Hegewald & Peschke
Meß- und Prüftechnik GmbH

Mechanic testing of biological structures

Technical Innovations Designed Following The Example of Nature

- ✓ *University of Freiburg receives new electro-mechanical testing machine Inspekt 3axis 20-5-500 from the Hegewald & Peschke GmbH*
- ✓ *Execution of multiaxial tests on biological structures*
- ✓ *Analysis of the interrelations between form, structure and function of biological structures in order to translate this knowledge for technical materials*

Nossen/Freiburg (Germany), December 14, 2009 – The Hegewald & Peschke Meß- und Prüftechnik GmbH has developed a special testing machine for the Plant Biomechanics Group at the University of Freiburg. The Freiburg scientists use this machine especially for the study of the mechanic properties of branched biological structures, such as stems with branches. The results of this research help them to quantify natural design principles and problem solving strategies in order to apply them to technical applications. The system type Inspekt 3axis 20-5-500 can be used for multiaxial tests on standard test pieces, shaped elements, components and component assemblies.

Multiaxial tests on plants

Dendriform plants can serve as a source of inspiration for technical innovations in many ways. In the course of biological evolution, they adapt to static (own weight, leaves, snow) and dynamic loads (wind) with the help of different strategies. Thus, their anatomy and morphology provide important information for the comprehension of principles (e.g. shock absorption) and for innovative biomimetic applications. The goal is, for instance, to develop light-weight branched structures with high absorbability and fracture strength.

The Plant Biomechanics Group Freiburg is engaged intensely in researching the mechanic significance of the alignment of fibres and executes experiments on the maximum breaking load, on fracture toughness and on the fracture behaviour of branchings. For those, the scientists use the Inspekt 3axis 20-5-500, which can carry out tests on up to three axes simultaneously.

Press Release

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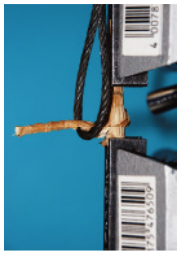
Presse Images:

1: The testing machine Inspekt 3axis 20-5-500

2: Torsion test on a caulis

3: Vertical load application (tension) for testing branching



This press release incl. images can be downloaded, here:

www.daylight-medienserver.com

www.hegewald-peschke.com/aktuell/presse-publikationen/publikationen.html

The testing machine for biological structures

The machine's test frame for multi-axial testing consists of an upper and a lower fixed crosshead and a moveable crosshead between the two. A part of the moving crosshead is designed like a carriage, which can be moved in horizontal direction (x-level) and can generate a shearing force. The lower fixed crosshead is equipped with a rotating support plate, which allows for a rotary motion around the z-axis. The test room, which contains the biological structures that are to be tested, is located between the lower fixed crosshead and the moving crosshead.

The Inspekt 3axis 20-5-500 can generate loads of max. 20kN in z-direction, 5kN in x- direction and torques of up to 500 Nm around the z-axis.

Digital controller for the synchronous collection of measuring data

Each axis has an external controller container, which is equipped with all elements of the power supply, a digital controller, an amplifier and an E-stop control unit, which can be connected to auxiliary equipment for the operational safety of the entire testing system. The controllers are necessary for the actual control of the Inspekt 3axis 20-5-500 and for the data acquisition. Each controller regulates one axis and supervises soft- and hardware limit switches. Furthermore, the digital controls allow for the simultaneous acquisition of measured values. The controllers can use three channels (load, crosshead position, external travel, e.g. strain) for the control. They have a high load resolution of 180,000 steps at 20 ms integration time, which means that measuring ranges do not have to be switched. Additionally, each controller is equipped with a I2-bus system for max. two additional cards and high computing power.

The manual movement and positioning of the inspekt 3axis 20-5-500 for the botanical garden Freiburg are done with the panel of the software LabControl.

About Hegewald & Peschke Meß- und Prüftechnik GmbH

The measuring and testing technology specialists are based in Nossen, near Dresden. Since 1990, the company has been developing, manufacturing and selling high-quality machines, components and software solutions for testing raw materials, constructional elements and components. These include universal testing machines, hardness testing machines, test stands for furniture and constructional elements, as well as various length measurement devices for industry and research. The company, with 50 employees and various sales offices throughout Germany, also provides various measuring and testing services and retrofitting for universal testing machines. The design and software development divisions at Hegewald & Peschke maintain close cooperation with universities and research institutes (such as Fraunhofer) in order to ensure that the company's products remain at the cutting-edge of technology. Hegewald & Peschke is certified under ISO 9001 and has its own DKD calibration laboratory. **For further information about Hegewald & Peschke Meß- und Prueftechnik GmbH, please refer to the website www.hegewald-peschke.com.**

About the Plant Biomechanics Group of the botanical garden of the University of Freiburg

The Plant Biomechanics Group Freiburg covers the entire value chain of basic biological research up to the development of bionic products on the laboratory scale. It focuses on lightweight construction and stick structures, as well as gradient materials, fibre composites and smart materials.

The focus of the bionic research and development work is set on the quantitative analysis of the interrelations between form, structure and function of plants and the translation of these principles for innovative technical products. Due to the involvement of the botanical garden, the Plant Biomechanics Group has a multitude of plants, and thus an almost inexhaustible pool of biological inspiration, at its disposal. **For further information about the botanical garden of the University of Freiburg and about the Plant Biomechanics Group Freiburg refer to www.botanischer-garten.uni-freiburg.de/plantbiomechanicsgroup.htm.**

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