

# Application of Rubber Fatigue Analysis with Endurica Software

For many companies, validating the service life for an elastomeric product is the most time-consuming and expensive stage of the product development process. The physical testing requires investment in prototypes that will be destroyed and lengthy trials that execute on expensive equipment. This course shows how Endurica software can be applied to virtually evaluate fatigue performance and solve design issues at the concept stage. After this 2-day course, you will be ready to use the software to diagnose and solve fatigue issues.

## Course Objectives

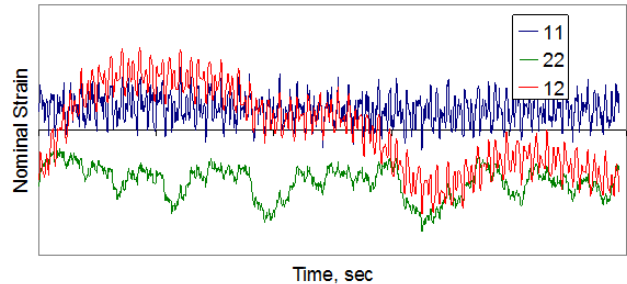
- Review three famous cases involving elastomer failure, and the issues at stake in fatigue analysis.
- Understand key ingredients of successful fatigue analysis for rubber
- Be able to select and specify material models that accurately describe elastomer stress-strain and fatigue behavior.
- Understand principles needed for accurate fatigue analysis: critical plane analysis, rainflow counting, and damage accumulation.
- Set up a Finite Element model to ensure accurate fatigue analysis.
- Use Endurica Software to solve durability issues involving multiaxial, variable amplitude loading.

## Format

The course features lectures and hands-on exercises focused on specifying, executing and interpreting numerical simulations of fatigue behavior. Breakfast, lunch, snacks, and dinner on Day 1 are provided.

## Instructor

Dr. Will Mars is an international authority on damage mechanics in elastomers. He brings two decades of experience developing product testing and simulation methods in the rubber industry. He is the editor of *Rubber Chemistry & Technology*.



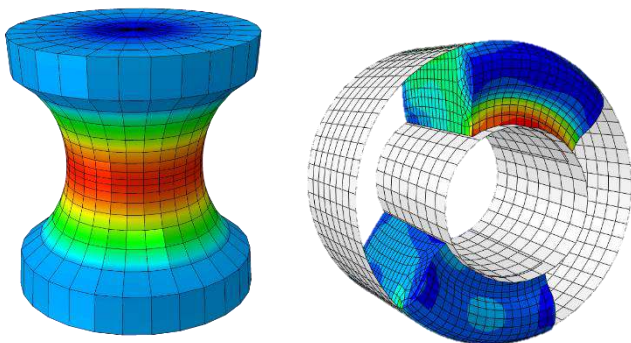
## Agenda

Day 1: 8:30 – 4:45 pm, 6 pm Course Dinner

- Rubber product failure - what is at stake?
- Overview of software capabilities and workflows
- Setting up the stress-strain model
- Using material models for fatigue - fully relaxing
- Using material models for fatigue - nonrelaxing and strain crystallization
- Industry Applications: bushing under a 2-channel road load signal, exhaust mount, prosthetic joint

Day 2: 8:15 – 3:30 pm

- Calibrating crack precursor size
- FEA for life prediction
- Hands-on: sheet with a hole example
- Dealing with Multiaxial loading in fatigue analysis
- Hands-on: Diabolo
- Dealing with Variable amplitude loading in fatigue analysis





**Registration Form: Application of Rubber Fatigue Analysis with Endurica Software**

Course Dates (see website): \_\_\_\_\_ Course Location: \_\_\_\_\_

Price: \$1695\* USD

\*for registrations received 14 days prior to course date. Registration after this date incurs a late fee of \$250.

Mail, fax or e-mail this form to:

Attention: Joe Suter, [jasuter@endurica.com](mailto:jasuter@endurica.com)  
Fax: 567-429-7034

Endurica LLC  
1219 West Main Cross, Suite 201  
Findlay, Ohio 45840

Name \_\_\_\_\_

Company Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Email \_\_\_\_\_ Work Phone \_\_\_\_\_

Any food or other preferences (veggie?) \_\_\_\_\_

Payment Method:

PO No. \_\_\_\_\_ Credit Card Type:  VISA  MasterCard  American Express

Card No. \_\_\_\_\_ Card CVV No. \_\_\_\_\_

Cardholder Name \_\_\_\_\_ Exp. Date \_\_\_\_\_

Card Billing Street Address \_\_\_\_\_

Card Billing ZIP Code \_\_\_\_\_

Signature: \_\_\_\_\_

Or, write a check payable to Endurica LLC.

Endurica LLC reserves the right to cancel a scheduled training course if the minimum class size is not met. In the event of a cancellation, Endurica LLC will make every attempt to notify registered participants within five working days. Payment made for a canceled course will be refunded in full or applied to another scheduled training course.

Participant cancellations must be received at least 10 working days in advance. Registrations canceled by participants less than 10 working days before the training course begins are subject to a 50% cancellation charge. For cancellations occurring on the first day of a scheduled training course, and for "no shows," the full tuition fee is non-refundable.