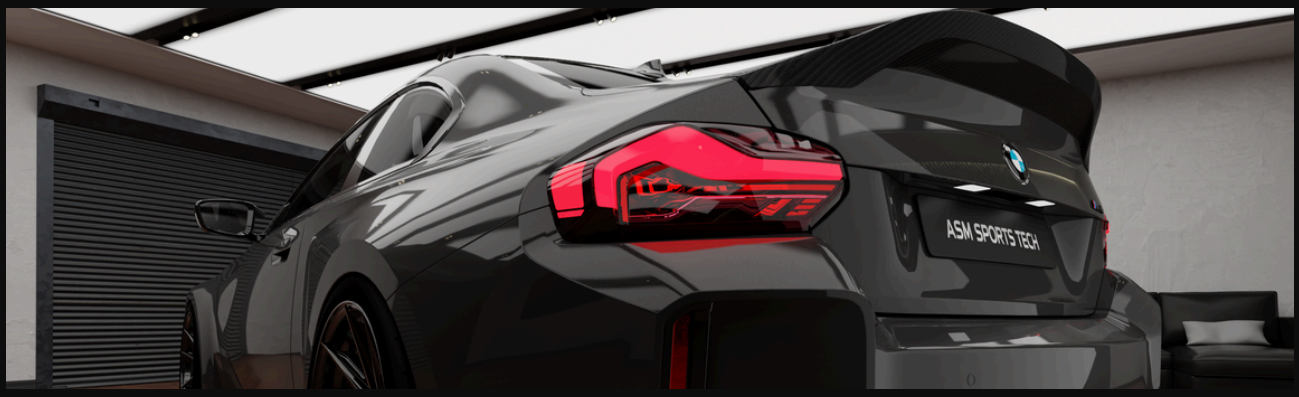
ASM SPORTS TECH




# BMW G87 M2 Dry Carbon Fibre Rear Spoiler

CFD-validated rear spoiler analysis at 140 km/h

> A platform-focused CFD evaluation of the ASM Design rear spoiler for the BMW G87 M2, assessing airflow behaviour, wake stability, pressure distribution, downforce generation and drag impact at 140 km/h.

| | |
|---|---|
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| **Version:** | V2.0 |
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| **Prepared by:** | ASM Sports Tech Engineering Division |

## EXECUTIVE SUMMARY

The ASM Design rear spoiler improves rear aerodynamic stability by managing airflow separation over the boot lid and reducing wake instability behind the vehicle. The result is measurable rear downforce with a controlled drag penalty.

KEY PERFORMANCE METRICS (AT 140 KM/H / 38.89 M/S)

| 356.6N | 36.3kgf | 17.6N | 20.2 : 1 |
|---|---|---|---|
| NET DOWNFORCE | FORCE EQ. | ADDED DRAG | L/D EFFICIENCY |

> The spoiler introduces a limited drag increase, expected from an aerodynamic surface, while producing a substantially stronger downforce benefit.

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## PRODUCT OVERVIEW

### BMW G87 M2 Dry Pre-Preg Carbon Fibre Rear Spoiler

The ASM Design rear spoiler features a high kick ducktail profile engineered exclusively for the BMW G87 M2 platform. Manufactured from dry pre-preg carbon fibre, it adheres strictly to an OEM+ fitment philosophy, integrating seamlessly into the factory boot lid geometry.

As a core component of the ASM Sports Tech aerodynamic programme, this component is not treated as a visual accessory. It is developed as part of a complete vehicle direction, supporting rear-end stability, material refinement, and platform-focused integration.

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## TEST VEHICLE & SIMULATION SETUP

The aerodynamic validation was conducted using Computational Fluid Dynamics (CFD) to measure the precise impact of the ASM rear spoiler.

| PARAMETER | SPECIFICATION |
| --- | --- |
| **Test Vehicle** | BMW G87 M2 Coupé |
| **Configuration A** | Baseline (Rear trunk without spoiler) |
| **Configuration B** | ASM dry carbon rear spoiler installed |
| **Test Speed** | 140 km/h / 38.89 m/s |
| **Analysis Type** | Computational Fluid Dynamics (CFD) |

**Evaluation Areas:**

- Rear wake behaviour
- Pressure distribution
- Velocity field
- Force coefficient convergence
- Downforce and drag force output
- Rear-end aerodynamic stability

> **Note:** CFD results are simulation-based and should be interpreted as engineering validation under the stated virtual test conditions.

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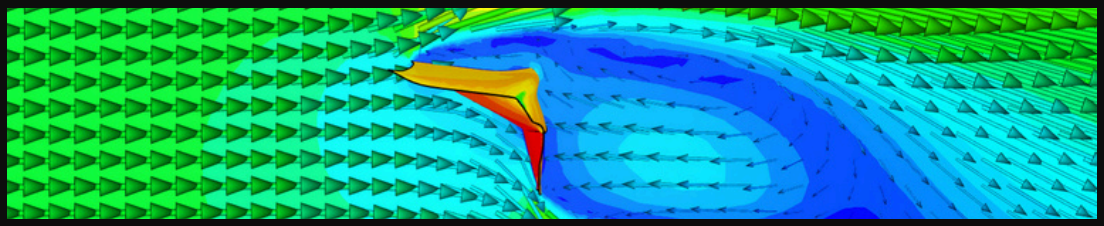
## CFD METHODOLOGY

The aerodynamic evaluation utilizes a direct comparison between the baseline vehicle and the spoiler-equipped configuration to accurately quantify performance deltas.

Rather than evaluating the spoiler in isolation, the analysis focuses on how the rear profile modifies airflow separation and the behaviour of the wake downstream of the vehicle. The simulation tracks the pressure differential across the vehicle's rear architecture and monitors the convergence of force coefficients over time to ensure data stability.

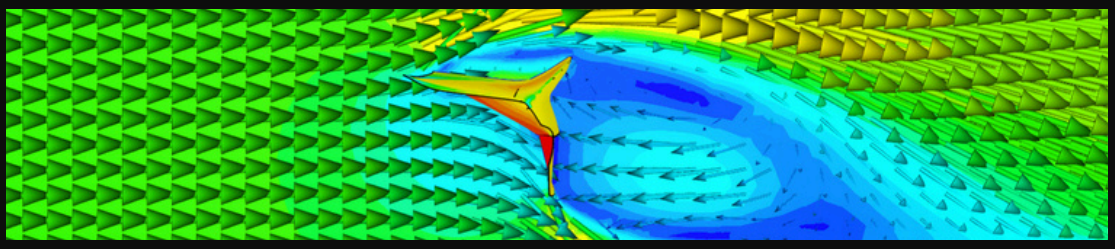
The 140 km/h test speed was selected to evaluate pressure distribution, velocity fields, and resulting aerodynamic forces under realistic fast-road conditions.

## BASELINE CONFIGURATION



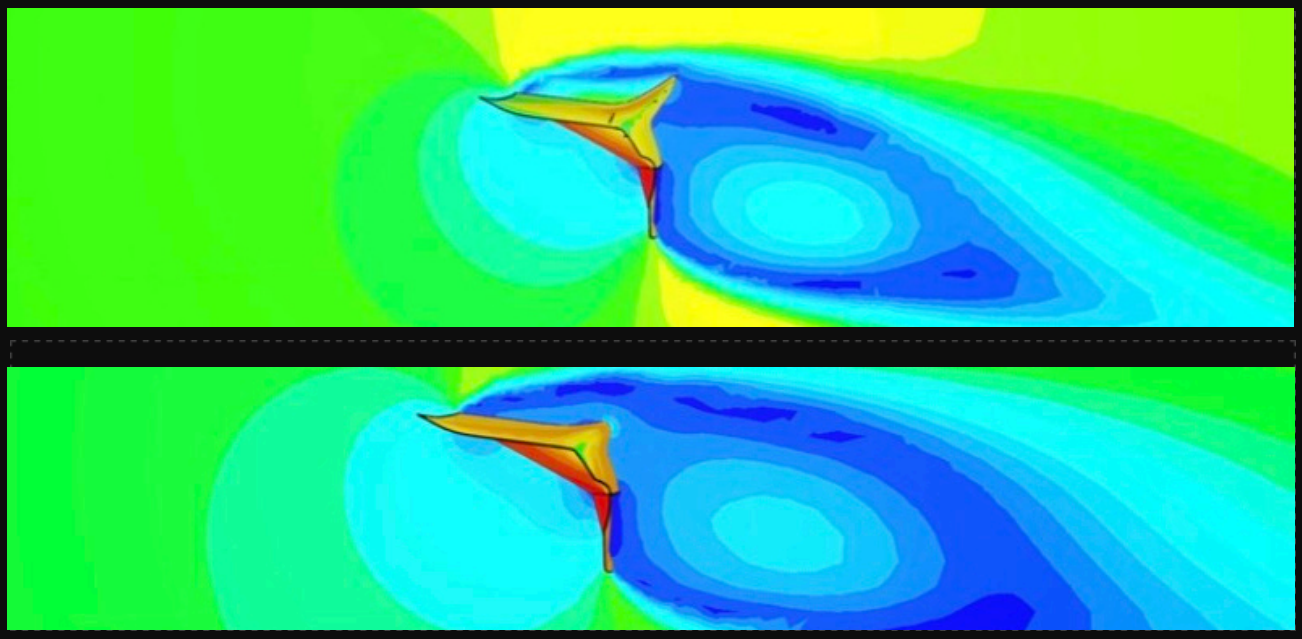
Without an aerodynamic device, airflow separates earlier from the rear trunk area. The wake behind the vehicle is broad and unstable, characterised by a large low-pressure region. Because the air does not remain attached to the surface, it generates turbulence and drag. This baseline setup indicates reduced rear-end aerodynamic control, resulting in lower rear downforce contribution and limited high-speed stability.

## ASM SPOILER CONFIGURATION



With the ASM spoiler installed, airflow is redirected more effectively over the rear deck. The spoiler creates a focused low-pressure region that actively increases vertical downforce. Crucially, the wake becomes significantly narrower and cleaner, displaying improved flow attachment and a measurable reduction in trailing turbulence. This structured flow directly contributes to increased rear downforce and improved high-speed driving confidence.

# PRESSURE & VELOCITY FIELD COMPARISON

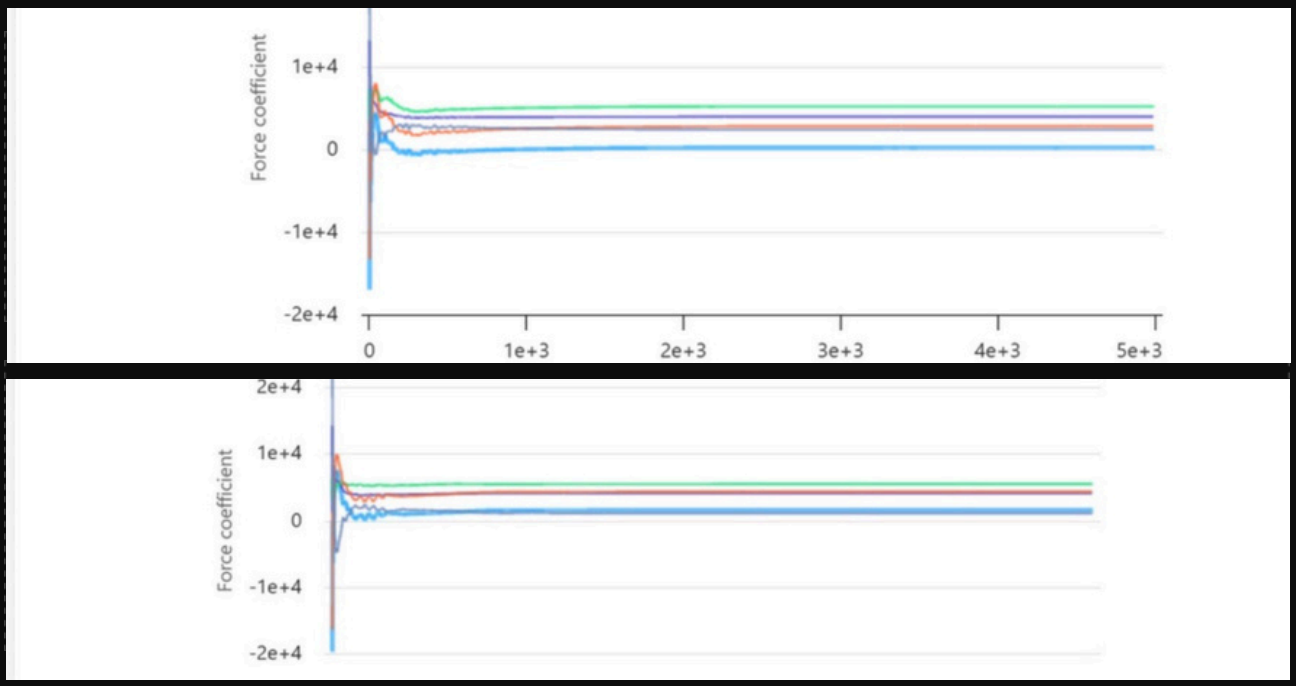


A comparative analysis of the pressure and velocity fields reveals the fundamental mechanism behind the spoiler's performance.

| CONFIGURATION | AERODYNAMIC CHARACTERISTICS |
|---|---|
| **Without Spoiler** | • Broad, unstable wake<br>• Earlier flow separation<br>• Lower rear downforce<br>• Expanding low-pressure zone indicating energy loss |
| **With ASM Spoiler** | • Narrow, controlled wake<br>• Improved flow attachment<br>• Stronger rear downforce<br>• Improved pressure distribution and organised velocity gradient |

By compressing and stabilising the airflow at the rear, the ASM component resolves the unstable wake behaviour of the baseline vehicle, improving the overall aerodynamic balance.

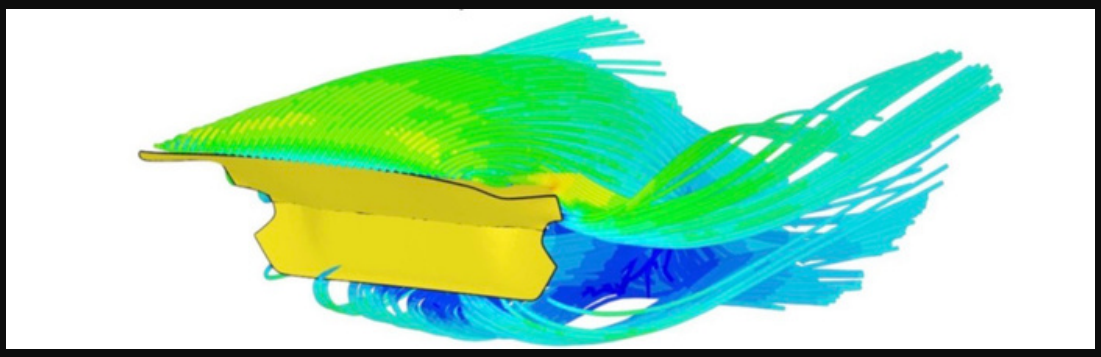
# FORCE COEFFICIENT CONVERGENCE




The force coefficient history charts demonstrate the simulation's stability over time. Stable force coefficient behaviour supports the reliability of the comparative result and confirms that the reported aerodynamic loads are not taken from an unstable transient phase.

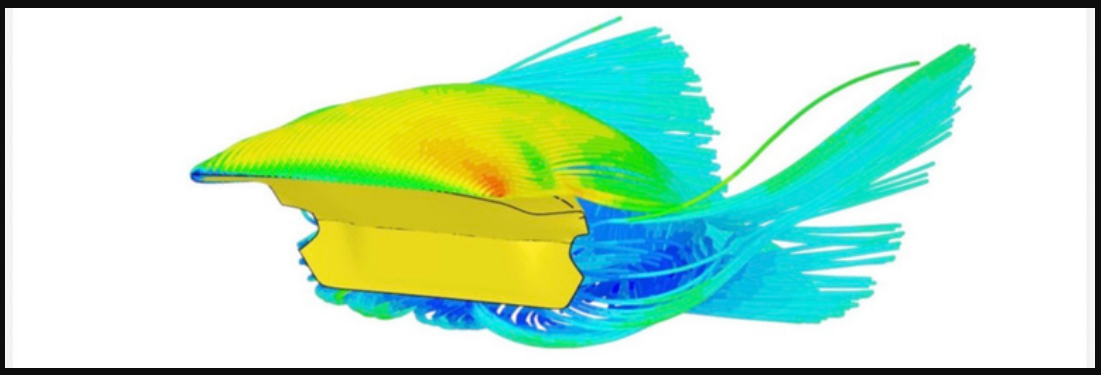
- **Stabilisation:** After initial transient fluctuations, all aerodynamic coefficients stabilise consistently, confirming a fully converged simulation.
- **Lift Coefficient:** With the spoiler installed, the lift coefficient stabilises at a higher value, indicating an improved downforce level.
- **Drag Coefficient:** The drag coefficient shows an expected small increase due to the addition of the aerodynamic surface.
- **Moment & Distribution:** The moment coefficient remains consistent, ensuring predictable rear-end behaviour, while the distribution coefficients indicate improved rear axle grip.

## 3D STREAMLINE VISUALISATION



Without Spoiler:

In the unassisted configuration, streamlines are visibly more chaotic, showing earlier flow separation and less downward deflection. Air passes over the trunk with minimal aerodynamic guidance, generating a wide turbulent wake. This lack of control reduces the overall aerodynamic efficiency and high-speed rear grip.



With ASM Spoiler:

With the dry carbon spoiler equipped, streamlines remain attached to the vehicle longer and are deflected downward, providing clear evidence of added downforce. The component directs the air in a controlled path, stabilising the wake and reducing turbulence behind the vehicle. This directly translates into stronger aerodynamic loading at the rear.

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## FORCE CALCULATION SUMMARY

The precise outputs of the CFD simulation quantify the aerodynamic shift achieved by the ASM Design spoiler.

| FORCE CALCULATION DATA | METRIC |
|---|---|
| **Test Speed** | 140 km/h (38.89 m/s) |
| **Net Downforce (Lift Force)** | 356.6 N |
| **Downforce Equivalent** | 36.3 kgf |
| **Total Drag Force (With Spoiler)** | 385.6 N |
| **Total Drag Equivalent** | 39.3 kgf |
| **Added Drag vs Baseline** | 17.6 N |
| **Added Drag Equivalent** | 1.8 kgf |
| **Lift-to-Drag Efficiency Ratio** | 20.2 : 1 |

The measured result shows a strong rear downforce gain relative to the additional drag introduced by the spoiler. At 140 km/h, the component generates 356.6 N of downforce against a drag penalty of only 17.6 N. This is the highly desired trade-off for a rear aerodynamic component developed for stability and vehicle confidence.

## ENGINEERING INTERPRETATION

The data extracted from the CFD analysis translates into distinct, functional benefits for the driver.

- **Planted Rear End:** The generation of 356.6 N of rear downforce directly increases tyre loading, leading to a more planted rear end during high-speed driving.
- **Improved Confidence:** By resolving the broad, unstable wake of the baseline vehicle, the driver benefits from improved rear confidence and predictability.
- **Aerodynamic Balance:** The consistent moment coefficient confirms that the spoiler enhances rear-end grip without upsetting the inherent chassis dynamics.

- **Controlled Wake:** Structuring the velocity gradient and reducing trailing turbulence ensures the vehicle slices through the air with greater efficiency.
- **Functional Purpose:** The component acts as a strictly functional aerodynamic upgrade, delivering measurable improvements in traction and balance.

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## ASM SPORTS TECH DEVELOPMENT PHILOSOPHY

ASM Sports Tech develops aerodynamic components around platform-specific integration, completely rejecting universal styling.

The G87 M2 dry pre-preg carbon fibre rear spoiler supports a holistic, complete-build philosophy. It is engineered to perform strongest when considered alongside front aerodynamic management, side profile flow control, underbody diffuser balance, and our forged wheel specification.

By maintaining an OEM+ fitment standard and focusing strictly on material refinement, ASM Sports Tech ensures an engineering-led product presentation. We deliver real performance without visual excess, ensuring that every contour serves a distinct aerodynamic purpose.

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## LIMITATIONS & ASSUMPTIONS

- CFD simulation results are highly dependent on the virtual setup, mesh resolution, boundary conditions, and the overall scope of the digital model.
- Real-world aerodynamic performance may vary depending on vehicle ride height, wheel offset, tyre configuration, road conditions, and installation tolerances.
- This report exclusively evaluates the aerodynamic behaviour under the stated test speed of 140 km/h (38.89 m/s) and specific virtual configurations.
- These results are not a replacement for full-scale wind tunnel certification unless further physical testing is performed.
- The findings presented in this document are intended strictly to support engineering validation, product understanding, and performance baseline tracking.

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## CONCLUSION

The ASM Design dry pre-preg carbon fibre rear spoiler for the BMW G87 M2 demonstrates measurable aerodynamic value under CFD evaluation.

At 140 km/h, the spoiler produced 356.6 N of downforce, equivalent to approximately 36.3 kgf, with only 17.6 N of added drag versus the baseline configuration. The result confirms a highly favourable 20.2:1 aerodynamic trade-off, improving rear wake behaviour, pressure distribution, and high-speed rear-end stability while strictly preserving ASM Sports Tech's OEM+ design language.

**CFD-validated. Platform-focused. Engineered for refined performance.**

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tstech.com/configurator/ g87-m2/