AERO OPTIM × wind tunnel SLIM BALANCE

Evaluation of Aero Parts (Sample Data)

Overview

Using a wind tunnel testing system composed of 12 Aero Optim units (Japan Wind Tunnel Manufacturing) and the SLIM BALANCE (Yamato Scale), we have evaluated various aero parts given to us by TOP SECRET (thank you Smokey!) Parts are designed for use on the Nissan GT-R R35.

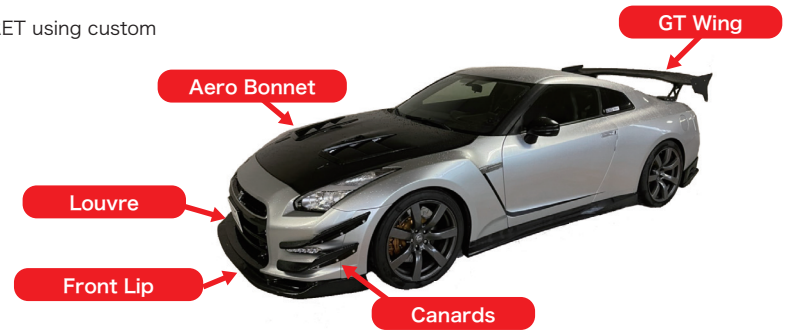
Test Conditions

Test Vehicle	Nissan GT-R R35 (2011 Model)
Wind Tunnel	Aero Optim 21J × 12 Units (Outlet: approx. 2.8m×2.1m)
Balance	SLIM BALANCE (Prototype)
Test Conditions	Open Wind Tunnel (Blockage rate: approx. 40%) Boundary layer thickness: approx. 20mm (with splitter)
Scale	1/1 (Actual vehicle)
Wind Speed	Approx. 54 km/h (Approx. 15 m/s)
Measurement	Sampling rate: 20Hz・300 sec × 3 sets, temperature-corrected
Method	Lift, drag and side forces are extracted from each wheel

Test Vehicle

An early model Nissan GT-R R35 tuned by TOP SECRET using custom aero parts is used for this test.

Parts included in the base model:
- Front Wide Fender Type 1
- Full Bumper Kit Ver2
- Rear Under Bumper and Fin
- Side Diffuser Ver2
- Carbon LED Mirrors



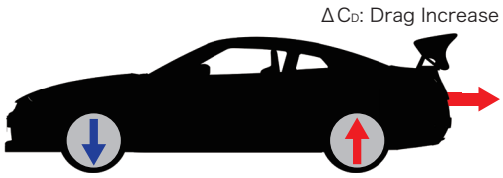
Reading Data

Understanding ΔC_D and ΔC_L

C_D and C_L are values crucial in evaluating the aerodynamics of a vehicle.

- C_D : Coefficient of Drag
- C_L : Coefficient of Lift

Delta
ΔC_D = Change of C_D



ΔC_L (Front and rear): A negative value equals greater downforce.

While it is possible to show drag and downforces in units of force such as Newtons and kgf, it would be difficult to compare these values across vehicles of different sizes or scales, tested under wind speeds and environments that are not the same. Therefore, coefficients such as C_D and C_L are used as a standard way to evaluate the car's shape composed of the main body and the parts attached to it. These coefficients are calculated when the dynamic pressure and frontal area are known beforehand. If the values of these coefficients are small, their corresponding forces will also be small.

This data sheet displays drag increase and lift increase (=downforce decrease) as ΔC_D and ΔC_L respectively.

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Front Lip: Short vs. Long

Product: TOP SECRET Type 1 and Type 2 Lip

Increased Front Downforce

ΔCL (Front): -0.031 ΔCL (Rear): +0.025

Front Canards: None/1 Row/2 Rows

Product: TOP SECRET Front Bumper Canard/Upper Canard

Increased Front Downforce

ΔCL (Front): -0.017 (1 Row) ΔCL (Rear): +0.007 (1 Row)
ΔCL (Front): -0.029 (2 Rows) ΔCL (Rear): +0.010 (2 Rows)

Aero Bonnet (Open Vents)

Product: TOP SECRET Aero Bonnet/Bonnet Fin

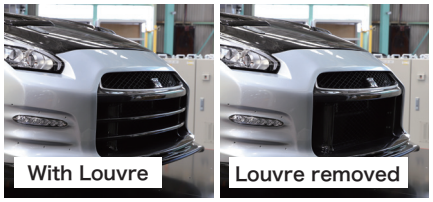
Increased Front Downforce

Reduced Drag

ΔCL (Front): -0.014 ΔCL (Rear): +0.002

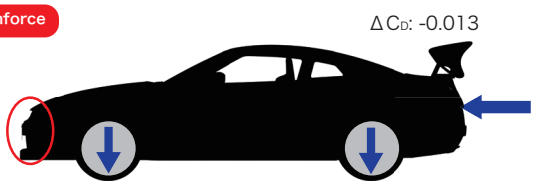
Louvre Removal/Open Vent Bonnet

Product: TOP SECRET Full Bumper Kit Ver2



Increased Front Downforce

Reduced Drag



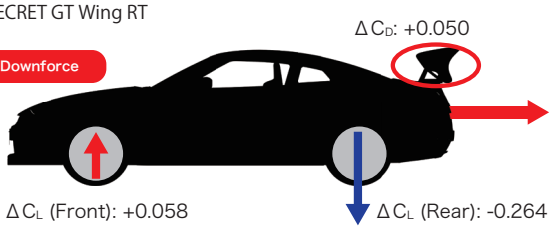
ΔCL (Front): -0.020 ΔCL (Rear): -0.010

GT Wing

Product: TOP SECRET GT Wing RT

Note: the silhouette shows drag and downforce changes when the GT Wing is added. The graph shows the effect of wing angle on drag and downforce.

Greatly Increased Rear Downforce



ΔCL (Front): +0.058 ΔCL (Rear): -0.264