



# Minimize noises

## Aero-acoustic fan test stand

Alongside air pollution, noise is one of the major environmental stresses of our time. This also applies to rail vehicles – and here particularly to one of the main sources of noise: the fans of cooling systems. In order to achieve long-term optimization of this acoustic source, Voith – in cooperation with TU Darmstadt – has developed a new test stand. In future, acoustic and aerodynamic measurements can be carried out simultaneously on one single device. In the past, at least two such devices were needed. An alternative that not only saves time, but also significantly minimizes the error rate of such measurements.

With the help of the new test stand, it is now possible to carry out specific further developments on the fan itself and its periphery. The cooperation of Voith and the Chair for Fluid

Technology of TU Darmstadt proved highly beneficial for both parties: Voith benefits from the resources and the academic possibilities of the University. In return, the students were able to get actively involved in an industrial project.

Simultaneously with the first measurements, the test stand is also represented as a CFD model (Computation Fluid Dynamics). In future, this model will allow calculating the acoustics of a cooling system in addition to its aerodynamic solution, which can already be realized. For this purpose, the sustainable and detailed measurements must be consolidated with the simulation results. Thanks to the research activities on the new fan test stand, estimated values can be significantly improved and noise emission levels can be reduced. As a result, fans produced in this way will meet even the highest demands made by modern rail vehicles.

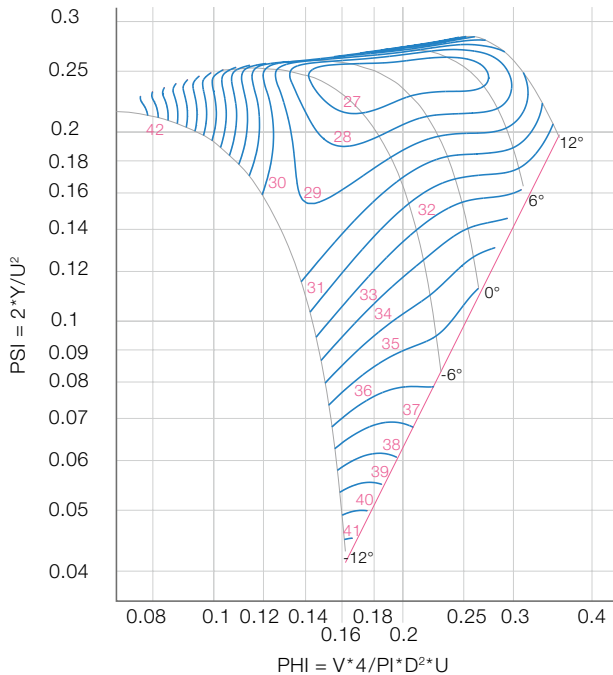
## Fan test



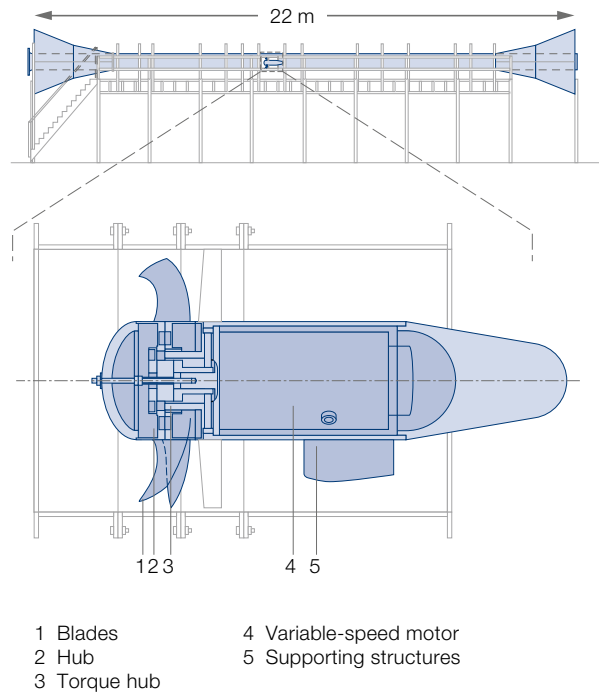
## Technical data of norm test stand (ISO 5136)

- Dimensions 22 000 x 800 x 1 000 mm, erected on a measuring platform with a height of approx. 3 meters
- Fans: outer diameter: 630 mm; hub diameter: from 280 mm
- Powered by water-cooled, variable-speed asynchronous motor: At 2 950 min<sup>-1</sup>; max. motor input power 17 kW; Speed: 0 – 4 000 min<sup>-1</sup> infinitely variable
- Measuring technology: Torque measuring flange integrated into fan hub (made by Manner) Brüel & Kjaer microphones with turbulence screen, pressure sensors via closed loops at outer diameter, instationary pressure measurements at defined measuring points
- Throttling effect on pressure side

## Acoustic diagram of a Voith fan



## The Voith share in the fan test stand



Voith GmbH & Co. KGaA  
 Zoeppritzstr. 73  
 89522 Heidenheim, Germany  
 Tel. +49 7321 37-4286  
 Fax +49 7321 37-7096

cooling-systems@voith.com  
 www.voith.com



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