

Newsletter 05/2013

Special Edition 39th MPA-Seminar October 8th and 9th, 2013

39th MPA SEMINAR

This year's MPA Seminar with the theme "Plant Monitoring and Availability – Component Calculation and Materials Utilisation" took place on October 8th and 9th.

The structure of energy supply especially in Germany is in a permanent state of flux. The substantive development of renewable energies will influence the operation of the existing fossil-fired power plants and has to be considered for future fossil-fired power plants. This will create a lot of technical problems urgently to be solved in the near future. One consequence will be that the operation mode will change – power plants have to operate more flexibly. This will have an impact on the design, the structural materials used for complex loaded components, failure modes and damage mechanisms, monitoring and life time assessment.

There is a substantial need for further innovation considering:

- Optimization of materials and component manufacture looking to increase efficiency and reliability
- Improving design and life-time assessment with regard to the real loading conditions
- Advanced monitoring and inspection methods

Implementing the so-called "Energiewende" – which means the "turnaround" in energy policy - is only possible if the technical problems are solved. These problems have been tackled in this year's MPA Seminar.

During the 34 lectures the 180 participants took the opportunity to inform themselves about current materials development/qualification and emerging methods as well as assessment of conditions and life management of complex loaded components in power plants.

MPA Seminar is a traditional event cordially organized by MPA University of Stuttgart, VGB – the European technical association for electricity and heat generation - and the FDBR – the association for plant manufacturers especially for power technologies.



Professor Karl Maile welcomed the participants from 10 countries who also enjoyed the opportunity to maintain an exchange amongst themselves.

Responsible for this newsletter is Prof. Dr.-Ing. Karl Maile

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The 39th MPA Seminar was structured into the following sessions:

- Opening Lectures
- New Concepts for Fossil Fired Power Plants
- Nuclear Power Plants
- Power Generation using Regenerative Energy Sources
- Fossil Fired Power Plants

In the session **“Opening Lectures”** an overview was given of the situation in Germany considering the current state of R&D in the field of power plants. The second paper discussed the change in energy supply and the subsequent impact on the future of fossil fired power plants. The third paper dealt with the prospects of renewable energy especially in the south of Germany. In the last paper the contribution of nuclear power plants, especially of advanced reactor types to the energy supply was discussed.

Lectures:

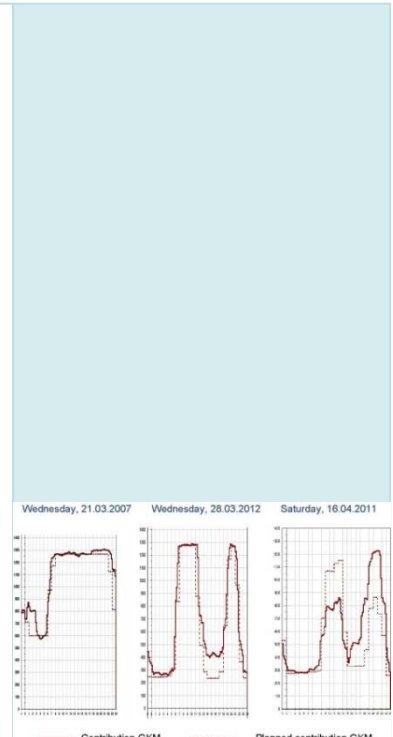
(1)	Current Research Projects in the Field of Power Plants in Germany H. Höwener, Forschungszentrum Jülich
(2)	The Importance of Fossil-Fired Power Plants for the Future Energy Supply K.-H. Czychon, GKM Großkraftwerk Mannheim AG
(3)	Baden-Wuerttemberg's Future Energy Supply: Renewable – but Risky? M. Schmidt, Center for Solar Energy and Hydrogen Research Baden-Wuerttemberg (ZSW)
(4)	EPR™ Project Delivery: The Value of Experience R. Leverenz, AREVA GmbH, Erlangen

The session **“New Concepts for Fossil-Fired Power Plants”** was focused on qualification and application of new high performance materials for power plants to achieve improved efficiency and reliability. Also the importance of advanced numerical methods for life-time assessment and accurate determination of safety margins considering microstructural changes and specific damage mechanisms as well as the impact of the loading situation was demonstrated by several papers.

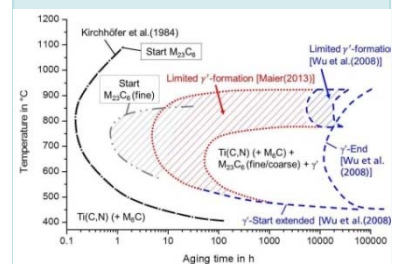
A highlight within this session was the presentation of the status of planned and ongoing R&D activities concerning the advanced ultra super critical thermal power plant in Japan, USA and Germany.

Lectures:

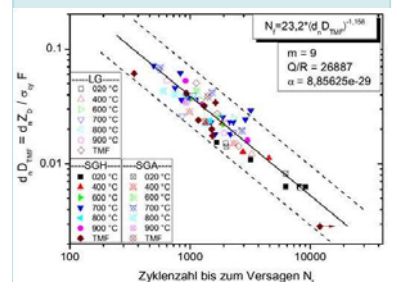
(5)	Microstructure, Deformation and Lifetime of Alloy 617B – Experiences from Different Heat Treatments and Heats G. Maier, H. Oesterlin, M. Schlesinger, P. von Hartrott, Fraunhofer Institute for Mechanics of Materials (IWM), Freiburg, C. Somsen, Ruhr-University Bochum, Materials Research Department
(6)	Numerical Assessment of Power Plant Components by Use of Mechanism-Based Material Models for Deformation and Lifetime H. Oesterlin, Fraunhofer Institute for Mechanics of Materials (IWM), Freiburg



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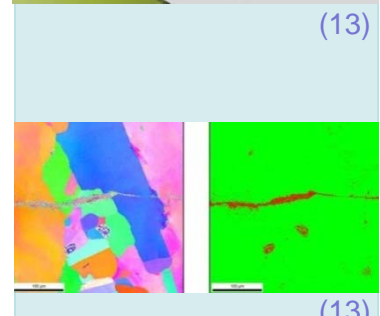
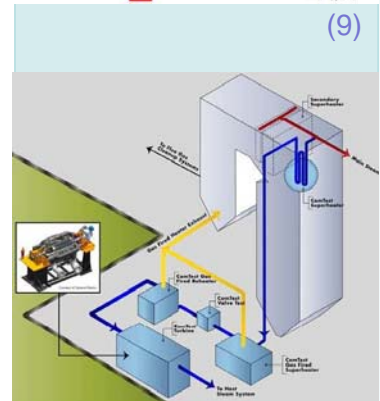
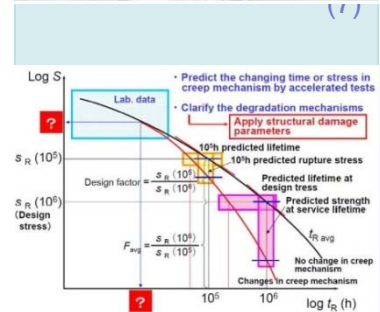


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(7)	Commissioning of the Thick Walled Pipe Test Rig for 725°C Power Plants K. Metzger, GKM Großkraftwerk Mannheim AG, V. Baumhoff, Bilfinger Piping Technologies, Essen, H. C. Schröder, TÜV Süd Industrieservice GmbH, Mannheim, K. Maile, S. Zickler, MPA Universität Stuttgart
(8)	Numerical Assessment of Secondary Stresses in Pipe Bends and Thermal Fatigue in Headers D. Hüggenberg, A. Klenk, MPA Universität Stuttgart
(9)	Materials R&D Program and Issues for A-USC Power Plants – Alloy Development and Degradation Assessment F. Masuyama, Graduate School of Engineering, Kyushu Institute of Technology
(10)	The Ongoing and Planned Activities of A-USC Project in Japan M. Fukuda, Research Institute for Advanced Thermal Power Systems, Tsukuba
(11)	700°C Plant. Vision of High Efficiency and Clean Energy Production. MPA – GKM Expertise in Materials and Components. Status of Advanced Ultra Super Critical Power Plant Designed for Operation at 700°C in Germany A. Klenk, K. Maile, MPA Universität Stuttgart, K. Metzger, GKM Großkraftwerk Mannheim AG
(12)	U.S. Program Advancements in A-USC Materials Technology J. Shingledecker, Electric Power Research Institute (EPRI), Charlotte, North Carolina



In the session “**Nuclear Power Plants**” two papers were presented about the effect of hydrogen flakes in forged RPV steels on the mechanical properties and the possibilities for their assessment. In the other papers new approaches of the assessment fatigue crack initiation and propagation under thermal and mechanical loading including environmental effects were discussed.

(13)	Influence of Segregations and Hydrogen Flakes on the Mechanical Properties of Forged RPV Steels C. C. Eiselt, J. May, H. Hein, AREVA GmbH, Erlangen
(14)	Mechanism of Crack Initiation and Crack Growth under Thermal and Mechanical Fatigue Loading S. Utz, E. Soppa, H. Silcher, MPA Universität Stuttgart
(15)	Safety-related Considerations for Reactor Pressure Vessels in Consideration of Hydrogen Flaking S. Dugan, X. Schuler, K.-H. Herter, H. Silcher, MPA Universität Stuttgart
(16)	Study on Fatigue Analysis for Operational Load Histories P. Wilhelm, AREVA GmbH, Erlangen, P. Steinmann, University of Erlangen-Nuremberg, Chair of Applied Mechanics, J. Rudolph, AREVA GmbH, Erlangen

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The possibilities of chemical storage of renewable electricity with liquid hydrocarbons and the advantages in comparison with other storage systems were presented in session **“Power Generation Using Regenerative Energy Sources”**. More than 15 years in investigating damage in the field of wind energy was the basis for a report about dynamic behaviour of wind-turbine-drive trains. Monopiles, tripods and jackets are the main foundation concepts for the substructures of offshore wind turbine structures. In another paper the requirements and the need for qualification for new innovative mixing technologies for cost optimized high performance grouts for offshore wind turbines was discussed. The lifetime of a large number of components in hydro-power plants is limited by the damage mechanism of material fatigue. In the last paper present findings, particularly in relation to the long-term use of components in hydro-power plants, the changing operating conditions as a result of the changing energy market and the use of optimized materials were presented and discussed.

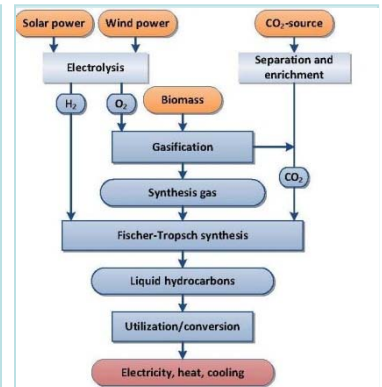
(17)	Synthetic Liquid Hydrocarbons – a High Density Energy Storage G. Scheffknecht, N. Armbrust, Institute of Combustion and Power Plant Technology (IFK), University of Stuttgart, M. Moser, T. Pregger, DLR-Institute of Technical Thermodynamics, M. Köhler, DLR-Institute of Combustion Technology, C. Kern, Chair of Chemical Engineering, University of Bayreuth
(18)	Investigation Into the Dynamic Behaviour of Wind Turbine Drive Trains and Damage Examples T. Gellermann, Allianz Risk Consulting GmbH – Allianz Zentrum für Technik (AZT), München
(19)	Innovative Mixing Technology for Cost-Optimized High Performance Grouts for Offshore Subsea Grouting of Wind Turbine Structures H. Garrecht, MPA Universität Stuttgart und Institut für Werkstoffe im Bauwesen (IWB), C. Baumert, Institut für Werkstoffe im Bauwesen Universität Stuttgart, V. Birtel, MPA Universität Stuttgart
(20)	Damage Analysis of Fatigue-Loaded Components in Hydro-Power Plants J. Kinder, S. Dugan, X. Schuler, MPA Universität Stuttgart

The last session **“Fossil Fired Power Plants”** was focused on

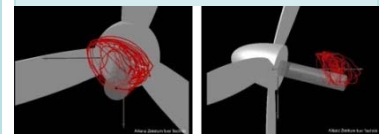
- specific problems were treated concerning quality assurance and damages in the erection phase of power plants as well as in the operation phase
- Life-time assessment and monitoring of components.

The crack formation in T24 tubes was a central topic of several papers, showing the results of ongoing research and experimental work in this context but also demonstrating possible solutions to avoid the risk of crack initiation.

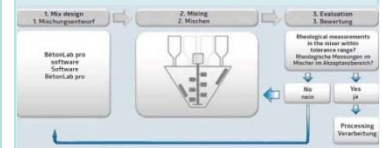
With regard to the future flexible operation of power plants mode new strategies for life time monitoring and maintenance were discussed. Also new concepts for describing the stress-strain situation and the development of damage in components under static as well as fatigue load based on Finite Element calculations with implemented constitutive models and damage hypothesis were shown. In addition papers discussed damages in P91 and Alloy 617 components and the reasons for their occurrence.



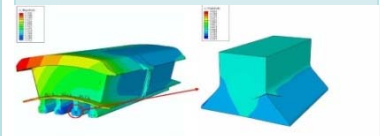
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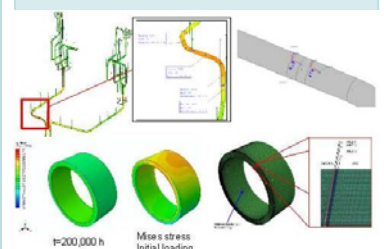
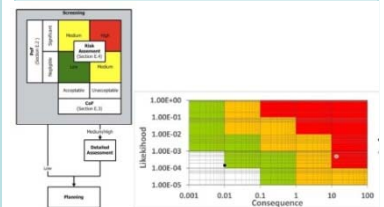
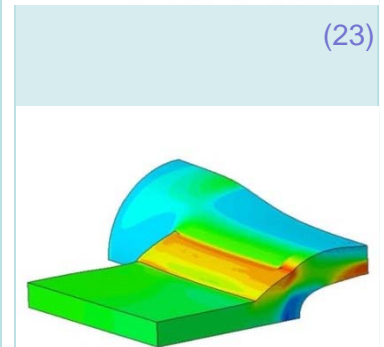
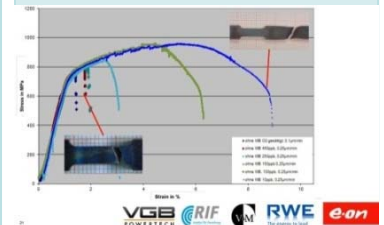
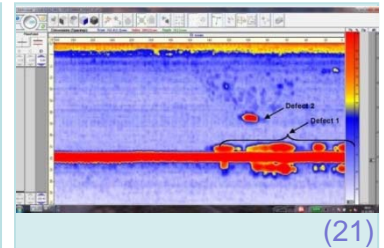


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(21)	Sampling Phased Array: Practical Application in Non-destructive Testing of Nickel-Based Welded Joints J. Schenkel, TÜV Süd Industrie Service GmbH, Mannheim
(22)	Cracking of T24 in High Temperature Water B. Devrient, AREVA GmbH, Erlangen, R.-U. Husemann, Hitachi Power Europe GmbH, Duisburg, R. Kilian, AREVA GmbH, Erlangen, D. Bernds, Hitachi Power Europe GmbH, Duisburg
(23)	Stress Corrosion Cracking of T24 – Project Achievements and Ongoing Investigations C. Ullrich, RiF e. V., Dortmund, S. Heckmann, RWE Technology GmbH, Essen, W. Tillmann, RiF e.V., Dortmund, G. Gevelmann, Vallourec Mannesmann Deutschland GmbH, Düsseldorf, G. Gierschner, E.ON New Build & Technology GmbH, Gelsenkirchen, H.-G. Rademacher, E.ON New Build and Technology, Gelsenkirchen
(24)	Materials Science Based Assessment of Intergranular Cracks in T24 Welds K. Metzger, GKM Großkraftwerk Mannheim AG, K. Maile, J. Böse, MPA Universität Stuttgart
(25)	Investigation on Crack Propagation Behaviour in Welded Waterwall Tubes D. Siegele, I. Varfolomeev, S. Moroz, M. Schlesinger, H. Riedel, Fraunhofer Institute for Mechanics of Materials (IWM), Freiburg, D. Hettkamp, A.-R. Jost, Hitachi Power Europe GmbH, Duisburg
(26)	Evaluation of Crack Formation in a Girth Weld of a HT Control Valve (Alloy617) O. Birkle, Bopp & Reuther, Mannheim, K. Metzger GKM Großkraftwerk Mannheim AG, H.C. Schröder, TÜV Süd Industrie Service GmbH, Mannheim, S. Zickler, K. Maile, M. Speicher, MPA Universität Stuttgart
(27)	Online Diagnostics of Steam Pipes and Thick-Walled Boiler Components – A Comparison of Methods Based on Operational Experience J. Wagner, STEAG Energy Services GmbH, Essen
(28)	EU Risk-Based Inspection Standards and their Practical Implementation in the Area of Power Plants A. Jovanovic, EUVRi – European Virtual Institute for Integrated Risk Management, Stuttgart
(29)	Advanced Methods for Life Time Analysis of Creep Loaded Components in Steam Power Plants A. Klenk, K. Maile, P. Buhl, M. Speicher, MPA Universität Stuttgart
(30)	A Combined Creep-Viscoplastic Constitutive Model for Modeling the Thermal-Mechanical Behavior of High-Cr Steel Components J. Wang, P. Steinmann, Chair of Applied Mechanics, University of Erlangen-Nuremberg, J. Rudolph, A. Willuweit, AREVA GmbH, Erlangen
(31)	Maintenance Undergoing Change – What Flexible Modes of Operation Demand of Power Plant Sites A. Foos, H. C. Schröder, TÜV Süd Industrie Service GmbH
(32)	Root Cause Analysis of Cracking in the HAZ of a Circumferential Weld in a Reheat Steam Pipe Made of the Material P91 G. Lüdenbach, StandZeit GmbH, Coesfeld, A. Kranz, TÜV Rheinland, Werkstoffprüfung GmbH, Köln



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Additionally a **poster session** was organized. The posters presented were included as full papers in the conference proceedings.

Proceedings

The conference proceedings of the 39th MPA Seminar with abstracts and a manuscript CD can be purchased at a price of 40,-€. You can place your order on mpa-seminar@mpa.uni-stuttgart.de

DVD Box MPA Seminar 1975-2012

At the same e-mail adress you can also order a DVD-Box with the manuscripts of the lectures (pdf files) from the 1st seminar in 1975 up to and including the 38th MPA Seminar 2012 at a price of 50,-€.

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MPA Seminar 2014 – Special Anniversary

The 40th MPA Seminar will take place on October 6th and 7th, 2014 at the Hotel Le Méridien Stuttgart.

In 2014 the MPA Universität Stuttgart will look back on a history of 130 years.

If you would like to register for news concerning the MPA-Seminar please contact Ms. Martens: sabine.martens@mpa.uni-stuttgart.de

**We are looking forward to welcoming you
to Stuttgart next year**

