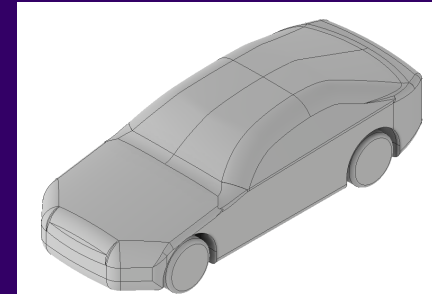
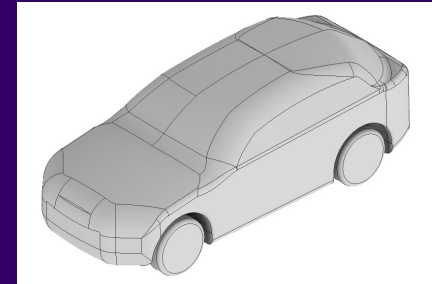


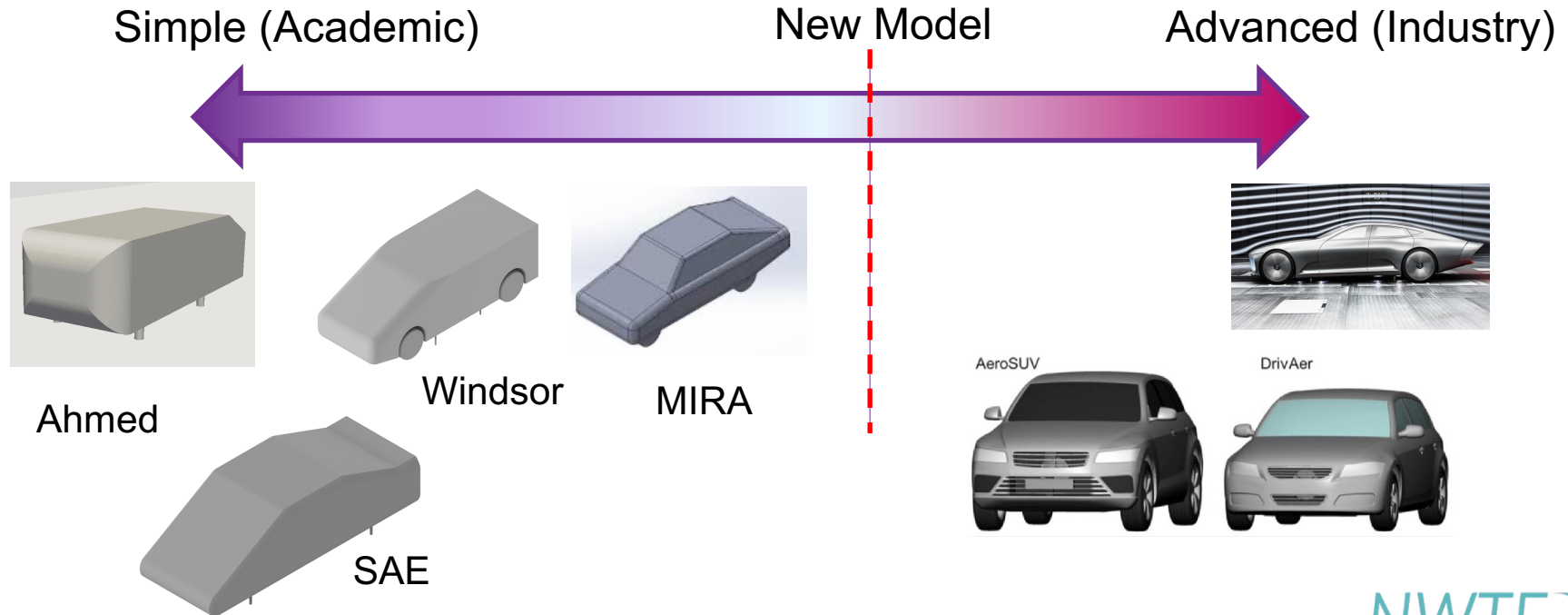
NATIONAL WIND TUNNEL FACILITY NEW AUTOMOTIVE REFERENCE MODELS



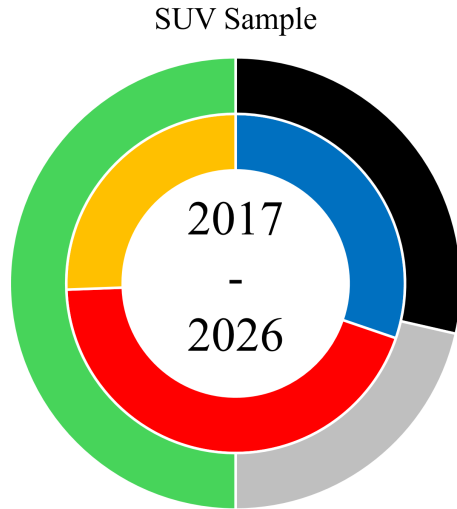
Gary Page
Aeronautical & Automotive Engineering
Loughborough University
G.J.Page@lboro.ac.uk

- Funding from UK Research Council to test standard models across a number of UK academic tunnels
 - Assess repeatability of results
 - Generate new data
 - Survey inlet conditions and geometry
 - Disseminate through NWTF website
- Runs through to December 2028

Existing Automotive Models

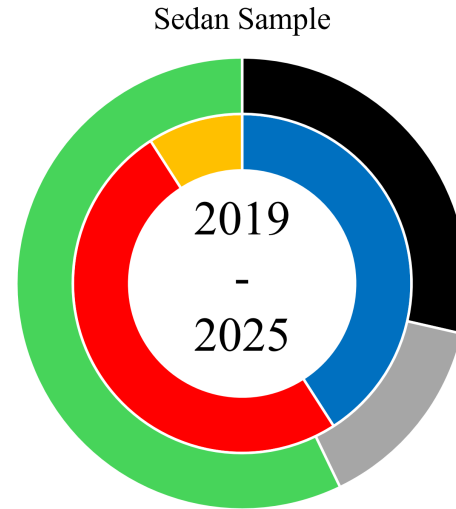
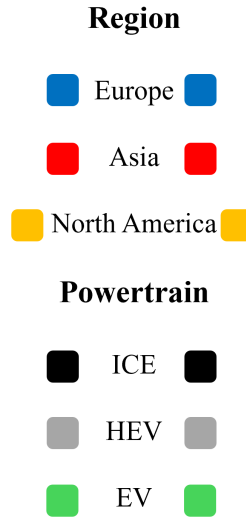


Passenger Vehicle Geometric Data



(a)

43 SUVs

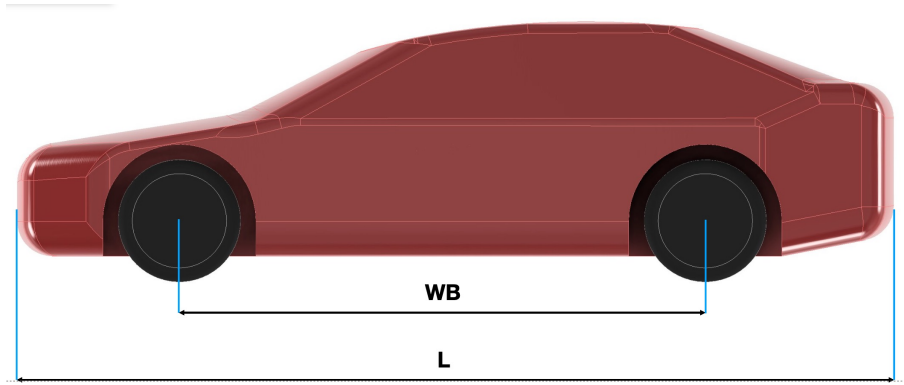


(b)

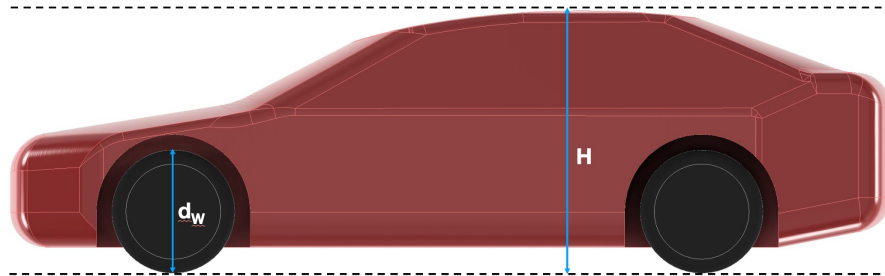
22 Sedans

31 Geometric Parameters

Example Parameters (out of 31)



wheelbase / length



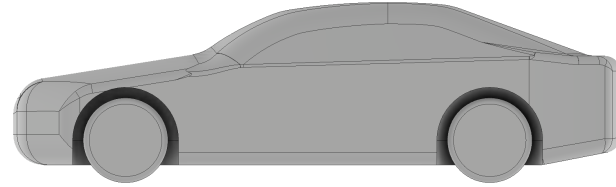
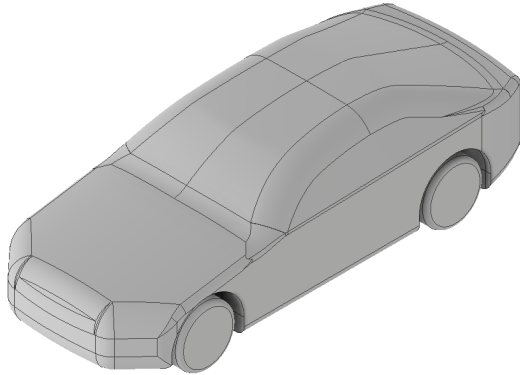
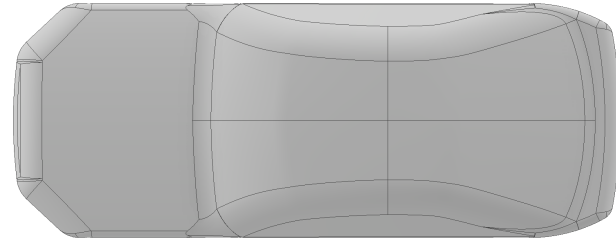
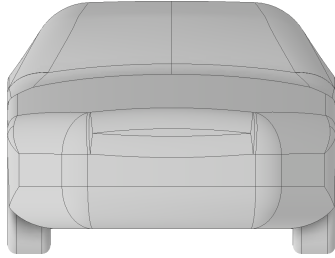
height / wheel diameter

Current Parameter Choices

Model	L [mm]	L/W	AR	AR _{FRE} / (L/W)	d _W / H	WB / L	W _{FW} / W	W _{RW} / W	GC / H	BH / H	BL / L	θ _B [°]	θ _L [°]	θ _F [°]	AR _{WSPE} / (L/H)
Sedan	5000	2.59	1.30	0.49	0.47	0.60	0.13	0.13	0.099	0.38	0.28	9	29	29	0.60
SUV	5000	2.48	1.14	0.48	0.44	0.60	0.13	0.13	0.116	0.42	0.27	8	30	31	0.80

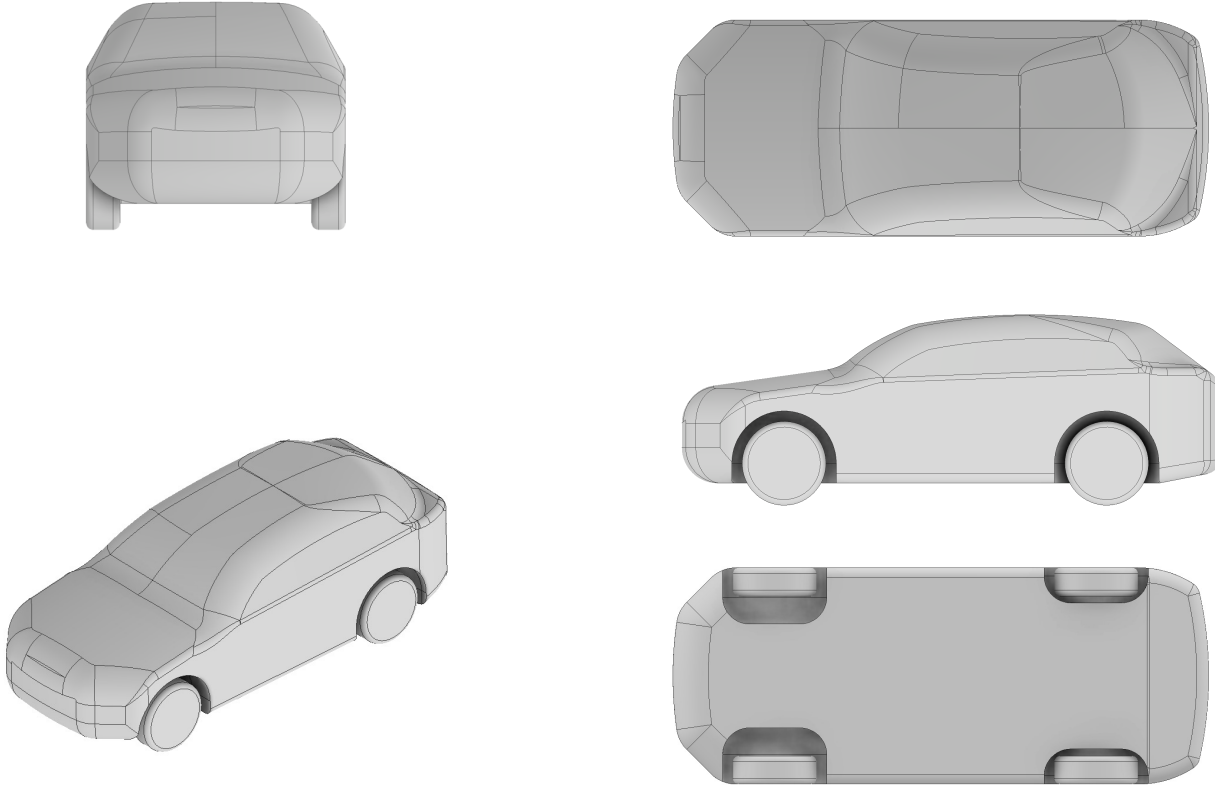
Model	θ _R [°]	RH / H	RL / L	AR _{BCE} / AR	AR _{WTPE} / (L/W)	AR _{RE} / AR	AR _{RSTPE} / (L/W)	FOH / L	ROH / L	θ _T [°]	θ _D [°]	θ _G [°]	L _{FB} / L	L _{RB} / L	θ _{FB} [°]	θ _{RB} [°]
Sedan	20	0.52	0.05	2.90	0.84	3.14	0.62	0.17	0.20	28	11	2	0.09	0.15	43	72
SUV	37	0.48	0.00	3.12	0.85	3.77	0.52	0.18	0.20	25	11	2	0.09	0.13	45	68

Sedan



$C_d \approx 0.30$

SUV



$$C_d \approx 0.47$$

- Created in Engineering CAD
 - Not specialized surfacing tool
 - But does include curvature on roof etc.
- Will disseminate CAD and a document describing the process
- No variable parameterization – but easily achievable
- Considering impact of radii and smaller scale testing
 - E.g. larger A-pillar radius for 1/5 scale testing
- Proof of concept testing at Loughborough end 2026
- Visit four tunnels in 2027

Filter by Organisation

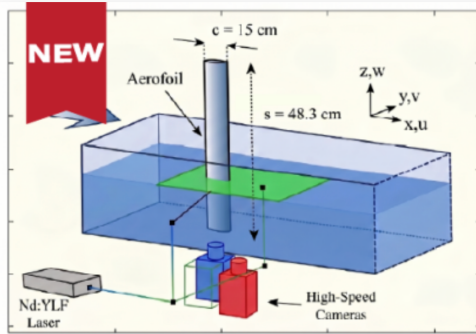
Filter by Keyword

Search datasets:



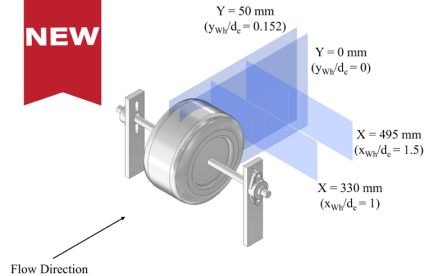
List ☒ Grid

<https://www.nwtf.ac.uk/experimental-database/>



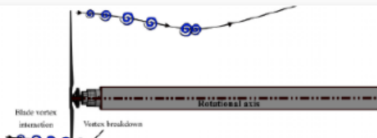
Low-Frequency Dipole Noise Mechanisms in Stalled Aerofoil

Facility: University of Southampton
Keyword: Aeroacoustic
Date created / revision: 20 August 2026



Wake of an Isolated Rotating Wheel

Facility: Loughborough University
Keyword: Automotive
Date created / revision: 31 March 2026



Noise Patterns of Overlapping Propellers in Forward Flight

Example Dataset

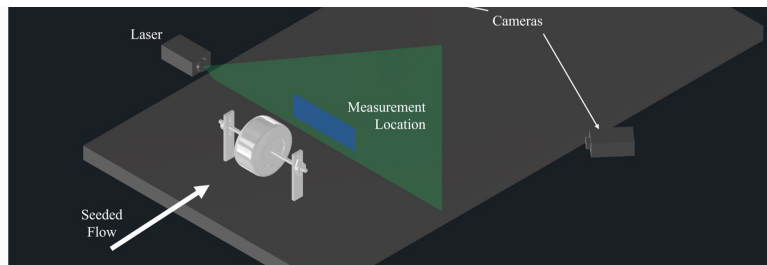
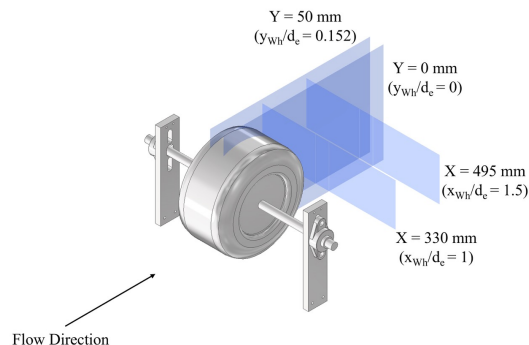


Figure 2: An example schematic of the PIV setup used to measure planar velocity.

Two measurement planes were taken downstream of the wheel at $X = 330$ mm and 495 mm (corresponding to $x/d_w = 1$ and 1.5 , respectively) where $X = 0$ corresponds to the centre of the axis of rotation. In these planes, the velocities refer to crosswise flows (V_y), vertical flows (V_z), and velocity through the plane (V_x). Additional planes were taken across the wheel tread at $Y = 0$ (centreline) and $Y = 50$ mm where streamwise (V_x) and vertical (V_z) velocities were measured. A schematic of the planar slices relative to the wheel are shown in Figure 3.



Datasets

The datasets below contain either four or five columns of data. The first two relate to the position on the plane, with nomenclature consistent with the global co-ordinate system in Figure 1, measured in metres (m). The following two/three columns present the velocity measured at the location on the plane in the directions denoted by the subscript, again relating to the co-ordinate system in Figure 1 measured in metres per second (m/s). The complete dataset can be downloaded [here](#).

Plane	Average Data	Root Mean Square (RMS) Data
X = 330 mm	X330mm_Mean.csv	
X = 495 mm	X495mm_Mean.csv	
Y = 0 mm	Y0mm_Mean.csv	Y0mm_RMS.csv
Y = 50 mm	Y50mm_Mean.csv	Y50mm_RMS.csv

Sample Plots

An example of the dataset as analysed to produce an interpolated plane of data is shown in Figures 4 and 5. Here, a linear interpolation of the data between sample points was conducted to give a complete picture of the velocity on the plane, rather than a series of points. A [python](#) sample code for both planes is provided based on the AeroX class and data standard, which is available for download [here](#). Similarly, a [MATLAB](#) script is available which performs a similar function

