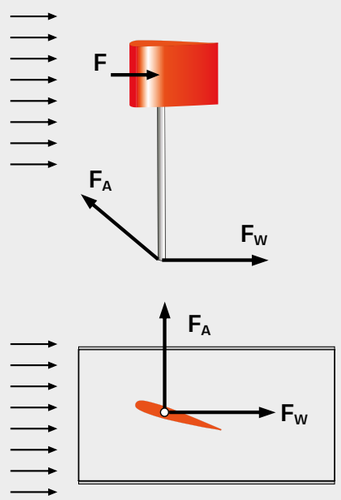
HM 170
Selected experiments

Flow around various drag and lift bodies HM 170.01 – HM 170.14

- determining drag and lift coefficients
- two-component force sensor for measuring drag and lift forces included in HM 170
- visualisation of streamlines by using fog



Force measurement on the drag body

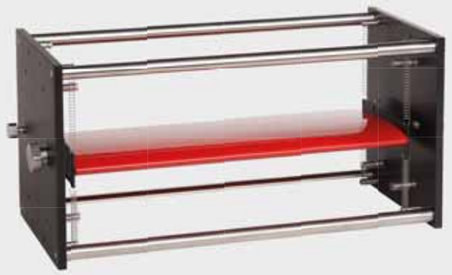
F_A lift force, F_W drag

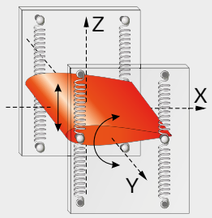
Demonstration of flutter

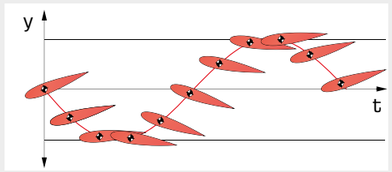
HM 170.20 Airfoil, spring-mounted

- demonstrate flutter (self-excited vibrations)
- natural oscillation behaviour can be influenced by different spring settings

Air flows along an elastic system. Motion-controlled flow forces can cause vibrations with significant amplitudes in the elastic system. This instability phenomenon is called flutter. Flutter is crucial in the design of aircraft, bridges, chimneys and high-voltage power lines. This model is used to demonstrate the aerodynamic excitation of vibrations and instability. By using a stroboscope it is possible to observe the natural oscillation of the wing.





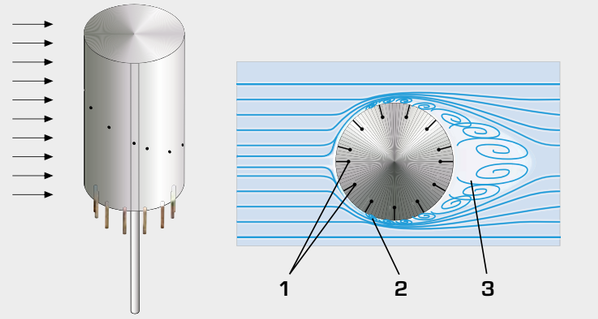


Flutter shown over time

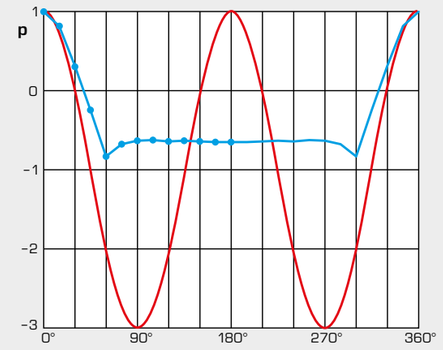
Pressure distribution at the perimeter of a cylinder immersed in a flow

HM 170.23 Pressure distribution on a cylinder

- record pressure distribution on the perimeter of the cylinder
- measuring the static pressure
- each pressure measuring point is equipped with a hose connection



1 measuring point, **2** flow separation, **3** turbulence



Comparison between measured and ideal pressure distribution when flowing around a cylinder

ideal pressure distribution (frictionless),
measured pressure distribution

In conjunction with the electronic pressure measurement HM 170.55:

- recording and display of the pressure distribution on a PC
- saving of measured values

In conjunction with the HM 170.50 16 tube manometers:

- recording the pressure distribution
- particularly clear display of the pressure distribution by the simultaneous measurement of all pressure measuring points with the tube manometers HM 170.50

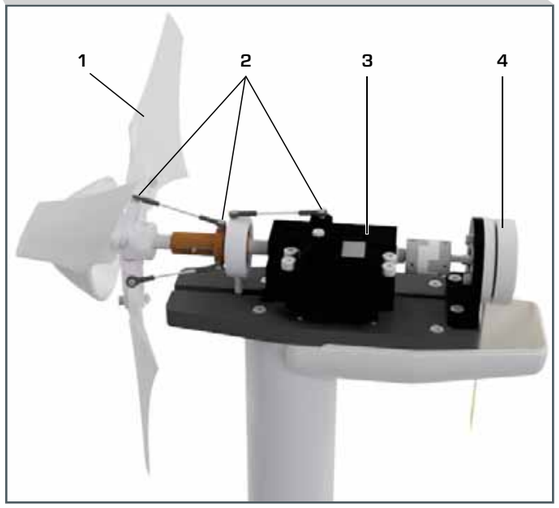
HM 170.70
Wind power plant with rotor blade adjustment

HM 170.70, together with the HM 170 wind tunnel, allows you to demonstrate a wind turbine with rotor blade pitching and variable-speed generator. The axial fan in the wind tunnel has a variable speed and provides the air flow required for the experiments. The generator is driven directly by a 3-blade rotor. A servo motor is used to change the angle of the rotor blades.

In order to approach different operating points, the nominal speed of the generator can be set via a controller. The rotor speed is precisely measured by Hall sensors built into the generator.

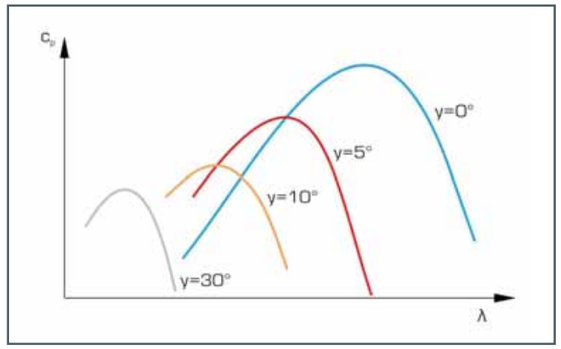
Features

- wind turbine with variable speed
- rotor blades adjustment angle adjustable via servo motor
- investigation of own rotor blade shapes (3D printing) possible
- network capability: observe, acquire, analyse experiments via customer's own network



1 rotor blade, **2** rotor blade pitching, **3** servo motor, **4** generator

HM 170.70 connected to the open wind tunnel HM 170



Determination of the power coefficient tip-speed ratio characteristic diagram

For the investigation of different shapes, rotor blades with straight and with optimised profile are included in the scope of delivery. Using suitable 3D construction and printing methods, new rotor blade shapes developed in-house can also be used.