

### DYNAmore GmbH Gesellschaft für FEM Ingenieurdienstleistungen

DYNAmore is dedicated to support engineers in solving nonlinear mechanical as well as multiphysical problems numerically. Our product portfolio includes the finite element solver LS-DYNA, the pre- and post-processor LS-PrePost and the optimization software LS-OPT as well as numerous finite element models needed for crash worthiness simulation (dummies, barriers, pedestrian and human models, ...). Our main field of activity is to sell, teach, support, and co-develop the software LS-DYNA and LS-OPT. In addition, we provide engineering services for numerical analysis and integrate simulation software in your CAE environment.

Our advanced training offer includes classical seminars, workshops, webinars, support and information days as well as LS-DYNA user conferences. More detailed information can also be found on our support and tutorial websites: [www.dynasupport.com](http://www.dynasupport.com) and [www.dynaexamples.com](http://www.dynaexamples.com).

We are one of the first addresses for pilot studies and development projects with respect to the simulation of nonlinear dynamic problems. We are always at your disposal to answer your questions on specific application as well as test licenses.

You will find DYNAmore in Stuttgart, Dresden, Ingolstadt, Berlin, Langlingen, Zurich (CH), Linköping (S), Gothenburg (S) and Torino (I).

### Organization

#### Date

12 - 13 November 2014, 9:00 - 17:00

#### Fee

950 Euro plus VAT, 50 % discount for universities.  
Students free of charge, provided there are vacancies.

#### Language

English

#### Location

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Industriestr. 2, D-70565 Stuttgart, Germany  
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[www.dynamore.de](http://www.dynamore.de)

#### Registration

Please use the registration form or register online at:  
[www.dynamore.de/failure](http://www.dynamore.de/failure).

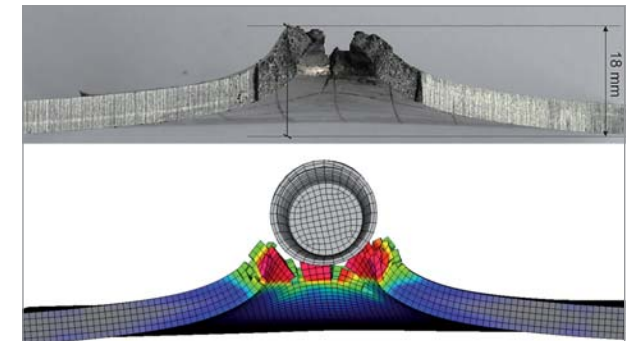
DYNAmore GmbH  
Industriestr. 2  
D-70565 Stuttgart  
Germany

Invitation to the seminar

## Damage and Failure Models

Taking Into Account Mesh Dependency and Triaxiality

12 - 13 November, Stuttgart, Germany



Courtesy of FVW (Forschungsvereinigung Verbrennungskraftmaschinen e.V.) and Inprosim GmbH



### Damage and Failure Models Taking Into Account Mesh Dependency and Triaxiality

This two-day seminar will discuss and clarify issues related to the complex adjustment of material models considering damage and failure. Starting with the design process of the experimental layout, the seminar will embrace everything to the point of actually creating material cards using LS-DYNA, thereby reflecting the entire verification and validation process.

Herein, a detailed explanation of the conversion of experimental data into true Cauchy stresses and logarithmic strains will be given. Moreover, the dependency of deformations on anisotropy and triaxiality will be discussed under inclusion of the complex descriptions of failure. Of particular interest will be the influence of the model reduction with shell elements and their influence on failure models of, e.g., Wierzbicki, on the basis of Gurson, Johnson-Cook and extended Barlat models.

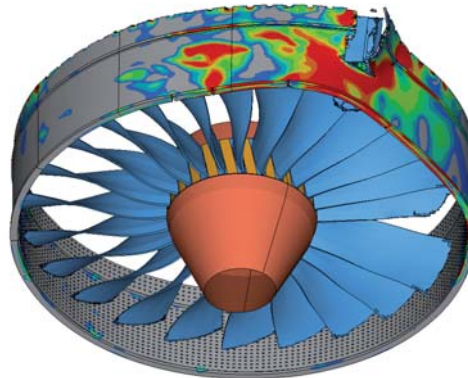
The influence of the element size dependency on the failure behavior will be discussed in the context of strain and energy equivalence. The issues of material stability and softening will be presented in detail using the Gurson material model. Exercise examples illustrate the theoretical findings.

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### Contents

- Basics
  - Rheology
  - Stress invariants (Triaxiality,  $J_2$ ,  $I_1$ , ...)
  - Shell assumptions
  - Theory of localisation
  - Mesh dependency
  - Regularisation
  - Nomenclature
  - Instability
- Failure models
  - Models in LSDYNA
  - Four simple criteria
  - Different diagrams
  - Non-proportional loading
  - Example model: Failure in SAMP
- Damage models
  - Elastic and ductile damage
  - Energy or strain equivalence
  - Data preparation
  - Models in LS-DYNA
- Some example in LS-DYNA
  - SAMP model
  - Gurson model
  - Mises + damage
  - GISSMO
  - Threepart model



Courtesy of Inprosim GmbH

### Registration

I herewith register for the seminar:  
„Damage and Failure Models Taking Into Account  
Mesh Dependency and Triaxiality“,  
12 - 13 November, Stuttgart, Germany.

Industry: 950 €  University: 475 €

Students free of charge, provided there are vacancies.

### Sender

First name: \_\_\_\_\_

Last name: \_\_\_\_\_

Company/University: \_\_\_\_\_

Dept.: \_\_\_\_\_

Street: \_\_\_\_\_

Zip-code, city: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Date, Signature: \_\_\_\_\_

Please complete and fax to +49(0)711-459600-29, send to DYNAmore GmbH, Industriestr. 2, D-70565 Stuttgart, Germany, or E-mail to seminar@dynamore.de.

Online registration at [www.dynamore.de/failure](http://www.dynamore.de/failure).

Data protection and competition law declaration of consent:  
With your registration you allow us the use and the processing of your data for seminar organization and own promotional purposes. You may at any time revoke these commitment. For this, please contact DYNAmore GmbH by phone or in writing.