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Institut for Byggeri og Anlæg

INNOVATION DAY 2013

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FORCE TECHNOLOGY

Climate and large cable-supported bridges: influence of atmospheric icing on aerodynamic performance of bridge cables

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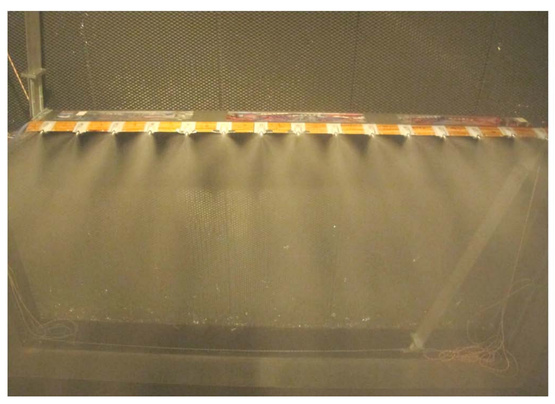
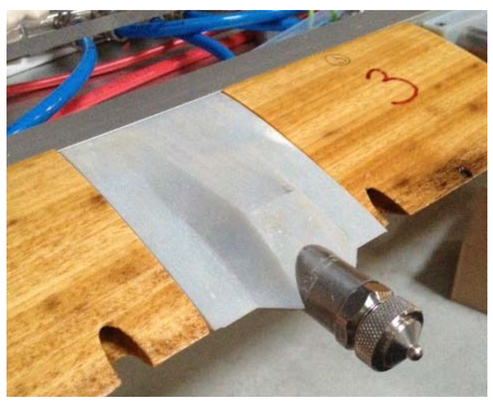
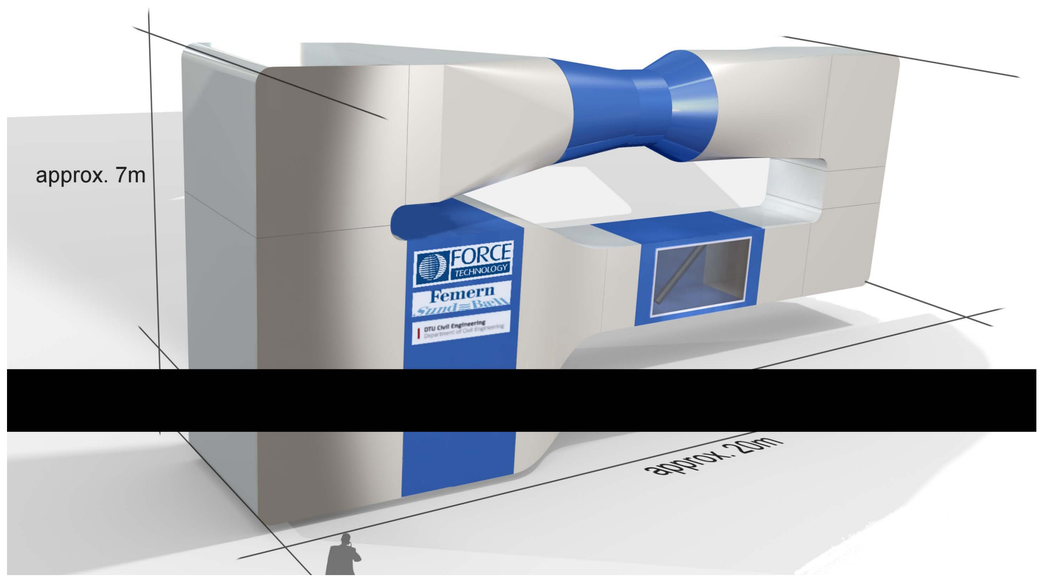
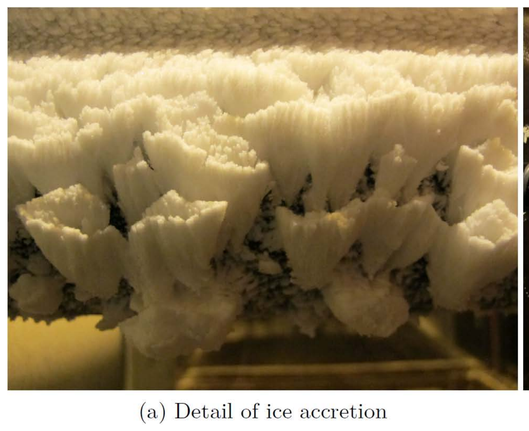
Icing and Bridge Cables: It has been observed that climate change may lead to an increased number of icing events on civil engineering structures. This phenomenon is in particular relevant for large cable-supported bridges. The **structural cables** contribute significantly to the **overall horizontal load** of super-long bridges. Hence, effort is made to reduce that influence by **shaping the surface of the cable protection tubes**. Specific climatic boundary conditions are known to add load to the cable or to induce **aerodynamic excitation** leading to **large amplitude vibrations**. One sparsely investigated phenomenon is atmospheric icing, which recently experiences increased attention. With a changing local climate conditions leading to atmospheric icing can **affect the operation and lifetime of bridges**. A newly developed wind tunnel facility allows studying this particular phenomenon comprehensively and **reveals unique insight** in the icing process and its effect on the aerodynamic performance of **contemporary and future** bridge cable designs.

Climatic Wind Tunnel

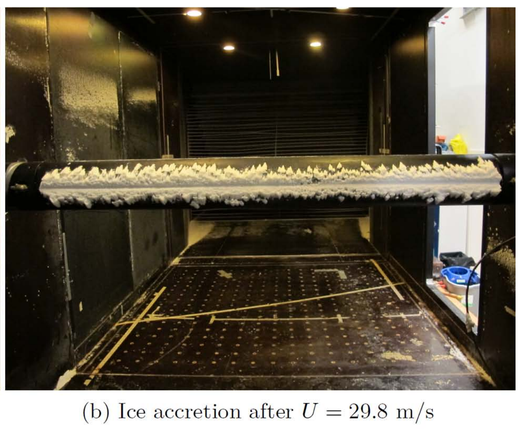






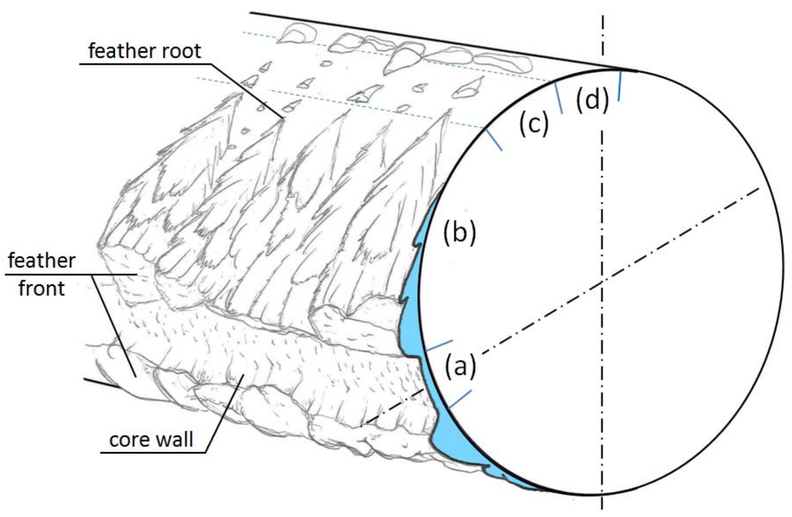


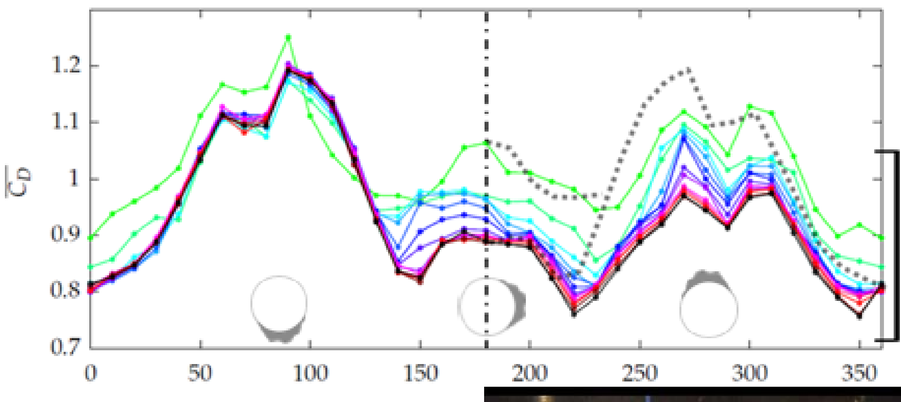
(a) Detail of ice accretion



(b) Ice accretion after $U = 29.8$ m/s

Testing





Effect of icing on aerodynamic force coefficients.

Testing of dynamic response of cable segment to the aerodynamic forces created by the ice layer.