



APROSYS FINAL EVENT

Integrated Project on Advanced Protection Systems



Intelligent Safety Systems

Quantification of energy savings due to aerodynamically improved cabin design

FUNCTIONALITY

Passive vulnerable road user protection systems for the truck front like the "Soft Cone" developed in APROSYS will result in an increase in cabin length.



By intelligent design of future cabins the increased length can be used to achieve additional benefits, like improved aerodynamics. Wind tunnel experiments have shown that for the truck models the drag coefficient is improved by 10-20%.

TECHNICAL DESCRIPTION

A 1:10 model of a truck was designed. The truck is modelled of wood and foam. Wind tunnel tests are performed with velocities up to 40m/s.

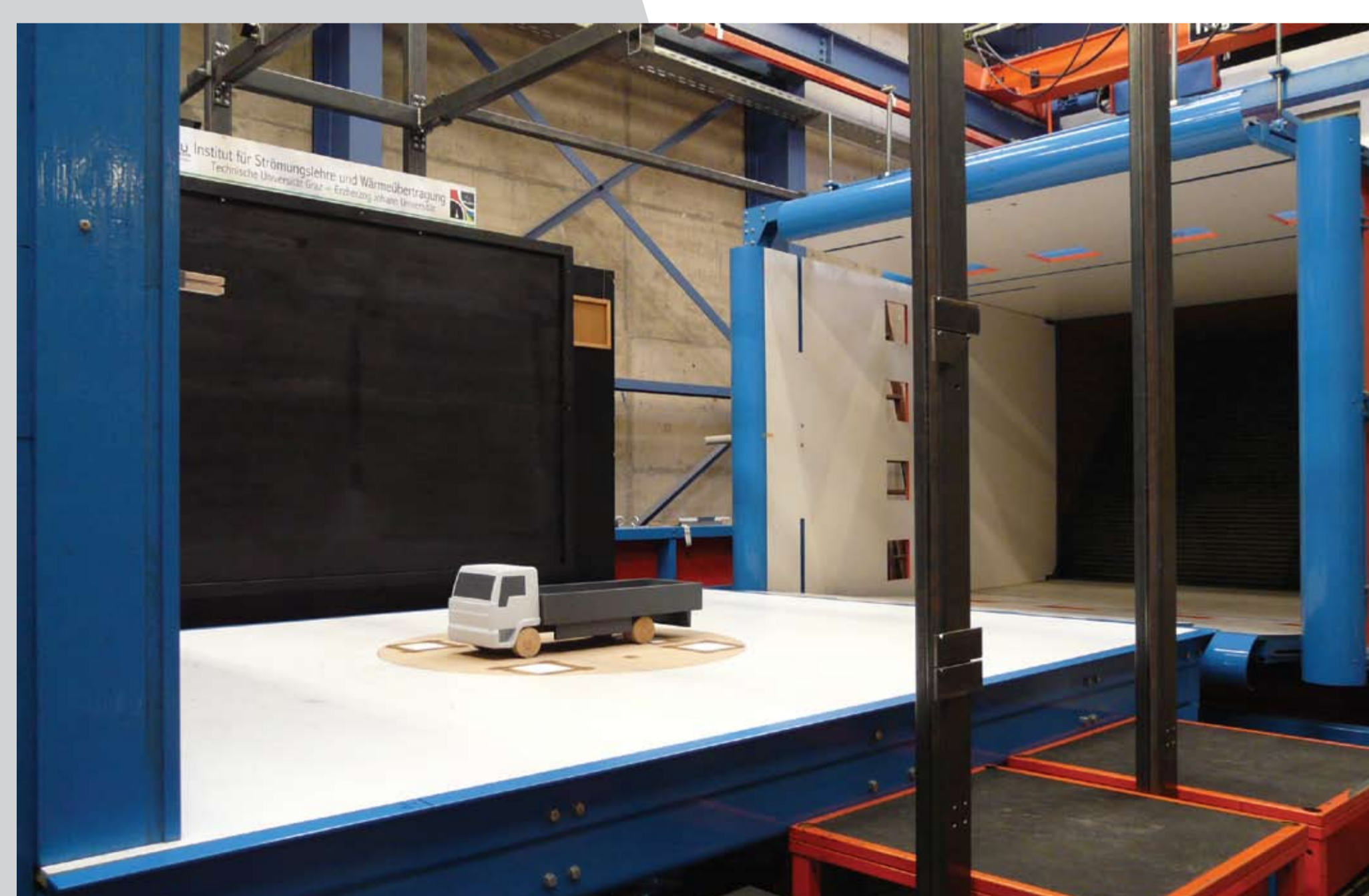
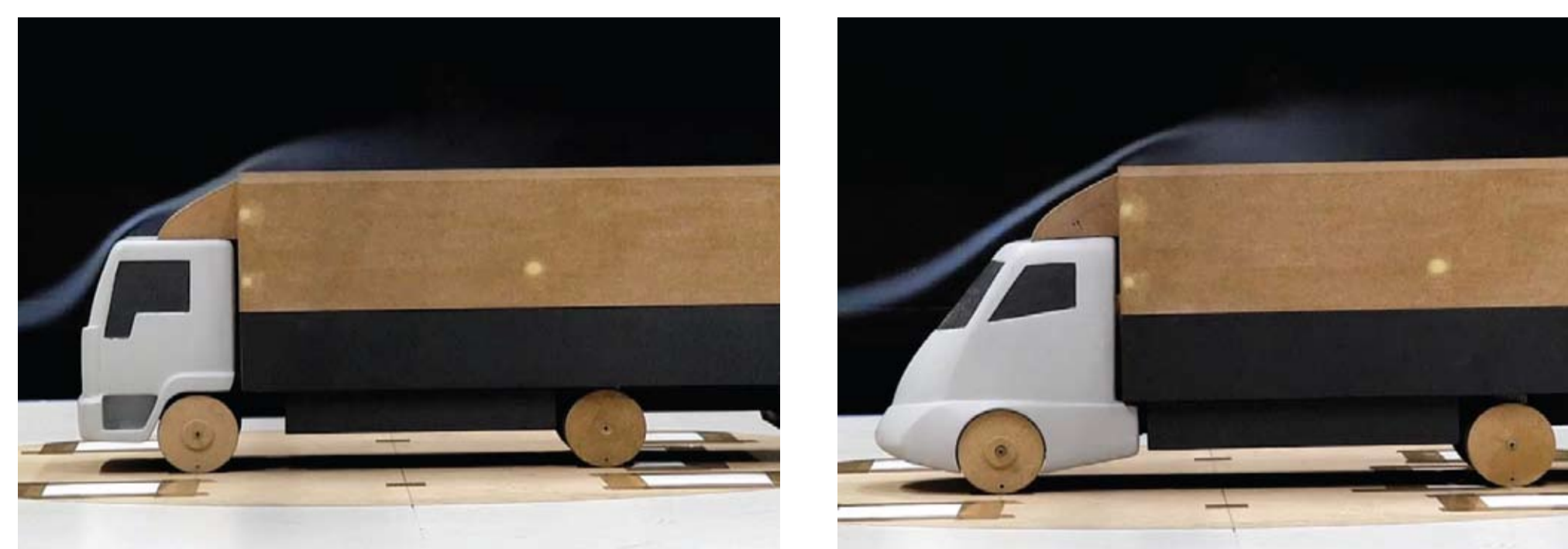


Figure: Wind Tunnel

EXPLOITATION

- Quantification of energy savings due to aerodynamically improved cabin design enabled by additional cabin length for safety features
- Motivation of heavy vehicle customers and manufacturers to implement safety optimised cabins
- Encouragement to review current length regulations for heavy vehicles



SOCIO-ECONOMIC IMPACT

- Complying with grown ecological awareness of society



Measurements during wind tunnel tests are forces and moments in all directions. The calculation of the coefficients (cx) was referenced to the truck width (lB) or the cross section area (AB) (=characteristic dimensions)

Drag coefficient	$c_w = \frac{F_w}{qA_B}$	coefficient pitch moment	$c_N = \frac{M_N}{qA_B l_B}$
Lateral force coefficient	$c_s = \frac{F_s}{qA_B}$	coefficient rolling moment	$c_R = \frac{M_R}{qA_B l_B}$
Lifting coefficient	$c_A = \frac{F_A}{qA_B}$	coefficient yawing moment	$c_G = \frac{M_G}{qA_B l_B}$

During the tests the air flow is made visible by artificial fog. This shows clearly the benefits of a homogenous airflow around the vehicle. Summarizing the differences in drag coefficients and fuel consumption benefits the decrease of the drag coefficient for the truck models measured was between 0.10 and 0.33. This is equivalent (not taking into account the scale of the model) to a reduced fuel consumption of 1.2 to 3.6 litres / 100km.

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