



## Scope

Components, assemblies and even entire systems are characterised by cyclic-oscillating, time-varying and often random load sequences that can lead to material fatigue and other damage mechanisms. The associated failures, downtimes or maintenance requirements are causes of high costs and damage consequences. Therefore, understanding the dependency of fatigue damage and random cyclic loading is a necessary prerequisite for the operationally durable dimensioning of components and structures.

However, such a component design in accordance with the principles of fatigue strength is not only motivated by the effort to avoid damage and repairs. Today's increasingly important issues of lightweight construction, material and energy efficiency and, thus, improved sustainability require exact knowledge of the operational loads and the corresponding fatigue behaviour. Sustainability in a modern sense means the most efficient possible use of available resources and this goal can only be achieved for many components and structures if the load sequences occurring in operation are known and taken into account for the optimisation of materials, design and production. Variable load amplitudes as a characteristic feature of typical operational load sequences thus become a very important design parameter for sustainable, optimised components and structures.

Therefore, the goal of this conference, organized by the German Association for Materials Research and Testing (DVM), is to provide a platform to the international community for exchanging ideas and information about recent developments, new scientific approaches and industrial applications regarding variable amplitude fatigue of materials, components and structures. Started in 2002, the 2024 conference will be the fifth in a row and will continue to provide excellent opportunities for researchers and industrial representatives to discuss recent achievements and results of research studies, new approaches and state-of-the-art processes in different industries.

A. Esderts, S. Werdin, C. Bleicher  
Chairmen of VAL5 International Conference

## Conference programme

The VAL5 conference schedule including session arrangements and abstracts of the contributions will be published on the conference website [val5.de](http://val5.de).

## Conference language

The conference language is English and will be required for abstracts, papers, posters and oral contributions.

## Call for Papers in the following Scientific Topics

The conference is open to valuable proposals related to six different key topics which are relevant for numerous different user industries. When submitting your abstract to the conference website [val5.de](http://val5.de), please indicate to which key topic (A to F), sub topic (1 to 4) and user industry (I to VI) your proposal refers.

### (A) Fatigue and vibration fatigue

- (1) Load assumptions and data reduction
- (2) Shock, harmonic and random vibrations
- (3) Multiaxial component & system life testing
- (4) Math modelling & computational fatigue

### (B) Fracture mechanics

- (1) Fatigue crack propagation
- (2) Microstructure and fractography
- (3) Modelling of cracks incl. microstructure models
- (4) Modelling of crack propagation incl. crack opening & closure

### (C) Advanced load data & reliability concepts

- (1) Data acquisition and georeferencing of data
- (2) Condition monitoring and residual life assessment
- (3) Data mining, big data and data analytics
- (4) Machine learning and predictive analytics

### (D) Test and control

- (1) Active systems using sensors, actuators and controls
- (2) Digital twins and 'in-the-loop' technologies
- (3) Advanced test rig hardware and control strategies
- (4) Virtual sensing

### (E) Advanced materials and manufacturing

- (1) New metallic material grades
- (2) Plastics and composites
- (3) Ceramics and smart materials
- (4) Additive Manufacturing and new joining technologies

### (F) Effects on lifetime

- (1) Design and materials
- (2) Environmental conditions and corrosion
- (3) Loading modes and effect of sequence
- (4) Surface treatment and residual stresses

- I Automotive (car, bus & truck)
- II Aviation
- III Railway
- IV Maritime
- V Civil & plant engineering
- VI others

## Exhibition

An accompanying exhibition showcasing technology, products and services related to variable amplitude fatigue is planned. For details please have a look at [val5.de](http://val5.de).

## Social Events

Events and possibilities for visiting companies and institutes will be announced soon at the conference website [val5.de](http://val5.de).

## Timeline

### April 2023

Start of abstract submission. For details please refer to the conference website [val5.de](http://val5.de)

### 15 September 2023

End of abstract submission

### 20 November 2023

Notification of authors about acceptance of their papers

### December 2023

Start of Early Bird registration

### 1<sup>st</sup> March 2024

- End of Early Bird registration
- Deadline for submission of full papers and registration including payment (conditional for publication of paper)

### 15 April 2024

Tentative conference programme online

### 15 May 2024

- Final conference programme available
- Submission of power point presentations

### 11 to 13 June 2024

VAL5 Conference in Dresden, Germany

## Conference proceedings and further Publications

Proceedings will be available as searchable PDF archive for download using an individual access code which comes together with the conference check-in.

Outstanding contributions to VAL5 will be selected for the publication in an extended format in special issues of renowned international journals such as »International Journal of Fatigue«, »Fatigue and Fracture of Engineering Materials« and »Structures and Engineering Fracture Mechanics«. Editorial boards will guide this process to ensure scientific impact and quality.

## Conference Venue

The name of Dresden is synonymous with art and culture. Dresden is the capital of Saxony and is located along the Elbe River. The 800 year old Baroque city offers cultural and art treasures of European rank, world-famous art collections, but also a lively theatre and music scene. Architectural jewels blend into a charming natural landscape. Situated close to the Elbe River in Dresden's leafy suburbs, the new Radisson Blu Park Hotel & Conference Centre, Dresden Radebeul, offers guests a peaceful location just 7 kilometres from Dresden city centre, 9 kilometres from Dresden Airport and 3 kilometres from the motorway, the hotel is easily accessible by road, rail and from the airport. For more information see [val5.de](http://val5.de).

## Travelling Information

Dresden is located just in the middle of the European Union and is reachable by motorways from Munich, Frankfurt, Hamburg or Berlin. Direct flights to Dresden are offered by airports all over the world or with only one stop from the international airports of Frankfurt and Munich. Details see [val5.de](http://val5.de).