The design of a 1,000mph car: BLOODHOUND SSC, an engineering adventure

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Subsonic to Supersonic

**BABS**
(at Pendine)
171 MPH

**BLUEBIRD**
(at Pendine)
174 MPH

**THRUST SSC**
763 mph

**THRUST2**
633 mph

**BLOODHOUND SSC**
1000 mph

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M=0.0  M=0.5  M=1.0  M=1.5

SUBSONIC  TRANSONIC  SUPERSONIC  HYPERSONIC

College of Engineering  www.swansea.ac.uk/engineering
Subsonic to Supersonic
Analysing Aerodynamic Design: Wind Tunnel Testing
Analysing Aerodynamic Design: Computer Simulation

Computer simulation:
(a) mathematical model
(b) approximation
(c) computer solution
(d) analysis of the results

Olek Zienkiewicz
1921—2009

aerodynamic modelling \rightarrow \text{computational fluid dynamics (CFD)}
CFD Process: overview

Geometry Preparation → Mesh Density Specification → CFD Solver → Mesh Quality Analysis and Mesh Cosmetics → Post-Processing → Analysis

BLOODHOUND CFD analysis as a design tool
Design challenge: reducing supersonic lift

The lift force at Mach = 1.1 in ‘config 9’ design was 142.6 kN (lift force coefficient L/q is 1.7 m^2)

The weight of the vehicle without fuel is 63 kN

Rear lift force coefficient L/q rear is too large
ongoing research: automating flow visualisation
CAR BUILD: Autumn 2014 – Autumn 2015
THE RECORD ATTEMPT

Hakskeen Pan in the Northern Cape of South Africa

playa surface

12 miles of track

very hard and very flat

good access & ideal weather