# FITNET FITNESS-FOR-SERVICE (FFS) ANNEX

## Revision MK8

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**NOTE**

This **FITNET FFS Procedure** (Revision MK8) has been developed within the European Fitness for Service Thematic Network (FITNET TN) and is not a standard. It is developed under the rules of CEN Workshop Agreement 22 (CWA22) to provide guidelines for assessing the structural significance of postulated or detected flaws with respect to FRACTURE, FATIGUE, CREEP and CORROSION damage in metallic structures with and without welds. It provides updated and validated FFS procedure in a unified form to be used to ensure and enhance structural safety and efficiency of in-service structures and new engineering structures at design stage.

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## Contents (Vol. II)



 

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# Foreword

European **Fit**ness-for-Service **Net**work (**FITNET**) was a four-and-a-half-year thematic network developed within the "Competitive and Sustainable Growth (GROWTH)" research programme of the European Community under the contract of GIRT-CT-2001-05071. This thematic network started to work in February 2002 with the objective of developing and extending the use of fitness-for-service procedures to assess postulated or real damage due to **FRACTURE**, **FATIGUE**, **CREEP** and **CORROSION** in metallic structures. About 60 experts from 16 European countries (as well as from Japan, Korea and USA) covering universities, research and technology organisations and a wide range of industrial sectors have provided contributions for the development of this **FITNET FFS Procedure** which addresses the analysis of four major failure modes.

The **FITNET FFS Procedure** is designed to assess the structural integrity of metallic welded or non-welded structures transmitting loads. In particular it embodies techniques for dealing with defects (known or postulated) to be present, in a structure together with the possible growth of such defects by a range of mechanisms and the assessment techniques required to evaluate the failure risk.

Flaws (such as cracks, welding defects and corrosion damage etc.) can arise during the manufacture and/or use of metallic components in engineering structures. For safety-critical structures such as aircraft, pressure vessels and pipelines, the failure of a single component due to the presence of a flaw can threaten human life, as well as having severe economic and environmental consequences. Other flaws can be harmless, as they will not lead to failure during the lifetime of the structure and hence repair of such flaws or replacement of the respective component is economically wasteful. The **FITNET FFS Procedure** can be used by expert engineers working in the field of structural safety, advanced manufacturing and design to assess the structural significance of such defects or postulated cracks or damage. The use of the FITNET FFS Procedure at the design and fabrication stages of advanced metallic structures working under static or cyclic loading conditions is also covered to provide an effective engineering tool for decisions with respect to material selection and fabrication route for an expected applied stress.

The **FITNET FFS Procedure** is developed by the expert members of the four Working Groups (WG):

WG 1: FRACTURE: Coordinated by S Webster, CORUS, UK

WG 2: FATIGUE: Coordinated by JJ Janosch, CARTEPILLAR, France

WG 3: CREEP: Coordinated by RA Ainsworth, BRITISH ENERGY, UK

WG 4: CORROSION: Coordinated by R Koers, SHELL, The Netherlands

This unified **Fitness-for-Service Procedure,** adopted by the European standardisation body of CEN via a "**CEN Workshop Agreement 22 (CWA22)**", covering four major structural failure modes, universally applicable to all major industries, able to be used at all stages of the life cycle of structures, aims to reach wider use in Europe and in the world for safer structures. The Italian standardisation organisation UNI has worked with the FITNET experts within the framework of the CWA22. This document is the 8$^{th}$ revision of the FITNET FFS procedure developed during the last four and half years. The FITNET FFS Procedure revision MK8 (January 2008) consists two volumes; Volume I: FITNET FFS Procedure, Volume II: Annexes.

In addition to these two volumes, there exists Case Studies and Tutorials as an additional information to provide selected validation cases and material for training and education.

A wide range of technical sources in the field of Fitness-for-Service technology, such as existing international or national standards; BS 7910, R6, API 579, WES 2805 codes, procedures of various industries, results of completed and on-going research projects (e.g. SINTAP) are used to develop this FITNET FFS procedure. A number of well-documented case studies are used for validation of assessment steps and routes to avoid non-conservatism in the procedure and check the sensitivity of an assessment to the selection of input parameters, assumptions and correlations. Further improvements and revisions in this **FITNET FFS Procedure (Rev. MK8)** will be carried out within the CEN standardisation process as well as after having users experience.

The FITNET TN consortium consists of following member and participant organisations in alphabetical order:

 

**GKSS RESEARCH CENTRE** (Coordinator), Germany

**ADVANTICA** UK

**ALCAN** France

**ALSTOM POWER** UK

**BATTELLE** USA

**BAY ZOLTAN INSTITUTE** Hungary

**BiSAFE** Czech Republic

**BRITISH ENERGY** UK

**BUREAU VERITAS** France

**CATERPILLAR** France

**CEIT** Spain

**CESI** Italy

**CETIM** France

**CORUS** UK

**CRF-FIAT** Italy

**CSM** Italy

**DLR Köln** Germany

**DNV** Sweden

**EDF** France

**EMPA** Switzerland

**FORCE INSTITUTE** Denmark

**HITACHI** Japan

**HSE** UK

**ICOM-EPFL** Switzerland

**IdS**
France

**IIS**
Italy

**INNOSPEXION**
Denmark

**IRSID-USINOR**
France

**IWM**
Germany

**IWT**
Germany

**JRC**
The Netherlands

**KIELCE UNIVERSITY OF TECHNOLOGY**
Poland

**KOREAN UNIVERSITY**
Korea

**MPA**
Germany

**NPL**
UK

**ROLLS-ROYCE**
UK

**SCK.CEN**
Belgium

**SHELL**
The Netherlands

**SKODA**
Czech Republic

**TECHNICAL UNIVERSITY OF DARMSTADT**
Germany

**TECNATOM**
Spain

**TWI**
UK

**UNIVERSITY OF AVEIRO**
Portugal

**UNIVERSITY OF CANTABRIA**
Spain

**UNIVERSITY OF GENT**
Belgium

**UNIVERSITY OF MARIBOR**
Slovenia

**UNIVERSITY OF OSAKA**
Japan

**VTT**
Finland

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