

**4th EUROPEAN CONFERENCE
ON FRACTURE
(ECF 4)**

**September 22 — 24, 1982
Leoben, Austria**

**European Group on Fracture
Montanuniversität Leoben, Austria**

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Institut für Metallkunde und Werkstoffprüfung

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REGISTRATION

Conference Office during the Conference:

Montanuniversität Leoben, Auditorium maximum (Tel. 0 38 42 / 43 5 57)

6:00 p. m. — 10:00 p. m.,	Monday,	September 20
8:00 a. m. — 9:00 p. m.,	Tuesday,	September 21
8:00 a. m. — 7:00 p. m.,	Wednesday,	September 22
8:00 a. m. — 7:00 p. m.,	Thursday,	September 23
8:00 a. m. — 7:00 p. m.,	Friday,	September 24

FEE

öS 1500,—

*For entire Conference including proceedings, entertainment and reception by the Mayor of Leoben.

The meeting fee will have to be paid-in simultaneously with application, under mentioning the name of the participant, to the account „ECF 4“. Creditanstalt-Bankverein Leoben, 0091-48420/00.

GENERAL INFORMATION

Technical Speakers: Author's slides should be given to the marked desk thirty minutes prior to the session in which they are presented. Authors are asked to pick up slides just there immediately after the close of their session.

Message Center: Messages may be received at Registration Desk, AUDITORIUM MAXIMUM.

Special Events: A „Folklore“-evening will be held in the GÖSSERBRÄU in Göss at 8:30 p. m. on Wednesday, September 22. A reception for the participants will be given by the Mayor of Leoben, Dir. Leopold P o s c h in the BRÜCKL-WIRT close by Leoben with buffet at 8:00 p. m. on Thursday, September 23.

The ladies of the participants to the ECF 4 can cost-free take part in the programme of social events.

There is a possibility of travelling from Leoben to Gösserbräu and Brücklwirt by special buses.

This trips are free-of-charge for the holder of a conference card.

Details are given at the Conference Office.

Further tours for ladies are available through the organizer if desired of sufficient participants.

Please contact the Conference Office for sightseeing tours to the Nunnery of Göss and Museum of Leoben, the Austrian open-air Museum at Stübing (historic farms) and for an excursion to the „Erzberg“.

For the tours to Stübing and to the Erzberg the price per person and tour incl. coach fare, guide and entrance fees is about öS 150,—. Application by registration form.

Application:

We ask for your understanding, that only those returning their application form to the Conference Office in time can be regarded as participant to this Conference.

Deadline for Application:

August 20, 1982

We cannot guarantee to fulfil wishes from applications arriving at our office after August 20, 1982.

Room-Reservation:

We ask you to fill out application form for room reservation and to send it to the REISEBÜRO DER STADT LEOBEN, A-8700 Leoben, Austria.

The appropriate confirmation will be sent to you stating the name of the hotel.

We ask for your reservation by August 20, 1982. We cannot guarantee any orders arriving after that date.

Conference Folder:

All participants in the ECF 4 will receive a conference folder at the Conference Office together with the invitation cards and the proceedings.

MEETING OF TASK GROUPS

Tuesday September 21, 1982

9:30 a. m. **Room B** (Hüttenmännischer Hörsaal)

Elastoplastic Fracture	K. H. Schwalbe, J. G. Blauel
Micromechanisms	J. F. Knott, D. A. Curry
Fatigue	K. J. Miller

Fracture and the Role of Microstructure

Wednesday September 22, 1982

9:00 a. m. **Room A** (Auditorium maximum)

WELCOME ADDRESS

Se. Magn. Prof. Dr. H. Holzer (Chancellor of the University Leoben)

OPENING ADDRESS

Dr. R. Labbens (President of the European Group on Fracture)

INTRODUCTION

Prof. Dr. K. L. Maurer (University Leoben)

„FRACTURE AND FRACTURE TOUGHNESS“

Room A

A

Wednesday September 22, 1982

Session 1 Crack Initiation and Stable Crack Growth,
Behaviour of Crack Tip

9:30—11:10 a. m. Chairman: T. Varga

H. C. van Elst

„A MODEL ACCOUNTING FOR THE INCUBATION TIME, WHICH PRECEDES CRACK INITIATION AFTER DEVELOPMENT OF MATERIAL DAMAGE“

P. Hopkins, G. Jolley

„THE SIGNIFICANCE OF CRACK TIP BLUNTING (STRENGTH ZONES) IN FRACTURE TOUGHNESS SPECIMENS“

J. Lereim

„DUCTILE FRACTURE MECHANISMS OF STRUCTURAL STEELS“

„FATIGUE“

Room B

B

Wednesday September 22, 1982

Session 6 Crack Initiation

9:30—11:10 a. m. Chairman: K. J. Miller

J. N. Vincent, L. Rémy

„PERSISTENT SLIP BANDS INDUCED BY FATIGUE IN A NICKEL BASE SUPERALLOY“

G. Wold

„SURFACE CRACKING OF QUENCHED AND TEMPERED STEEL BY SHEAR INSTABILITY, EFFECT ON FATIGUE CRACK INITIATION“

J. Mendez, P. Violan, C. Gasc

„FATIGUE CRACK INITIATION MECHANISMS IN AIR AND IN VACUUM IN POLYCRYSTALLINE COPPER“

A

C. P. You, J. F. Knott
„DUCTILE FRACTURE IN HIGH STRENGTH
STRUCTURAL STEELS“

11:10 — 11:30 a. m. Break

11:30 — 12:45 p. m. Chairman: H. C. van Elst
G. Michot, A. George, G. Champier
„DISLOCATION DEVELOPED AROUND CRACK TIPS
IN SILICON AND THEIR INFLUENCE ON FRACTURE
TOUGHNESS“

M. Pfuff
„DISLOCATION-THEORETICAL APPROACH TO THE
BRITTLE-TO-DUCTILE TRANSITION IN METALS“

G. Green
„EFFECTS OF ORIENTATION ON DUCTILE CRACK“

12:45 — 2:15 p. m. Lunch-Hour

Session 2 Crack Growth Resistance

2:15 — 4:20 p. m. Chairman: J. F. Knott
B. Voss, J. G. Blauel
„EXPERIMENTAL DETERMINATION OF CRACK
GROWTH RESISTANCE CURVES“
W. Schmitt, D. Siegele, T. Hollstein
„NUMERICAL ANALYSIS OF ELASTIC-PLASTIC
FRACTURE MECHANICS EXPERIMENTS“
T. V. Duggan, R. L. Jones
„COMPARISON OF R-RESISTANCE CURVES“
H. J. Kaiser, K. E. Hagedorn
„PREDICTION OF MAXIMUM LOAD VALUES OF
DIFFERENT SIZED CT-SPECIMENS USING THE
J-R-CURVE-CONCEPT“
H. Wieninger, R. F. Pabst
„K₂'-CURVE MEASUREMENTS WITH CERAMIC
MATERIALS“

B

I. Verpoest, A. Deruyttere,
E. Aernoudt
„THE FATIGUE LIMIT OF STEEL WIRES AS
DETERMINED BY THE FATIGUE THRESHOLD (ΔK_{TH})
AND THE SURFACE PROPERTIES“

11:10 — 11:30 a. m. Break

11:30 — 12:45 p. m. Chairman: R. Stickler
W. Ruch, V. Gerold
„THE INFLUENCE OF MICROSTRUCTURE ON
FATIGUE CRACK INITIATION AND FATIGUE CRACK
PROPAGATION IN Al-Mg-Si ALLOYS“

J. Foth, H. Nowack, G. Lütjering
„CRACK INITIATION AND MICRO CRACK
PROPAGATION UNDER CONSTANT AMPLITUDE
AND PROGRAM LOADING HISTORIES“

G. Kompek, F. E. Matzer, K. L. Maurer
„CRACK INITIATION AND CRACK PROPAGATION
BY TORSIONAL FATIGUE IN LOW CARBON STEELS“

12:45 — 2:15 p. m. Lunch-Hour

Session 7 Crack Growth

2:15 — 4:20 p. m. Chairman: G. Lütjering
A. Bignonnet, R. Namdar, M. Truchon
„FATIGUE CRACK GROWTH RATE IN AIR, OF
QUENCHED AND TEMPERED STEELS“
J. Petit, P. Violan, P. Renaud
„EFFECT OF MICROSTRUCTURE ON CRACK
GROWTH IN A HIGH STRENGTH ALUMINIUM
ALLOY“
K. Schulte, H. Nowack
„THE INFLUENCE OF INCOHERENT PARTICLES ON
FATIGUE CRACK PROPAGATION UNDER VARIABLE
AMPLITUDE LOADING IN HIGH-STRENGTH
ALUMINIUM ALLOYS“
D. Rhodes, K. J. Nix, J. C. Radon
„VOID COALESCENCE DURING FATIGUE CRACK
GROWTH“
C. Maillard-Salin, H. P. Lieurade,
B. Thomas, P. Rabbe
„STUDY OF THE FATIGUE CRACK GROWTH
MECHANISM IN AN AUSTENO-FERRITIC
STAINLESS STEEL“

A

4:20 — 4:40 p. m. Break

Session 3 Microstructure and Fracture Toughness

4:40 — 6:20 p. m. Chairman: T. V. Duggan

F. L. Bastian, J. A. Charles
„STUDY OF THE INFLUENCE OF MICROSTRUCTURE
ON STABLE CRACK GROWTH“

J. Hofstätter, W. Schwarz, W. Meyer
„THE INFLUENCE OF STRUCTURAL PARAMETERS ON
CRACK PROPAGATION IN HIGH-STRENGTH STEELS“

W. K. Oberparleitner
„INFLUENCE OF MICROSTRUCTURE TO FRACTURE
TOUGHNESS AND CRACK PROPAGATION OF
TiAl6V4“

G. Marci, J. Eschweiler, T. Fett
„FRACTURE TOUGHNESS OF HEAVY SECTION 7075
— T 7351 ALUMINIUM SHEETS“

6:20 p. m. End

8:30 p. m. „Folklore“-Evening in the GOSSERBRAU
in Göss

Thursday September 23, 1982

Room A

Session 3 (continued)

9:00 — 11:05 a. m. Chairman: J. C. Radon

J. H. Tweed, J. F. Knott
„MICROSTRUCTURE-TOUGHNESS RELATIONSHIPS
IN C-Mn WELD-METAL“

L. Devillers, B. Marandet
„FRACTURE TOUGHNESS AND MICROSTRUCTURE
OF S. A. W. WELD METAL“

B

4:20 — 4:40 p. m. Break

4:40 — 6:20 p. m. Chairman: D. A. Curry

L. Guerra Rosa, C. Moura Branco,
J. C. Radon
„EFFECTS OF PLASTICITY AND STRAIN RATE ON
FATIGUE CRACK GROWTH“

R. Pippan, H.-P. Stüwe
„THE TEMPERATURE FIELD SURROUNDING THE
FATIGUE CRACK TIP“

A. F. Blom, A. Hadrboletz, B. Weiss
„THEORETICAL AND EXPERIMENTAL
DETERMINATION OF THRESHOLD STRESS INTENSITY
FACTORS IN A 20 kHz RESONANCE SYSTEM“

M. Prodan, J. C. Radon
„FRACTOGRAPHY AND THE SHAPE OF
PART-THROUGH CRACKS“

6:20 p. m. End

Thursday September 23, 1982

Room B

Session 7 (continued)

9:00 — 11:05 a. m. Chairman: K. T. Rie

Mrs. J. Woodtli-Folprecht
„THE EFFECT OF MICROSTRUCTURE ON
APPEARANCE OF FATIGUE FRACTURE OF H I STEEL“

K. Neailey
„EFFECTS ON THE FATIGUE CRACK GROWTH OF
TYPE 316 STAINLESS STEEL“

A

D. Firrao, R. Roberti, G. Silva
„THE ROLE OF MICROSTRUCTURE AND NOTCH
ROOT RADIUS ON THE FRACTURE TOUGHNESS OF
A MARTENSITE STRUCTURE STEEL“

D. Firrao, S. Anzalone, J. A. Begley
„THE INFLUENCE OF CARBIDE MORPHOLOGY ON
THE UPPER-SHELF FRACTURE TOUGHNESS (J_{Ic})“

P. Uggowitzer, M. O. Speidel
„FRACTURE TOUGHNESS OF CAST STRUCTURES“

11:05 — 11:25 a. m. Break

11:25 — 12:40 p. m. Chairman: C. M. Branco

A. Gysler, V. Bachmann, G. Lütjering
„EFFECT OF MICROSTRUCTURE ON FRACTURE
TOUGHNESS OF AGE-HARDENED ALLOYS“

D. Dormagen, H.-J. Rosezin, W. Dahl
„INFLUENCE OF MICROSTRUCTURE ON THE
TOUGHNESS OF A STEEL 20 MnMoNi55“

S. Slatcher, J. F. Knott
„INFLUENCE OF MICROSTRUCTURE ON THE
FRACTURE TOUGHNESS OF TEMPERED MARTEN-
SITIC ALLOY STEELS“

12:40 — 2:15 p. m. Lunch-Hour

2:15 — 4:20 p. m. Chairman: H. Kotilainen

C. Berger, F. Staif
„FRACTURE TOUGHNESS INVESTIGATIONS OF
LONG-TIME BEHAVIOUR OF THE CAST STEEL
G-X 8 CrNi 12“

B

C. Robin, C. Chehimi, G. Pluvinage
„INFLUENCE OF OVERLOADS ON THE SUBSEQUENT
CRACK GROWTH OF A FATIGUE CRACK“

K. Pedersen, O. Lohne
„THE EFFECT OF GRAIN STRUCTURE ON FATIGUE
LIFE OF AGE HARDENING ALUMINIUM ALLOYS“

Y. Katz, A. Bussiba, H. Matthias
„THE ROLE OF INDUCED PHASE TRANSFORMATIONS
ON FATIGUE PROCESSES IN AISI 304L“

11:05 — 11:25 a. m. Break

Session 8 Influence of Environment and Temperature

11:25 — 12:40 p. m. Chairman: C. Gasc
J. S. Crompton, J. W. Martin
„FATIGUE CRACK PROPAGATION AT ELEVATED
TEMPERATURE“

A. Nyilas, H. Krauth
„FRACTURE TOUGHNESS AND FATIGUE BEHAVIOUR
OF AUSTENITIC STEELS AT 77 AND 4 K“

M. Réger, L. Rémy
„INFLUENCE OF ENVIRONMENT ON MICROCRACK
PROPAGATION IN HIGH TEMPERATURE LOW
CYCLE FATIGUE“

12:40 — 2:15 p. m. Lunch-Hour

2:15 — 4:20 p. m. Chairman: D. Firrao
K. Törrönen, M. Kemppainen,
H. Hänninen, S. Salonen
„THE EFFECT OF INCLUSIONS ON THE ENVIRON-
MENTALLY ACCELERATED CYCLIC CRACK GROWTH
OF REACTOR PRESSURE VESSEL STEELS IN
SIMULATED LWR ENVIRONMENTS“

A

H. Marques Caminha jun., F. L. Bastian
„EFFECT OF SIDE GROOVES AND ORIENTATION OF
THE TEST PIECES ON THE CRACK OPENING
DISPLACEMENT VALUES OF A STRUCTURAL STEEL“

K. Hermann
„QUASISTATIC EXTENSION OF AN INTERFACE
CRACK“

H. Mildner, T. Varga, G. Schneeweiss
„THE INFLUENCE OF MICROSTRUCTURE, SPECIMEN
SIZE AND TEST TEMPERATURE ON SOME ELASTIC-
PLASTIC FRACTURE MECHANICS VALUES OF
STRUCTURAL STEELS“

P. Balladon, J. Heritier, P. Rabbe
„INFLUENCE OF MICROSTRUCTURE AND
TEMPERATURE ON THE FRACTURE TOUGHNESS OF
A 316 L STEEL“

4:20 — 4:40 p. m. Break

Session 4 Sources of Scatter in Fracture Toughness

4:40 — 6:20 p. m. Chairman: H. J. Schwalbe

J. F. Knott
„SOURCES OF SCATTER IN FRACTURE TOUGHNESS
VALUES AND IN FATIGUE-CRACK PROPAGATION-
RATES“

S. Sedmak, L. Nedeljković,
A. Radović
„INVESTIGATION OF MECHANICAL AND
STRUCTURAL ANISOTROPY OF N-A- XTRA 70 MAG
WELDMENTS“

D. A. Curry, I. Milne, K. N. Akhurst
„SCATTER IN THE CLEAVAGE FRACTURE
TOUGHNESS OF A533B PLATE“

G. L. Zambelli, L. Haenny
„TOUGHNESS VALUES DISPERSION CORRELATED
WITH FRACTURE PATH PROFILOMETRIC ANALYSIS
OF GREY CAST IRON“

6:20 p. m. End

8:00 p. m. Reception by the Mayor of Leoben
Dir. L. Posch in the BRÜCKLWIRT

B

H. Schmidt, B. Weiss, R. Stickler
„CORROSION FATIGUE CRACKING BEHAVIOUR
OF AUSTENITIC STAINLESS STEELS IN CHLORIDE
SOLUTIONS AT ROOM TEMPERATURE“

G. Nouail, P. Poudou, J. Ayel,
G. Pluinage
„IMPORTANCE OF LUBRICANT AS ENVIRONMENT
ON FATIGUE FAILURE“

K. T. Rie, Th. Lampe, W. Kohler
„INFLUENCE OF PLASMA HEAT TREATMENT AND
ENVIRONMENTAL CONDITIONS ON CYCLIC
BEHAVIOUR“

K. T. Rie, W. Kohler
„EFFECTS OF MICROSTRUCTURES ON
LCF-BEHAVIOUR OF STEELS IN HIGH PRESSURE
HYDROGEN ENVIRONMENT“

4:20 — 4:40 p. m. Break

Session 9 Fractography

4:40 — 5:55 p. m. Chairman: H.-P. Lieurade

L. E. Culver, J. C. Balthazar, J. C. Radon
„A FRACTOGRAPHY OF FATIGUE CRACKING IN A
CAST ALUMINIUM ALLOY AT A RANGE OF
TEMPERATURES“

B. Bauer, M. Frippan, H. E. Exner
„THREE-DIMENSIONAL FRACTOGRAPHY“

G. Airoidi
„QUANTITATIVE FRACTURE SURFACE PROFILE
ANALYSIS IN ENVIRONMENTAL FATIGUE TESTS“

5:55 p. m. End

A

Friday September 24, 1982

Room A

9:00 a. m. Report of the Task Groups

Session 5 Microstructure and Fracture

9:45—11:00 a. m. Chairman: J. G. Blauel

H. Kotilainen

„THE CLEAVAGE FRACTURE STRENGTH IN A BAINITIC MICROSTRUCTURE“

R. Padmanabhan, W. E. Wood

„INVERSE RESPONSE OF CHARPY IMPACT AND PLANE STRAIN FRACTURE TOUGHNESS TO MICROSTRUCTURAL VARIATIONS IN A LOW ALLOY STEEL“

J. Buchar, Z. Knésl, Z. Bílek

„THE INFLUENCE OF STEEL MICROSTRUCTURE ON DYNAMIC FRACTURE TOUGHNESS“

11:00—11:20 a. m. Break

11:20—1:00 p. m. Chairman: E. Sommer

D. Aurich, R. Helms

„DUCTILITY AND MICROSTRUCTURE OF FERRITIC CAST IRON WITH NODULAR GRAPHITE“

R. Ebner, K. L. Maurer

„MICROSTRUCTURE AND DUCTILE FRACTURE OF A QUENCHED AND TEMPERED STEEL“

K. Mohr, P. J. Ennis, H. Nickel,

H. Schuster

„THE EFFECT OF CARBIDE MORPHOLOGY ON THE FRACTURE OF CARBURIZED NICKEL-BASE ALLOYS“

B

Friday September 24, 1982

Room B

Session 10 High Temperature Behaviour of Ceramics

9:45—11:00 a. m. Chairman: R. F. Pabst

G. Orange, J. C. Glandus, G. Fantozzi,
P. Boch

„HIGH TEMPERATURE FRACTURE BEHAVIOUR OF A SINTERED B' SIALON MATERIAL“

J. C. Glandus, P. Boch

„THERMAL SHOCK RESISTANCE OF CERAMICS SUBMITTED TO SEVERE SHOCKS“

A. Bornhauser, K. Kromp, R. F. Pabst

„DIRECT MEASUREMENTS OF CRACK INITIATION AND CRACK EXTENSION OF CERAMIC MATERIALS AT HIGH TEMPERATURES“

11:00—11:20 a. m. Break

Session 11 Thermal Fatigue

11:20—1:00 p. m. Chairman: M. O. Speidel

L. Kosec, F. Vodopivec

„NUCLEATION AND GROWTH OF THERMAL FATIGUE CRACKS IN A SEGREGATED TOOL STEEL“

A. Dias, J. Giusti, H.-P. Lieurade

„INFLUENCE OF DIFFERENT MECHANICAL AND METALLURGICAL PARAMETERS ON THE MECHANISMS OF CRACK INITIATION BY THERMAL FATIGUE AND CRACK PROPAGATION IN THE CASE OF HOT ROLLING ROLLS“

G. Degallaix, J. Foct

„HIGH-TEMPERATURE LOW-CYCLE FATIGUE OF A MARTENSITIC STAINLESS STEEL. NEW DAMAGE MODEL, APPLIED TO THERMAL FATIGUE“

A

J. Rodić, A. Rodić
„CONTRIBUTION TO THE RESEARCH OF FRACTURE
MICROMECHANISMS AND MORPHOLOGY OF
Cr-Mo-V TOOL STEELS“

1:00 — 2:30 p. m. Lunch-Hour

2:30 — 4:35 p. m. Chairman: L. O. Faria

G. Sperl
„FRACTURE OF AUSTENITIC STEEL SHEETS AT
LOW TEMPERATURES“

V. Radmilović, D. J. Drobňak
„DUCTILE FRACTURE IN A V/Nb DUAL PHASE STEEL“

K. Kühne, H. Dünnewald, W. Dahl
„REASONS FOR THE APPEARANCE OF SEPARATIONS
IN HSLA-STEELS“

B. Engl, A. Fuchs
„THE CAUSE OF SEPARATIONS AND ITS EFFECTS
ON FRACTURE BEHAVIOUR“

R. Eck, I. Jäger, E. Pink
„FRACTURE BEHAVIOUR OF MOLYBDENUM
BASE ALLOYS“

4:35 p. m. **Close of Meeting**

B

T. Schöberl, R. Danzer
„LOW CYCLE FATIGUE OF X40CrMoV51
AT HIGH TEMPERATURES“

1:00 — 2:30 p. m. Lunch-Hour

Session 12 Creep

2:30 — 4:35 p. m. Chairman: H. P. Stüwe

R. B. Scarlin, K. N. Melton, W. Hoffelner
„FATIGUE AND FRACTURE MECHANICS OF A
WROUGHT Ni-BASE ALLOY“

H. Schmidt, W. Hoffelner
„ON THE INTERACTION OF HIGH-CYCLE-FATIGUE
AND CREEP IN THE CAST NICKELBASE-SUPER-
ALLOY IN 738 LC“

A. v. Stubbendorff
„CREEP TESTS ON TITAN Ti 993“

B. Quantin, M. Guttman
„AN ANALYTICAL MODEL OF INTERGRANULAR
CREEP-CRACKING APPLICATION TO THE STRESS-
RUPTURE OF A PRECIPITATION HARDENED
Al-Mg-Si ALLOY AT 0.45 T_M INFLUENCE OF
MICROSTRUCTURE AND OF AN EMBRITTLING
IMPURITY“

H. M. Yun, P. J. Ennis, H. Nickel,
H. Schuster
„COMPARISON OF CREEP FRACTURE IN AIR AND
IN SIMULATED HIGH TEMPERATURE REACTOR
HELIUM“

4:35 p. m. **Close of Meeting**

5:00 p. m. **EGF Conference (Room B)
Meeting of the National Representatives of the
EGF**