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1. Jahreshälfte / 1. Half Year 2012		
07.03	Barnaby Law, Head Of Integrated Fuel Cell, Airbus	Dr. Klaus Taube
	<u>Airbus Multifunctional Fuel Cell Integration</u> Fuel cell technology has been selected by EADS as Key Strategic Project and is considered as one of the most promising technologies that can enable a step change in aircraft system architecture to achieve the ACARE 2020 goals and to enable emission free and noiseless aircraft ground operation. The ambition of Airbus is to replace the Auxiliary Power Unit (APU) of a future aircraft by a fuel cell system. This initial step would lead directly to emission-free and noiseless ground operations and provide a significant ecological impact. Using the by-products water and inert gas from the fuel cell process allows in a second step to replace existing aircraft components like water- and inerting systems and consequently to improve the economics. Based on the successful Fuel Cell Emergency Power System Flight Test Campaign on A320 in 2008, Airbus is investigating the replacement of an APU by a Multifunctional Fuel Cell System. In this role, the fuel cell acts as an independent power source, which could basically power any electrical consumer of the aircraft, also the cabin. This is especially true in the case of a more-electric aircraft architecture. The water generated by the fuel cell can be used for cabin humidification for enhanced comfort, as well as potable water and toilet flush water, hence saving weight by reducing the aircraft's water buffer tank size. Since a fuel cell replacing an APU would be based on an air-breathing system, the exhaust gas contains air with very low oxygen content. This gas can be used for inerting purposes in the fuel tanks and cargo compartments, as well as for fire extinguishing systems, together with the water produced on-board. Especially with respect to the need for a replacement for Halon-based fire extinguishing systems, fuel cells offer a very efficient and environmentally friendly alternative for the future. The presentation will discuss the achievements and status of the program and will especially focus on the technological challenges such as overall aircraft system architecture optimization, thermal management at aircraft level, hydrogen infrastructure and maturity of Fuel Cells and H2 storage equipment.	
19.04	Jie Cheng, WZP	Dr. Norbert Hort
	<u>Computational and Experimental Analysis of Internal Defects to Evaluate their Effect on Mechanical Performance of Al-alloy Castings</u> The objective of this research is to evaluate the internal casting defects (macro-shrinkages, blowholes) on the mechanical performance of Al-alloy castings. Both the experimental method and computational analysis were used to achieve the research objective. In Experiments, tensile test specimens and impact test specimens with internal macroshrinkages and blowholes were produced by hanging an Al alloy wire whose melting point is slightly higher than the feeding temperature of AC4C Aluminum Alloy (700°C~710°C). An alumino-silicate ceramic fiber-based non-woven fabric (Ceramic Fiber Paper) was fixed on the wire to act as an artificial macro-shrinkage after the solidification of molten AC4C Aluminum. Specimens with internal defects of various sizes were produced, and then tensile tests were performed on the produced specimens, respectively. In addition to experimental investigation, computational analysis was also conducted to determine the internal defects dependent mechanical performance of material. A computational system for finite element analysis	

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	of casting components with internal defects was proposed. A Python-based code was developed to integrate the numerical calculation and model generation works. The code was then embedded into a commercial Finite Element Analysis (FEA) package, Abaqus, as a plug-in toolkit. By using the developed toolkit, models of tested specimens were generated and then submitted to FEA in accordance with the experimental conditions. The good agreement between the results obtained by experiments and computer simulations verified the reliability of proposed computational system for FEA of casting components with internal defects. The proposed computational system may give more reliable and realistic prediction of casting's performance when an engineering decision should be made to remedy the defects or not. As a result, product development time and manufacturing cost can be significantly reduced, and thus improving the competitiveness of company.	
24.05	N.N.	
28.06	Prof. Dr.-Ing. habil. Stefan Heinrich, TU Hamburg-Harburg	Prof. Andreas Schreyer
	"Partikeltechnologie am Beispiel der Herstellung von neuartigen Material-systemen mittels Wirbelschichttechnik: Experimente und Modellierung"	

2. Jahreshälfte / 2. Half Year 2012		