

PRESS RELEASE

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Taking the road to the lab: Users deliberate upon biaxial fatigue strength tests for passenger car and truck wheels and hubs

In recent years there have been major changes in the life cycle testing of vehicles or individual components: Thanks to the state-of-the-art testing technology today where a few hours in the laboratory are sufficient for life cycle testing - whereas previously test drives on the road would take a couple of weeks for this purpose. This development was clearly reflected at the UC17 Users Conference on Biaxial Wheel and Hub Fatigue Testing, held on November 5th, 2025, in Darmstadt. Around 50 scientists and users from Europe and all around the world met at the Fraunhofer Institute for Structural Durability and System Reliability LBF in Darmstadt. Thanks to a wide range of development and testing activities in the field of wheel testing and approval, the institute was able to establish itself as a technology leader. Today, its testing technology is recognized and accepted worldwide and has become an international standard for improving safety in the design of vehicle wheels and hubs. In addition, it significantly shortens development times for new, reliable, and safety-relevant products.

BiAx Users conference – What’s next?

The international meeting, organized by the Fraunhofer-scientists, is known as a forum to discuss new developments in the market for testing and validation technologies with industry experts. During the last conference, questions like: In which direction will the technology and the conference develop, what are the future requirements of this technology and why it is beneficial to further develop the biaxial fatigue tests after so many years of application were explored in detail. These discussions clearly showed that with the support of an active conference committee, the event continues to stay alive with high interest. And the question of the conference before “What’s next?” can be answered with “What’s next - is now!” Many presentations with topics like new methods for load spectrum development, wheel concept, quenching process, simulation process and along with active participation from the attendees motivated looking forward to the next conference in 2027.

Editorial office

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ZWARP/BiAx technology: efficient wheel development for more than 40 years**PRESS RELEASE**

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The Fraunhofer LBF is considered as the pioneer in the multi-axial life cycle testing of vehicle wheels and wheel hubs. In 1982, scientists at the institute put the biaxial wheel/hub test rig (ZWARP/BiAx) into operation for the first time. At that time, it was a novel device for examining vehicle wheels under biaxial load. In 1982 a patent for road vehicles and in 1987 a patent for rail vehicles were filed and these technologies were subsequently sold under license to customers. At www.zwarp.fraunhofer.de/en.html Fraunhofer LBF created a website with in-depth information about biaxial wheel/hub testing (ZWARP/BiAx). Today, wheel road simulators of this type are used on a worldwide basis to shorten development times in the automotive industry and to test safety components such as wheels and wheel hubs.

More Information: www.zwarp.fraunhofer.de/en.html



Ivo Krause, Department Rotating Components at Fraunhofer LBF, welcomed the participants of UC 17 - Users Conference on Biaxial Fatigue Testing, the 17th user conference for biaxial fatigue testing of wheels, wheel hubs and wheel bearings. Photo: Fraunhofer LBF

FRAUNHOFER INSTITUTE FOR STRUCTURAL DURABILITY AND SYSTEM RELIABILITY LBF**PRESS RELEASE**

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Dr. Christoph Bleicher, Division Director Structural Durability at Fraunhofer LBF, welcomed the participants of UC 17 - Users Conference on Biaxial Fatigue Testing, the 17th user conference for biaxial fatigue testing of wheels, wheel hubs and wheel bearings. Photo: Fraunhofer LBF

Fraunhofer LBF in Darmstadt has stood for the **safety and reliability of lightweight structures** for more than 80 years. Today, with its expertise in the areas of structural durability, system reliability, vibration technology and polymer technology, the Institute provides solutions for three of the most important cross-cutting issues of the future: lightweight design, functional integration and cyberphysical mechanical engineering systems. The focus here is on solutions to social challenges such as resource efficiency and emission reduction as well as future mobility, like e-mobility and autonomous, networked driving. Comprehensive skills ranging from data acquisition in real operational field use to data analysis and data interpretation, in addition to deriving specific measures to design and improve material, component and system properties form the basis for this. Customers come from automotive and commercial vehicle construction, railway transport engineering, shipbuilding, aviation, machine and plant construction, power engineering, electrical engineering, medical engineering, and the chemical industry. They benefit from the proven expertise of 400 employees and cutting-edge technology accommodated in more than 17,900 square meters of laboratory and experimental space.

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