

Task Group – Non-linear Design Rules

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Draft Agenda of the second Teams[®] meeting of TG4

Tuesday March 1st, 2022

14:00 – 18:00 CET

1 Welcome of the participants

2 Remarks on previous meeting minutes

3 Remember EPERC Strategic Plan

- Comparison of International Codes & Standards
- Identification of Gaps & Needs with Code Organization and Industry
- Developments of R&D programs associated to dedicated Road Map developed by topics at the TG level
- Development of Recommended Practices with all the rules validation
- Performance of Benchmarks on practical cases
- Code Case Proposal
- Knowledge transfer through: Regular Thematic Technical Seminars, International Conference, Training courses, Master Classes, Summer School, Reports and Documentation
- Communication and Registration to different EPERC Activities through: www.eperc-aisbl.eu

4 Overview of the EPERC TG4 Road Map

4.1 WP1 : International Codes comparison

4.2 WP2 : Major failure Mode to Consider

4.3 WP3 : Major Degradation Mechanisms

4.4 WP4 : Flaw Tolerance

4.5 WP5 : Specific Cases

4.6 WP6 : Preliminary Recommended Practices

4.7 WP7 : EPERC TG4 R&D program

4.8 WP8 : Benchmarks

4.9 WP9 : Final Recommended Practices

4.10 WP10 : Synthesis and Code Cases Proposals

4.11 WP11 : Knowledge Transfer

5 EPERC TG4 Detailed Road map

5.1 WP1: International Codes comparison

- 5.1.1 **Nuclear Codes:** French RCCM, RCC-MRx, RSEM; USA ASME Boiler & Pressure Vessel Code: Section III Division 1 and 5, Section XI Division 1 and 2; and German KTA Code,
- 5.1.2 **Codes with available information in literature** (but no English Code Edition available): JSME Pressure Vessel Code, Russian Nuclear Codes and UK R6-R5 Rules (not strictly a Code)
- 5.1.3 **Non-nuclear Codes:** ASME Boiler & Pressure Vessel Code Section VIII Divisions 1-2-3, and ASME B 31 standards; European Standard EN13445, EN13480, EN12952, EN12953, French CODAP-CODETI; API Standards and British Standard BS5500-BS7610

5.2 Failure Modes

- 5.2.1 Plastic collapse
- 5.2.2 Plastic instability
- 5.2.3 Local failure
- 5.2.4 Buckling

For each of them a dedicated report with:

- Definitions
- Elastic approaches and criteria
- Elastic-plastic approach and criteria
- Limit load approach and criteria
- Other particular approaches and criteria
- Associated Material Properties needed
- Methods and Material data validation: theoretical, experimental, standards...

5.3 Degradation Mechanisms

- 5.3.1 Fatigue (*in connection with TG1 "Fatigue"*)
- 5.3.2 Plastic shakedown and Progressive Deformation
- 5.3.3 Creep consequences
 - *To be connected with TG6 " Creep Design Rules"*
 - Negligible creep rules
 - Creep-Fatigue interaction
 - Creep-Shakedown interaction
 - Creep-Buckling interaction
- 5.3.4 Corrosion
 - List of different type of Corrosion and Key parameters
 - Residual Stress analyses: fabrication and welding

For each of them a dedicated report with:

- Elastic approaches and criteria
- Elastic-plastic approach and criteria
- Limit load approach and criteria
- Other particular approaches and criteria
- Associated Material Properties needed
- Methods and Material data validation: theoretical, experimental, standards...

5.4 Flaw tolerance

To be connected with TG7 "Fitness For Service"

5.4.1 Reference Stress Method for J estimation

5.4.2 Rules and Recommendations for Direct analyses of J

5.4.3 Local approach of Rupture

5.4.4 Crack growth rules and crack tip plasticity

5.4.5 Creep consequences and C* evaluation rules (*connected with TG6 "Creep Design Rules"*)

For each of them a dedicated report with:

- Simplify methods and criteria
- Elastic-plastic methods for monotonic and cyclic loads
- Elastic-visco-plastic analysis and criteria
- Other particular approaches and criteria
- Associated Material Properties needed
- Methods and Material data validation: theoretical, experimental, standards...

5.5 Specific Cases

- Elastic Follow-up
- Bolted Flange and leak evaluation (in connection with TG3 on "Bolted Flange")
- Dynamic loads: seismic, water-hammer, vibration...
- Cumulative Strain criteria
- Opening Reinforcement rules
- HDPE piping

For each of them a dedicated report with:

- Simplify methods and criteria
- Nonlinear methods: recommendations and criteria
- Associated Material Properties needed
- Methods and Material data validation: theoretical, experimental, standards...

5.6 WP6 : Preliminary Recommended Practices Report

- Based on International Codes Review and the general review and recommendation previously done
- Rules, material properties, criteria and associated level of validation

5.7 WP7 : EPERC TG4 R&D program

- To be defined and based on Gaps and Needs review

5.8 WP8 : Benchmarks

- Definition of a list of Benchmarks and Sample Example
- To be released largely to a lot of actors

5.9 WP9 : Final Recommended Practices Report

- Preliminary Report + R&D results + Benchmark results analysis

5.10 WP10 : Synthesis and Code Cases Proposals

- A set of proposals to be largely released

5.11 WP11 : Knowledge Transfer

- Management of the different type of events:
 - Reports
 - Workshops and Seminars
 - Conferences
 - Summer School and Training Courses
 - Specific meetings with any user group

5.12 Closing Remarks

The meeting will be held as a web conference using Microsoft Teams®. All members and experts wishing to participate are kindly requested to register themselves on the EPERC web site, under “Seminars, Conferences and Meetings” in order to receive the link for the connection.

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NOTE:

Participation is free for all EPERC individual and company members. **As an exception to the actual EPERC Statute**, in order to promote participation to the research work of EPERC, **the Board of Directors has decided to admit free of charge at the meetings of TG4 also qualified experts having an experience on Non-linear analysis**, in order that they can evaluate the possibility of joining EPERC as members in order to participate also in the future meetings of this fundamental Task Group. Of course, the access to the technical documents presented in the meetings (except for meeting agendas and meeting reports) will remain reserved to EPERC members.

I wish to remind that **one of the main objectives of EPERC is to promote research projects** organized by a suitable group of individual members or member companies **financially supported by the Commission**, and this is very well possible considering the program of work presented in this agenda. Instructions and fees for joining EPERC (for individuals and/or companies) can be found under “Join us > membership”.

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