# SPECIALISTS ON DESIGN TOOLS MEET

## Theme day “From design dimensioning via design verification to certification”

**During the “Experience Composites”-fair there was also a CCeV-theme day on the topic “From design dimensioning via design verification to certification”. Professor Ralf Cuntze from Carbon Composites e.V. (CCeV) organized this event and invited specialists on design tools, applicable along the design development chain.**

Prof. Ralf Cuntze, retired from aerospace industry and presently heading the CCeV workgroup ”Engineering”, opened the workshop with a presentation with the title “From design dimensioning via design verification to product certification with emphasis put on composite parts development’” as a general introduction to the contents and title of the workshop. Dr. Robert Boehm (ILK, TU Dresden) followed with a presentation on “Novel material models and multi-scale simulation methods for composite materials”. Materials addressed were the “simple” UD material and basic textiles.

Dr. Christian Huehne from the Institute of Composite Structures and Adaptive Systems, DLR, Braunschweig talked about the “Simulation of manufacturing processes”: Process simulation, well connected to structural analysis, is a precondition for reliable designing, was his message. Design results, obtained in the MAI Carbon Cluster research project, were presented by Dr. Roland Hinterhoelzl (LCC, TU Munich). Again, connecting process simulation to structural analysis was addressed as a presently main design feature.

Excellent joints and load introduction elements are key enablers for high performance structural parts. Therefore, Professor Helmut Rapp (UniBw, München) presented ideas on “Load introduction in monolithic and hybrid lightweight structure”.

Structures may suffer from repeated loading which may lead to fatigue problems. Dr. Ilja Koch (ILK, TU-Dresden) and Prof. Peter Horst (TU Braunschweig), both members of the German fatigue working group “BeNa = Betriebsfestigkeits-Nachweis”, reported on their view of the lifetime prediction status. The presentation on “Strength and curing simulation of thick-walled composites with ANSYS WB 17.0” by Rene Roos (ANSYS Switzerland) and Cédric Devivier (LMAT Ltd. Bristol) stated that structural parts can be thick-walled, which requires a much higher analysis effort. This begins with an optimized curing simulation to keep residual stresses low.

Prof. Martin Schagerl (JKU University Linz, Austria) then gave insight to the structure of the German Aeronautical Handbook HSB, enriched with presently prepared “Current contributions and research activities on fundamentals and methods for structural design and analyses”. Valuable theoretical HSB design sheets, parts of this excellent design handbook, will shortly become available via Internet for every engineer.

First failure is not last failure, residual load and stiffness capacities still exist. Dr. Matthias Hörmann (CADFEM GmbH, Grafing) showed in his presentation “First-ply-failure and then what? – Approaches for detailed simulation of failure” what is left after initial failure occurred – important insights to avoid a costly design change in the case of an unforeseen overloading.

Horst Bansemir (formerly Eurocopter Germany, Ottobrunn) closed the workshop with a standard rules-based report on “Certification aspects” in airplane design when composites are used. It is based on his contribution to the FAA-rule “Damage tolerance and fatigue evaluation of composite rotorcraft structures”.

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The multi-location event included the Symposium of CCeV, CCeV seminars, theme events and the presentation of the CCeV Network in its booth at the Experience Composites fair.