



ENGINEERING REPORT

2021+ BMW M3 G80 Performance Air Intake | SKU: MMAI-G80-21

By Ye Liu, *Mishimoto Product Engineer*

REPORT AT A GLANCE

- **Goal:** Create a direct-fit, high-quality intake for the 2021+ BMW M3 G80 Intake.
- **Results:** The Mishimoto performance intake showed 13% (driver side) and 22.8% (passenger side) less restriction on the flow bench than the stock intake.
- **Conclusion:** The Mishimoto performance intake is an ideal bolt-on upgrade for 2021+ BMW M3 G80 owners looking for performance gains and increased induction sound.

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DESIGN OBJECTIVES

The design requirements assigned to this project are as follows:

- Improve airflow while maintaining a safe air/fuel ratio without custom tuning
- Durable design that will last the lifetime of the vehicle
- Easy bolt-on installation without any permanent modifications
- High-quality intake tone
- Compatible with most strut tower braces

MATERIAL SELECTION

The material used for the rotational-molded airbox and intake tube is XLPE (Cross-Linked Polyethylene) plastic. XLPE material demonstrates high-impact strength, excellent heat resistance, and is UV-stable. The flexible grommets that connect the intake tubes to the two airboxes are made of injection-molded silicone rubber that can withstand engine bay heat up to 350°F. In addition, the silicone intake tube offers excellent fuel and oil resistance compared to the OEM counterparts.

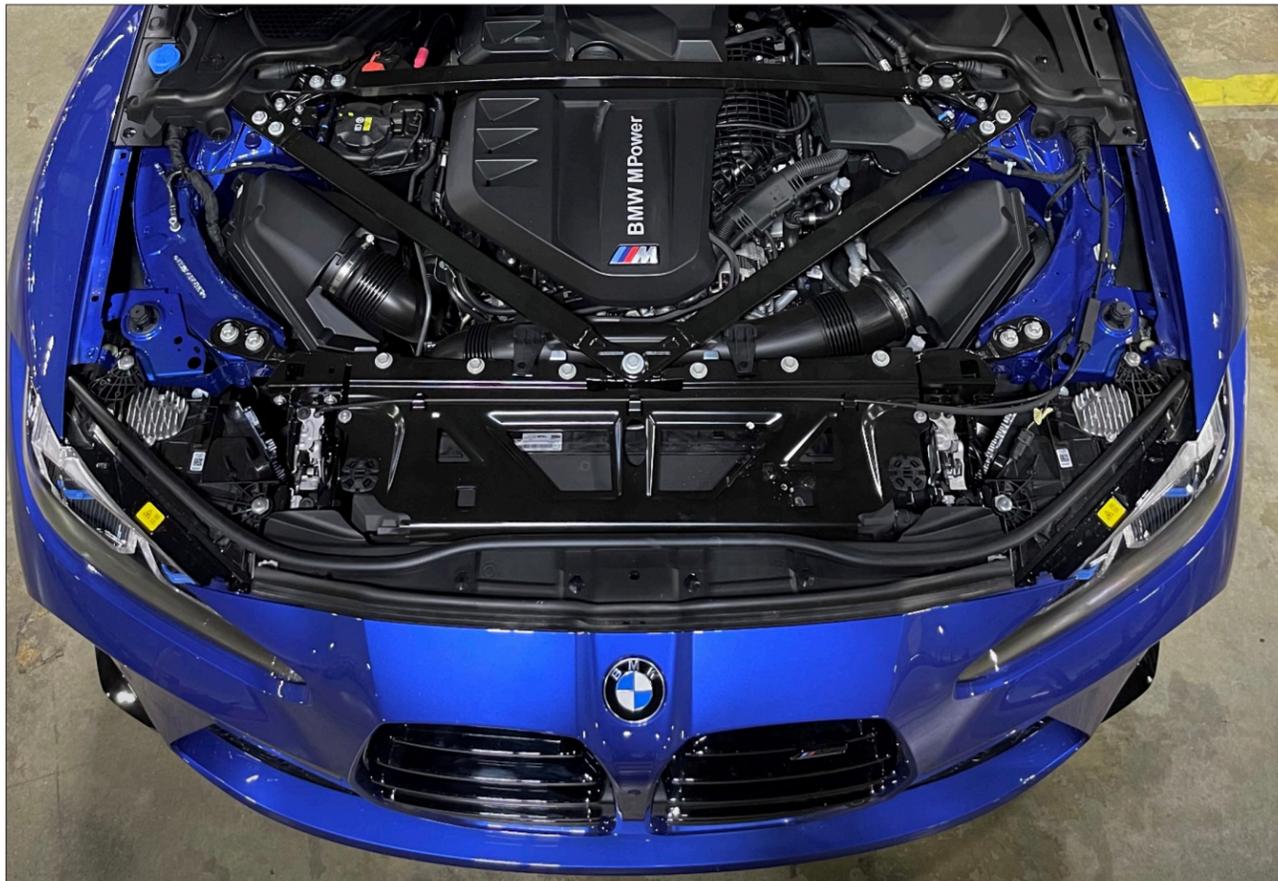


FIGURE 1: The new M3 employs dual intake design for the twin-turbo.

DESIGN AND FITMENT

Our design process started with taking the stock intake apart, thoroughly investigating the system, and searching for possible improvements to be made. Most twin-turbo vehicles are configured to share the same air cleaner body, then split the filtered intake air into two streams feeding to each turbo. This type of design conserves engine bay room and reduces component count but could limit the potential air supply on high-power and high air-consumption vehicles like the M3 and the M4.

The new G80 M3, however, employs two completely independent intake systems for the twin turbos. Preliminary flow bench testing on the stock intakes showed almost identical pressure drops on both sides under the same flow rate setting. This test helped us understand and design our intake with the same goal, to gain flow while balancing the pressure drop on two independent intakes.

Both turbos are located on the passenger side, with two airboxes on either side of the engine bay. The driver-side intake has a much larger inlet diameter than the passenger-side intake, located right next to the turbos. That is done to keep a balanced pressure drop across the two intakes. The Mishimoto performance intake uses two different air filters and tube diameters to achieve the same effect. The passenger-side air filter has an inlet diameter of 3.75", with the driver-side counterpart at 4.5", both increased over 20% in cross-sectional flow area compared to the stock intakes.

With the goal of maximizing airflow in mind, the Mishimoto intake also added a secondary fresh air inlet in addition to the frontal ports that connect to the factory fresh-air ducts. These secondary inlet ports are located on the bottom of each airbox, facing downwards and drawing cold fresh air from the wheel well area.



FIGURE 2: Initial 3D design of the Mishimoto intake.

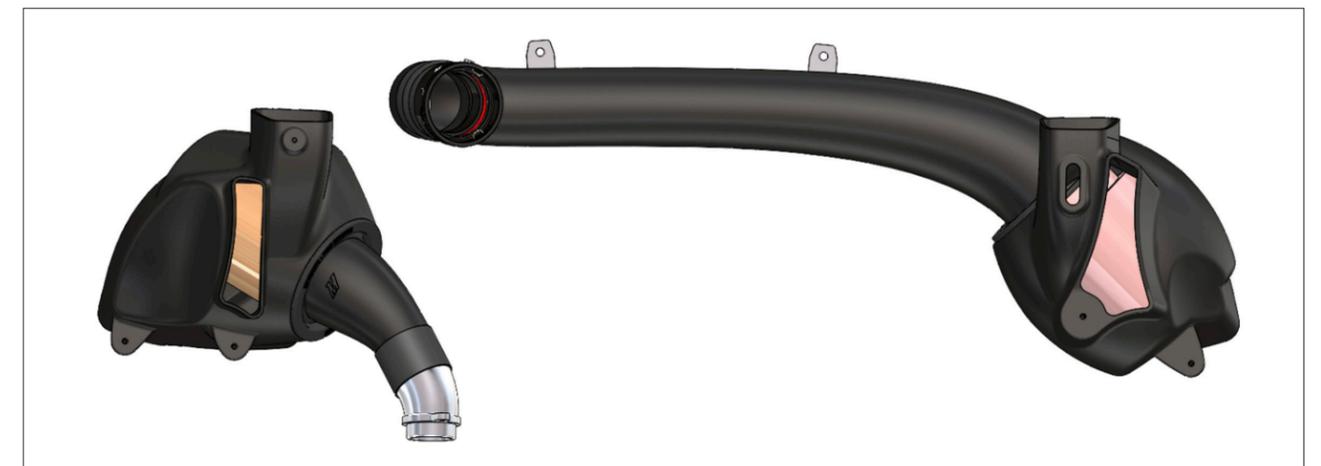


FIGURE 3: Secondary fresh air inlets located on the bottom of the Mishimoto airboxes.

SOUND TESTING

The Mishimoto performance intake provides a louder and deeper intake tone that is pleasing to the ear while also improving the turbo spool sound. Find our intake sound recordings on the Mishimoto Engineering Blog:

<https://www.mishimoto.com/engineering>

PERFORMANCE TESTING

The Mishimoto intake demonstrated a 13% and 22.8% decrease in restriction on driver-side and passenger-side, respectively, compared to the stock intakes:

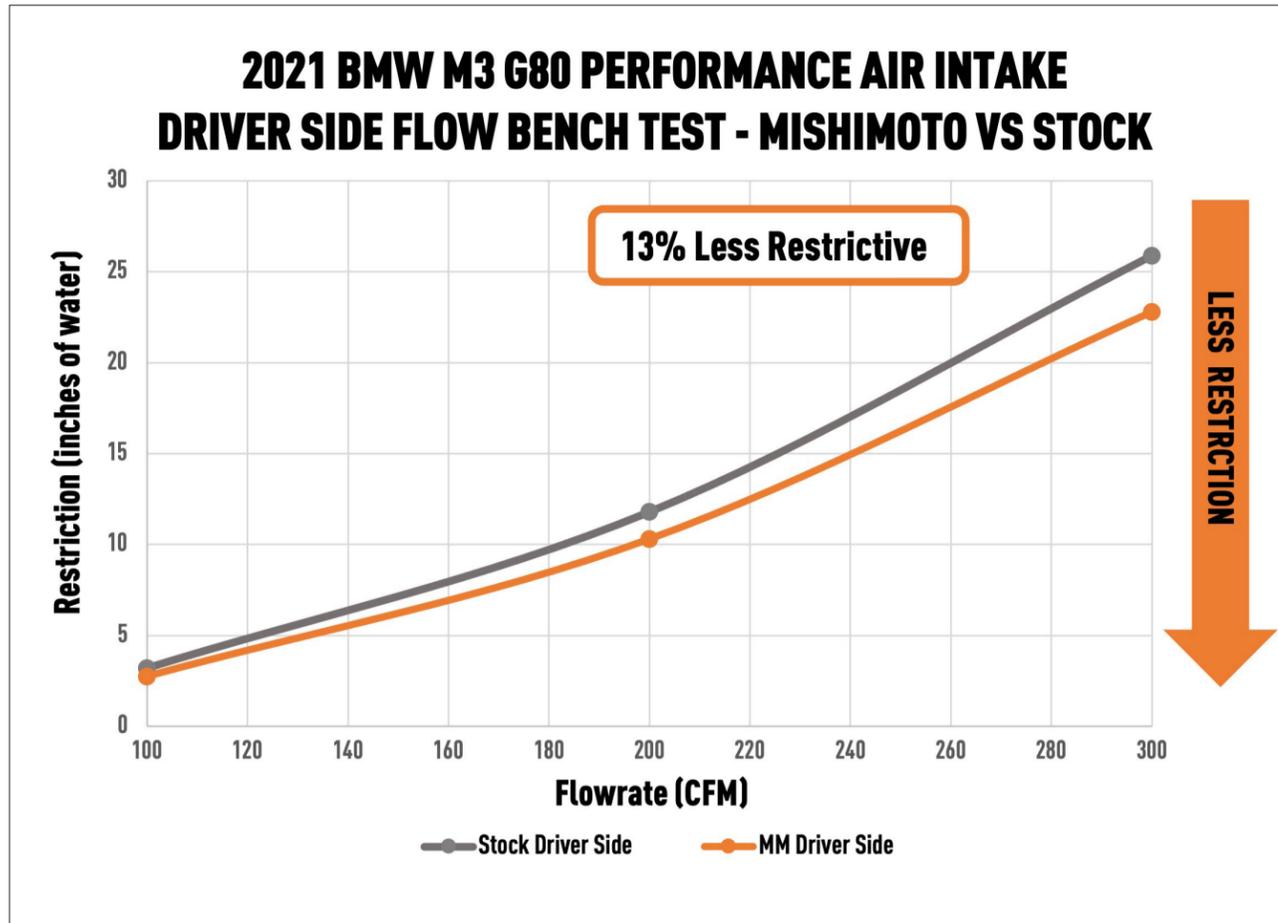


FIGURE 4: Flow bench comparison chart (driver side).

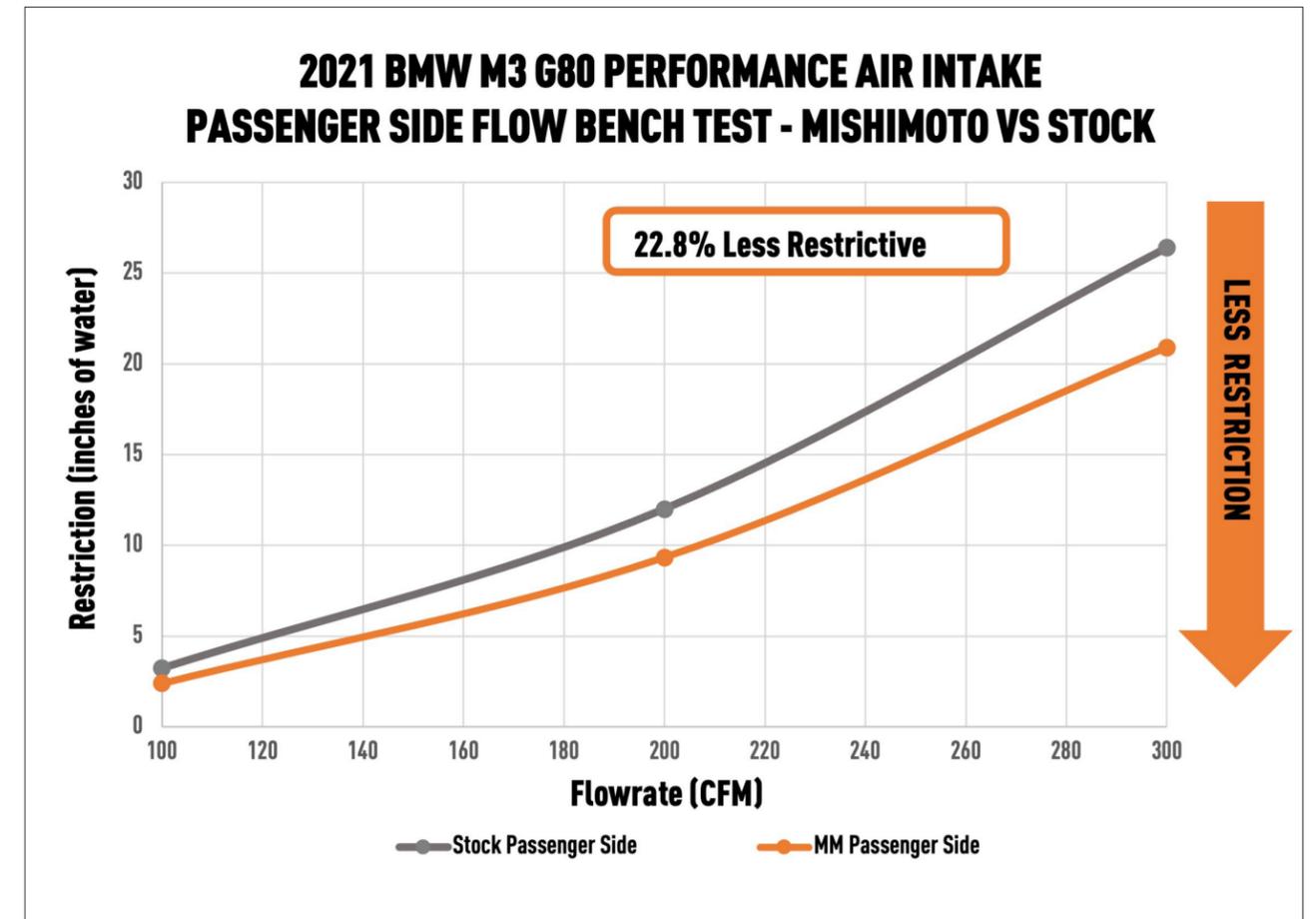


FIGURE 5: Flow bench comparison chart (passenger side)

We also installed the 3D-printed intake prototype on our R&D vehicle and conducted complete performance testing on our in-house DynaPack chassis dynamometer. The Mishimoto intake showed identical horsepower and torque numbers to stock intake due to the vehicle's torque-specific ECU programming. For the new M3, custom tuning is required to fully tap into the airflow potential provided by any aftermarket bolt-on intakes.

INSTALLATION NOTES

The Mishimoto performance air intake for the 2021+ BMW M3 G80 is a direct-fit upgrade and requires no permanent modification or custom tuning.

Testing Done by

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