



# MISHIMOTO

MISHIMOTO ENGINEERING VEHICLE



# ENGINEERING REPORT

**2018 JEEP JL 2.0T INTERCOOLER PIPE | SKU: MMICP-JLH-18**

By Jason Wettig, *Mishimoto Product Engineer*

## REPORT AT A GLANCE

- **Goal:** Design a direct-fit intercooler pipe to keep pressure drop as low as possible and provide stronger design than stock plastic pipe.
- **Results:** The Mishimoto intercooler pipe showed a torque and power increase of 8 lb-ft and 5 hp across the power band. The pipe also flowed 36.5% better on the flow bench
- **Conclusion:** The Mishimoto direct-fit intercooler pipe is an excellent upgrade for JL owners who want a stronger pipe and a performance part.

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DESIGN OBJECTIVES

The design requirements assigned to this project are as follows:

- Design a performance intercooler pipe that reduces pressure drop and increases flow when compared to the stock pipe.
- Must be a direct fit with no cutting or permanent modification necessary.
- Must be made from aluminum and be stronger than the stock plastic pipe.

DESIGN AND FITMENT

We began the R&D process by evaluating the stock intercooler pipe and finding potential room for improvement. The stock intercooler pipe has several potential flow restrictions. The geometry changes severely from round to rectangular and back to round a few times over its length. The lack of a smooth transition from a smaller diameter to a larger one can create a restriction and choke the flow inside the pipe. The routing of the pipe goes through some tight spaces with little room to increase the internal volume. That being said, we were able to smooth out the geometry changes as well as create a pipe that has a gradual size increase

from inlet to outlet. This improved the flow of the pipe by 36.5% over stock. The cast aluminum pipe is much stronger than the stock plastic pipe.

More information on the R&D process for the intake can be found on the Mishimoto engineering blog. <https://engineering.mishimoto.com/2016/12/real-f-150n-beaut-intercooler-rd-part-4-final-aesthetic-form/>

PERFORMANCE TESTING

A completely stock 2019 Jeep JL 2.0T was used for testing. The ambient temperature on the day of testing was approximately 72°F (22.2°C) with 44% humidity. To test the performance increases of the intercooler pipe, a Dynojet™ dynamometer was used to apply a constant and repeatable load on the Jeep, gathering torque and power gains.

To test the performance gains, the Jeep was loaded onto the Dynojet and baseline pulls were conducted for the completely stock car. Beginning with the same coolant temperature and the vehicle in 4th gear at 20 mph, the test was started and monitoring intake temperatures, manifold pressure, exhaust AFR, and engine

coolant temperature took place for each run. Accurate data comparison can be made to ensure conditions for each subsequent run were identical. Both the stock pipe and the Mishimoto pipe were tested on the same day and under the same environmental conditions.

From testing, it was clear that the Mishimoto intercooler pipe outperformed the stock intercooler pipe in terms torque and power. The average results for 4 runs on each configuration can be seen in Figure 3 below.

As is the case with many intercooler pipes, power levels increased slightly. However, this does open the door for better tuning capabilities in the future. Adding more volume and less flow restriction means the whole system has the capabilities to be pushed further with additional upgrades and a tune. Being made from cast aluminum, the pipe is severely stronger than the stock plastic unit. All these factors make this pipe a great addition to the 2.0T Jeep JL.



FIGURE 2: A Dynojet™ dynamometer was used for vehicle testing.

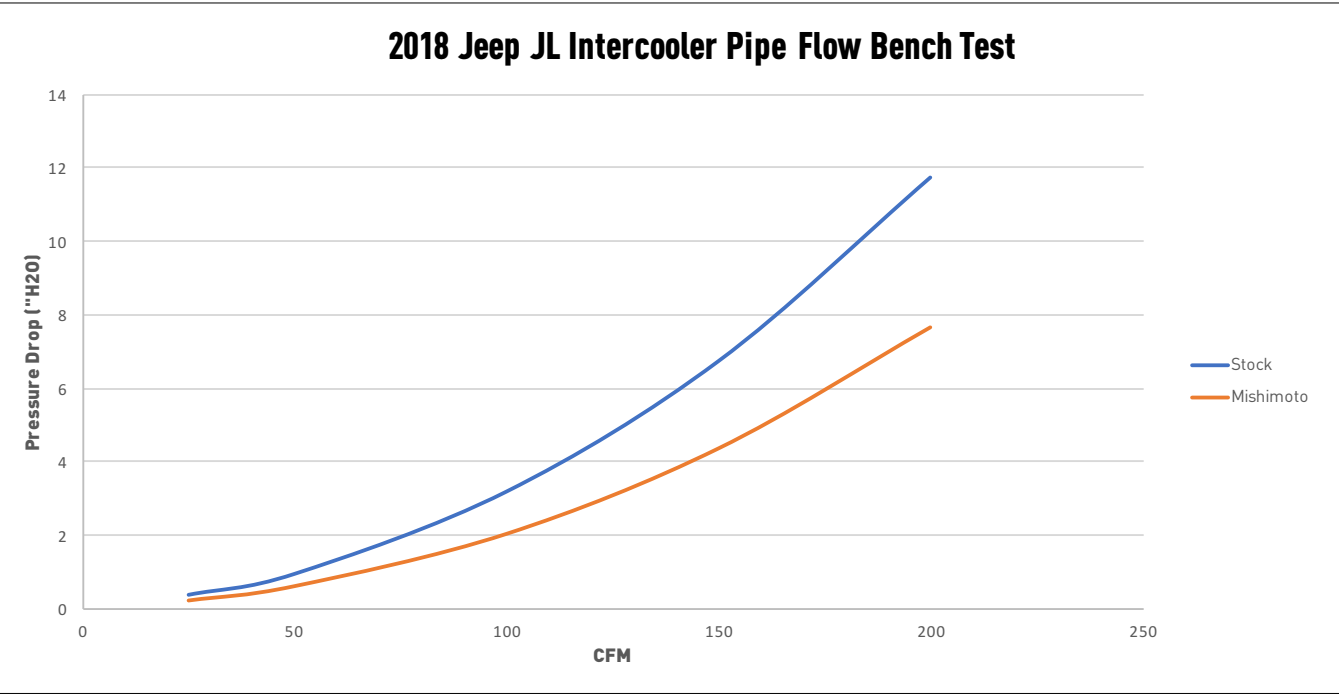


FIGURE 1: The Mishimoto intercooler pipe flows 37% better on the flow bench. This allows for air to quickly get from the turbo to the throttle body, improving driving responsiveness.

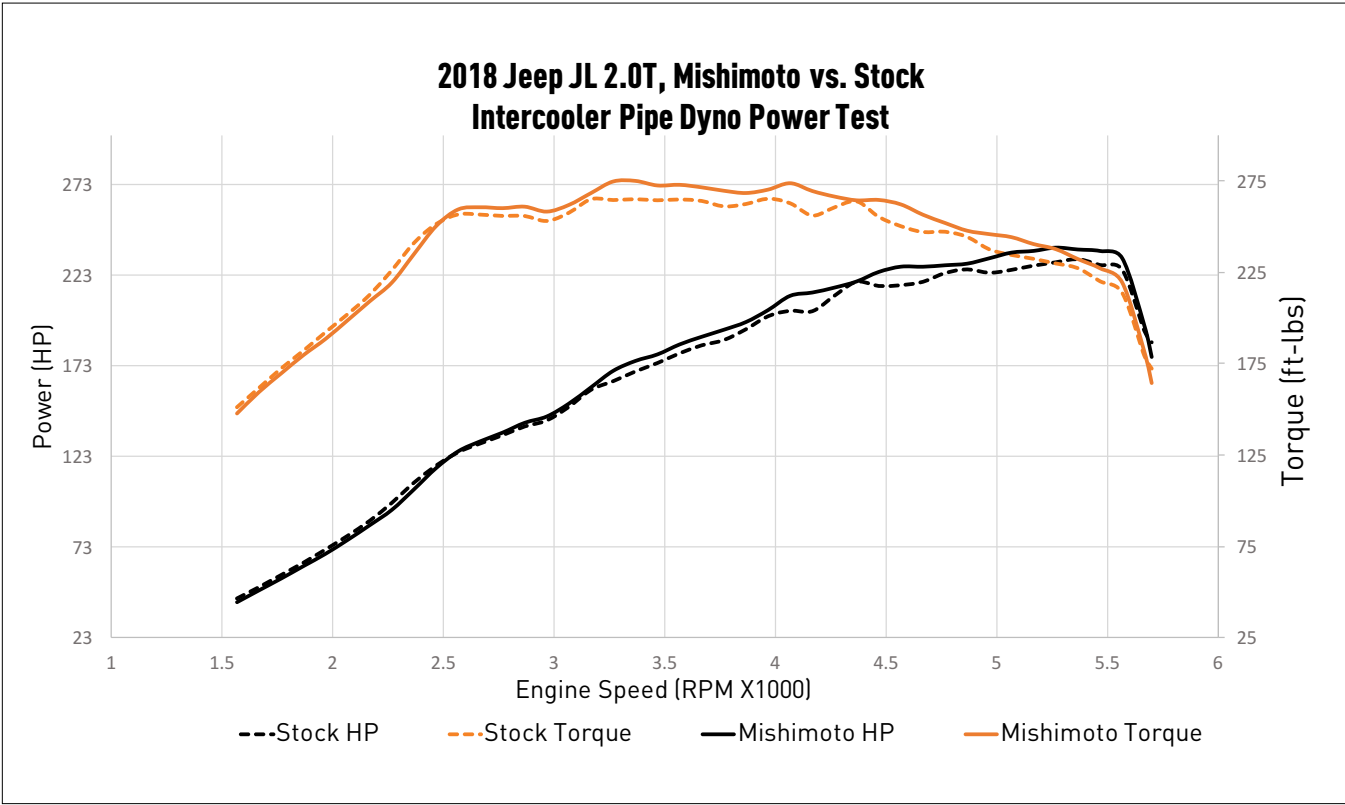


FIGURE 3: This is the Mishimoto Intercooler pipe vs the Stock Intercooler pipe, notice how the Mishimoto gains are constant over the majority of the dyno run.

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