

Announcement and Call for Presentations 23rd Blade Mechanics Seminar

11th September 2018 - Winterthur, Switzerland

Goals and Motivation

We are glad to announce that the ZHAW Zurich University of Applied Sciences is about to organize the 23rd Blade Mechanics Seminar. It will be held on September 11, 2018 in a similar theoretical and practical framework and a variety of interesting topics as the previous conferences.

The unchanged key target is to offer a platform for know-how and experience exchange among engineers from various turbomachinery companies. The Blade Mechanics Seminar aims to answer the participants' needs coming from their daily work on axial and radial bladed discs of aero- and heavy-duty engines. All presentations will be held in common engineering terms by using comprehensible mathematics.

Technical Area

The Blade Mechanics Seminar focusses on the structural mechanics of bladed discs and the interaction of turbomachinery blades with their working medium. This includes modelling and design methodologies based on analytical, numerical and experimental approaches that improve reliable operation of bladed discs. In this context, also monitoring and diagnostics are of interest in the seminar. Key aspects of fluid dynamics, acoustics and thermodynamics that contribute to the definition of realistic blade boundary conditions constitute a further focus in the seminar. In 2018, the main topics of the Blade Mechanics Seminar are related to:

Numerical and experimental vibration analyses

- Tuned and mistuned bladed discs
- Non-linear blade vibrations including friction and damping

Static and dynamic simulations

- Fluid-structure interaction (flutter and forced vibration)
- Stress analysis and optimization of static and transient thermo-mechanical problems
- Contact and material non-linearities
- Novel FE modelling techniques (sub-modelling, super-elements, boundary elements, etc.)

Experimental approaches

- Experimental mechanics and measuring methods (tip timing, strain-gauges, etc.)
- Imaging techniques (3D scanning, non-destructive testing, computer tomography, etc.)

Lifetime methods

- Creep, fatigue and creep-fatigue lifetime prediction
- Thermo-mechanical fatigue (TMF) mechanisms and testing
- Remaining Useful Life (RUL) assessments

Keynote Presentation

Dr. Erica Vacchieri, Materials Specialist, Ansaldo Energia s.p.a., Italy

Development of a creep-fatigue lifing strategy and small punch creep testing technique for gas turbine hot gas path components

The requirements of the energy market are driven by an increased flexibility due to the actual economic climate and the tendency for discontinuous use of conventional resources in favour of renewable energies. Their flexibility makes Gas Turbines (GT) the main source of electrical power in this highly intermittent energy market. This makes, however, great demands on the fatigue resistance of hot gas path blades and vanes (HGPB&Vs) and in particular on their ability to withstand the interaction of fatigue, creep and environmental damage. While these effects reduce the expected life, maintenance intervals and reparability of these components, continuous cost reduction initiatives for more competitive maintenance plans oblige GT OEMs to extend the life of these critically loaded components. An understanding of the behaviour of the critical parts in this environment is therefore key for GT OEMs to quantify residual component life after service and to rejuvenate HGPBs.

A new creep-fatigue design methodology has been developed for GT blades and vanes of two Ni based superalloys. This includes the definition of an advanced constitutive model able to characterise the critical locations and conditions in HGPB&Vs by FE simulation. Creep-fatigue experiments have then been designed that reproduce the service conditions in critical locations to understand and better describe the respective damage mechanisms. The effectiveness of the methodology has been verified using service-like Thermo-Mechanical Fatigue (TMF) benchmark tests that simulate the situation at critical locations of HGPB&Vs. Two case studies will be presented for which the new procedure has been applied. These results will be underpinned by available field feedback to validate the lifing method.

The assessment of operated components has been conducted not only through microstructural evaluation but also through a miniaturised testing technique that allows the sampling of material from real critical locations. Small punch creep testing has been evaluated for Ni based superalloys and applied for the determination of the residual creep life of critical HGPB&Vs after operation.

Finally, this testing technique has been exploited for the quantification of material recovery in SX blades as obtained through a newly developed rejuvenation heat-treatment process. Thereby, various components after service have been considered with different operating regimes.

Registration Fees

CHF 200 (approx. 170 Euro) for early birds until August 19, 2018

CHF 230 (approx. 195 Euro) after August 19, 2018

The registration fee includes all sessions, meals (lunch and coffee breaks) and proceedings.

Two employees of the seminar sponsors participate in the Blade Mechanics Seminar free of charge. For sponsoring opportunities, please get in touch with the Seminar Office.

Information for Presenters and Registration

Registrations and abstracts need to be submitted online at:

www.zhaw.ch/imes/blade-mechanics-seminar

Presenters are requested to upload a title and brief abstract (up to a 100 words) to the seminar web page as well as a short CV for introduction.

The deadline for the abstract submission is Monday, May 21st 2018.

After acceptance of the proposed topic by the seminar organizers, the presenter also needs to send in a 20-minute PowerPoint presentation, which must be cleared for publication. Every presentation will be distributed with the seminar proceedings.

Seminar Information at a Glance

Seminar Date: Tue, September 11, 2018
(Morning & Afternoon sessions)
Deadline for Reduced Participation Fee: Sun, August 19, 2018

Deadline for Abstract Submission (up to 100 words): Extended to Thur, May 31, 2018
Notification of Acceptance of Presentation: End of June 2018
Publication of Seminar Agenda: July 2018
Deadline for Presentation Submission: Sun, August 19, 2018

Length of presentation: Up to 20 minutes

Location

ZHAW Zurich University of Applied Sciences
Eulachpassage, TN E0.58
Technikumstrasse 71
8400 Winterthur
Switzerland

Travel to ZHAW, Winterthur

Winterthur is easily accessible by express trains from Zurich Airport in about 15 minutes and Zurich city in 25 minutes. From the main railway-station, the seminar location can be reached within a walking distance of less than 5 minutes. Additional information can be obtained from the seminar office (see below).

Seminar Organizer

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Please forward this invitation to your colleagues who are interested in attending this event.

We are looking forward to welcoming you at the Blade Mechanics Seminar soon.

Best regards

Prof. Dr. Jürg Meier

Dr. Thomas Mayer