

SHORT COURSE
FATIGUE CONCEPTS IN DESIGN

NOVEMBER 6 - 9, 2001
30TH ANNUAL OFFERING

Presented By

The University of Iowa in conjunction with the SAE Fatigue Design and Evaluation Committee to be held at the Management Education Center,
Michigan State University, Troy, Michigan

Who Should Attend: Practicing engineers who desire to improve the fatigue resistance/durability of their products.

Course Procedure: The course will cover the most successful current fatigue design practices, the most useful theoretical fatigue concepts, and the most useful sources of data. The course will develop these concepts, show their application to real problems, afford opportunities to discuss problems and practices from the experience of participants, and include face to face commentary with faculty.

Course Content

- Fatigue Background
- Stress-Strain Relationships
 - Material Aspects - Micro/Macro
 - Statistical Aspects in Fatigue
 - Notch Effects & Life Assessment Models
 - Fatigue Behavior of Structural Materials
 - Introduction to Fracture Mechanics
 - Residual Stress
 - Fatigue Life Predictions
- Spectrum Loads & Simulation of Service History
- Application of Fracture Mechanics to Fatigue
 - Fatigue Design of Welded Joints
 - Corrosion Effects
 - Load & Strain Acquisition & Reduction
 - Contact Stress Fatigue & Fretting Fatigue
 - Fatigue Design Under Multiaxial Stress
 - Failure & Fractographic Analysis
 - Fatigue Design of Mechanically Fastened Joints

The course is offered currently at the Management Education Center, Michigan State University, 811 West Square Lake Road, Troy, MI 48098 (about 25 miles north of Detroit.) The sessions are scheduled to begin Tuesday, November 6, 2001 at 8:15 a.m., and close Friday afternoon, November 9, 2001. Registration will be held at 8:00 a.m. on Tuesday, November 6, 2001 in the lobby of the Management Education Center, Michigan State University, Troy, MI.

Teaching Faculty

PROF. RALPH I. STEPHENS

Mechanical Engineering Dept.
The University of Iowa
Course Coordinator

DR. HAROLD S. REEMSNYDER

Consultant
Fracture Technology Associates

PROF. DAVID W. HOEPPNER

Mechanical Engineering Dept.
University of Utah

MR. LEE E. TUCKER

Consultant-Fatigue Analysis
Formerly, John Deere Mgr. Product Evaluation

MR. STEVEN R. HAEG

Principal Staff Design Engineer
Vehicle Dynamics Division
MTS Systems Corporation

PROF. DREW V. NELSON

Mechanical Engineering Dept.
Stanford University

SCHEDULE OF EVENTS

TIMETABLE	TEACHING FACULTY	SESSION CONTENT
Tuesday		
A.M.		
8:00 - 8:15		Registration, Management Education Center Lobby.
8:15 - 9:30	STEPHENS	Introduction and welcome. History of fatigue, service fracture appearance, fatigue terminology and definitions, S-LogN.
9:50 - 10:50	REEMSNYDER	Elastic stresses and strains, plane stress, plane strain, notches, yielding at notches, residual stresses, stress intensity factor, and crack tip plastic zones.
11:00 - 12:00	HOEPPNER	Deformation of engineering materials - physical concepts.
P.M.		
1:00 - 2:00	TUCKER	Mechanical behavior: monotonic, engineering stress - strain, "true" stress - strain, cyclic behavior, cyclic strain hardening and softening, strain - N.
2:10 - 3:10	REEMSNYDER	Life assessment models in fatigue design including statistical aspects of fatigue.
3:30 - 4:30	HOEPPNER	Fundamental micro and macro aspects of fatigue crack nucleation, crack growth, and crack growth modes.
4:35 - 5:00	ALL FACULTY	Question and answer period.
Wednesday		
A.M.		
8:00 - 9:00	REEMSNYDER	Life assessment models in fatigue design cont.
9:20 - 10:20	HOEPPNER	Fatigue behavior of structural materials.
10:30 - 11:30	STEPHENS	Introduction to fracture mechanics.
11:35 - 12:00	ALL FACULTY	Question and answer period.
P.M.		
1:00 - 2:00	NELSON	Residual stress.
2:10 - 3:10	TUCKER	Fatigue life predictions.
3:30 - 4:30	HAEG	Spectrum loads and simulation of service history.
4:35 - 5:00	ALL FACULTY	Question and answer period.
Thursday		
A.M.		
8:00 - 9:00	TUCKER	Fatigue life predictions continued.
9:20 - 10:20	HAEG	Spectrum loads and simulation of service history continued.
10:30 - 11:30	STEPHENS	Application of fracture mechanics to fatigue.
11:35 - 12:00	ALL FACULTY	Question and answer period.
P.M.		
1:00 - 2:00	NELSON	Residual stress continued.
2:10 - 3:10	REEMSNYDER	Fatigue design of welded joints.
3:30 - 4:30	HOEPPNER	Corrosion effects.
4:35 - 5:00	ALL FACULTY	Question and answer period.
5:00 - 7:00		Participant - faculty social hour.
Friday		
A.M.		
8:00 - 8:50	STEPHENS	Fracture mechanics applied to fatigue design.
9:10 - 10:00	HAEG	Load and strain data acquisition and reduction.
10:10 - 11:00	HOEPPNER	Contact stress fatigue and fretting fatigue.
11:10 - 12:00	NELSON	Fatigue design under multiaxial states of stress.
P.M.		
12:50 - 1:45	STEPHENS	Failure and fractographic analysis.
1:55 - 2:45	REEMSNYDER	Fatigue design of mechanically fastened joints.
2:55 - 3:30	ALL FACULTY	Course summary and concluding remarks

REGISTRATION

Advance registration is required and will be limited. Enrollments will be accepted on a first-come basis. The registration fee covers instruction, course materials, morning and afternoon coffee breaks, luncheons, and one social hour. The registration fee for the four-day course is \$1275. A 10% discount is applicable for those reservations received by September 15, 2001 yielding an early registration fee of \$1145. Multiple registrants of five or more registering simultaneously as a coordinated group from a single company received by September 15, 2001 receive a 15% discount yielding a group early registration fee of \$1080 per registrant. Registrations become firm two weeks before the course, after which no refunds can be made. Registration may be made via company purchase order, check, money order or credit card.

REFERENCES FURNISHED

A comprehensive bound set of specifically designed notes with index, course slide figures, and references, is provided along with a copy of the new textbook METAL FATIGUE IN ENGINEERING 2nd Edition by R.I. Stephens, A. Fatemi, R.R. Stephens, and H.O. Fuchs. These materials will be mailed to registrants' shipping address three weeks prior to the course. A purchase order number, or payment must be received before the materials can be sent.

CONTINUING EDUCATION UNITS

This course has been approved for 3.0 general continuing education units through The University of Iowa. A certificate of attendance will be provided indicating the 3.0 CEU's.

HOUSING

A block of excellent rooms has been reserved for participants at the Northfield Hilton hotel that is located directly across the expressway from the Management Education Center, Michigan State University (15 minute walk).

A special group single rate of \$109 per night has been arranged with the Northfield Hilton. All rooms are fully air-conditioned and will be held until October 22, 2001 or until exhausted. Many other hotels with a wide variety of rates are available within short driving distance. Please make your Northfield Hilton reservations early by contacting the Northfield Hilton, 5500 Crooks Road, Troy, Michigan 48098, telephone 248/879-2100. When making your reservations, please indicate that you will be attending the Fatigue Concepts in Design Short Course in order to receive the reduced group rate.

ADDITIONAL INFORMATION MAY BE OBTAINED FROM

The University of Iowa Center for Conferences and Institutes (319)335-4141 or 1-800-551-9029.
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SAE - The University of Iowa Fatigue Concepts in Design November 6-9, 2001

Short course to be held at the Management Education Center, Michigan State University, Troy Michigan.

MAIL TO:

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I wish to enroll and enclose a check, money order, company purchase order or credit card payment payable in U.S. dollars to The Center for Conferences, in payment of the fee for the Fatigue Concepts in Design course to be held November 6-9, 2001 at the Management Education Center, Michigan State University, Troy, Michigan.

FEE OPTION (check one)

- ☐ 1. Single registration: fee = \$1275.
☐ 2. Single registration fee prior to September 15, 2001 with a 10% early registration discount: fee = \$1145.
☐ 3. Coordinated group registration fee of five or more from a single company prior to September 15, 2001 with a 15% discount: fee per person = \$1080. (Please provide registration information for each registrant.)

If payment is by credit card,

Circle one: **MASTERCARD** **VISA**

credit card number _____

expiration date _____

REGISTRATION FORM 01-219-01 7-12118-00

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Name _____
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Shipping Address for Course Materials (no P.O. boxes)

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Attendance Limited — Mail Early

The University of Iowa requests this information for the purpose of processing your registration. No persons outside The University of Iowa are routinely provided this information. The item marked * is optional and is used only to maintain your enrollment record.

Individuals with disabilities are encouraged to attend all University of Iowa-sponsored events. If you are a person with a disability who requires an accommodation in order to participate in this program, please contact THE CENTER FOR CONFERENCES AND INSTITUTES in advance at (319) 335-4157.

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Management Education Center
Michigan State University

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SAE FATIGUE DESIGN and EVALUATION COMMITTEE

To be held at the Management Education Center
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Troy, Michigan

Coordinator: Ralph I. Stephens,
Professor, Mechanical Engineering, The University of Iowa