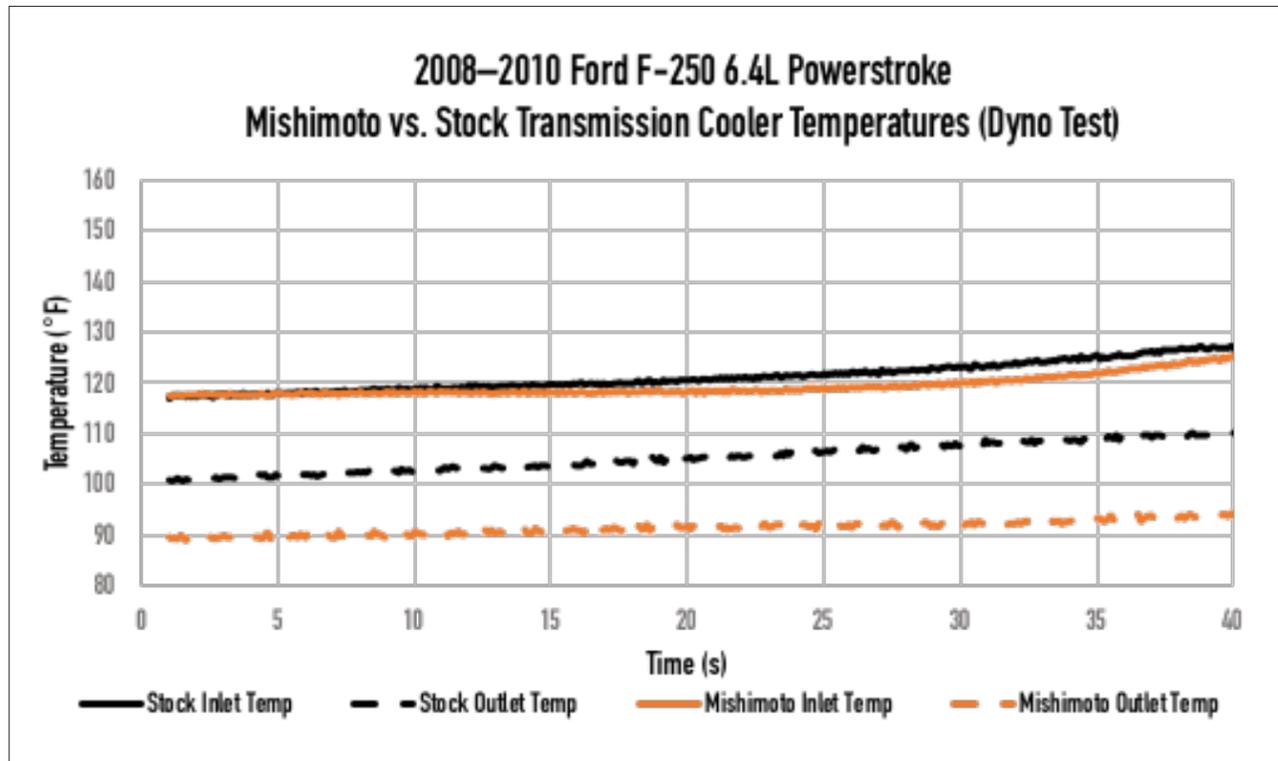


FIGURE 7: Dyno testing results.

INSTALLATION NOTES

Mishimoto transmission cooler for the 2008-2010 Ford F-250 6.4L Powerstroke is a direct-fit kit and can be installed without any permanent modification. This product is also designed to work with both the Mishimoto radiator and intercooler.

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