New state-of-the-art wind tunnel gives Volvo buyers reduced CO2-emissions and lower fuel consumption

One of the world's most advanced wind tunnels is Volvo Cars' new tool in the quest for lower fuel consumption and reduced carbon dioxide emissions. Volvo Car Corporation is the first car manufacturer to own a wind tunnel that fully simulates the airflow around and underneath the car's body, combined with wheel rotation on a flat road surface.

"Our 20 Million Euro investment is already paying quick dividends. We have succeeded in reducing air resistance in the new Volvo C30 DRIVe by more than 10 percent. This in turn leads to around 3 grams lower CO2 emissions per kilometre," explains Tim Walker, aerodynamics expert at Volvo Cars.

Translated into fuel consumption, this is a reduction by just over 0.1 l/100 kilometres according to the official EU Combined Cycle. In a real driving situation, however, where speed and therefore air resistance are often higher, the actual saving in fuel can be more than twice as high, that is to say in the region of 0.3 l/100 km. This means that a driver who covers 15,000 km per year will save about 45 litres of fuel - almost a full tank in a Volvo C30. It's an economy benefit that is also appreciated by the environment.

"With a firm focus on environmental properties for the foreseeable future, our recently upgraded wind tunnel is going to be a particularly valuable tool. Aerodynamic improvements to the body and underside of the car will help us cut CO2-emissions across the whole model range," says Magnus Jonsson, Senior Vice President, Research & Development at Volvo Cars.

Cutting-edge facility
 Volvo Cars' wind tunnel was a cutting-edge facility when it was built in 1986 - and 20 years later, after being completely refurbished, it is once again setting the benchmark in the car industry for its precise measurements of aerodynamics.

Since the underside and wheels account for more than 50 percent of a car's total air drag, a traditional wind tunnel where the vehicle stands still in a flow of air can provide an incomplete picture of the vehicle's overall aerodynamic properties.

"It's a bit like measuring the aerodynamic properties of a car that is standing still in a parking lot during a powerful storm. Our new wind tunnel, on the other hand, has been designed to exactly replicate the flow of air around and underneath the car when driving on a real road at speeds of up to 250km/h. Our wind tunnel uses sophisticated techniques at the forefront of aerodynamics technology" reveals Tim Walker.

Rolling road and spinning wheels
The biggest improvements compared with the previous wind tunnel can be summarised in three points:

- Four flat steel belts that spin all the wheels.
- One central, 5.3m long and 1m wide steel belt that simulates the road under the moving car.
- An 8.15-metre fan with carbon-fibre blades that generates wind velocities corresponding to road speeds up to 250 km/h.

The test car is connected to a highly sensitive balance using four small struts. These struts hold the car in position while the weight of the car is transferred from the tyres to the balance via the flat steel belts.

"This makes it possible to load up the wheels and tyres exactly as they are when driving on the open road. The balance is so sensitive it reacts even if you toss the world's smallest mobile phone onto the front seat," says Tim
Volvo Cars' aerodynamicists have just completed a major update to their wind tunnel. This makes it possible to load up the wheels and tyres exactly as they are when driving on the open road. The test car is connected to a highly sensitive balance using four small struts. These struts hold the car in position underneath the car when driving on a real road at speeds of up to 250km/h. Our wind tunnel uses sophisticated turntables (diameter): 6.6 m
Test yaw angle: +/- 30 degrees
Max load on balance: 3,000 kg
Max load per wheel: 1,000 kg
Balance sensitivity: +/- 30 gram

Facts about the new wind tunnel:

- Fan power: 5 MW (6 800 hp)
- Fan size (diameter): 8.15 m
- Fan type: Carbon fibre, 9 blades
- Wind speed: 250 km/h
- Wind Speed Accuracy: +/-0.05 m/s
- Moving ground: 2-72.22 m/s (260 km/h)
- Test Section Size Length: 15.8 m, width 6.6 m, height 4.1 m
- Turntable (diameter): 6.6 m
- Test yaw angle: +/- 30 degrees
- Max load on balance: 3,000 kg
- Max load per wheel: 1,000 kg
- Balance sensitivity: +/- 30 gram

Media Contacts

Per-Åke Fröberg
Director Volvo Cars Heritage
Volvo Car Group

Phone: +46 31 3257654
per-ake.froberg@volvocars.com

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Volvo Cars
PVH50, 50200
SE-405 31 Göteborg

Registered Office
Göteborg, Sweden
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