

International Fatigue Design Code Comparison

1 Code Name and References

- EN 13445
- Title and References
 - ...
 - ...
 - ...

2 Scope

- Components: vessels, pipes, valves, pumps, flanges, bellows, bolts, others...
 - List
 - ...
 - ...
 - ...
- Un-cracked components: Yes / No
- crack-like defects, sharp discontinuities:
 - Yes / No
 - ...

- Materials
 - List
 - ...
 - ...
- Base metal / Welds / HAZ
 - Considered Yes / No
 - ...
 - ...
- Environment: internal / external
 - List
 - ...
 - ...
 - ...
 - ...
- Temperatures min / max
 - min
 - max
 - negligible creep temperature
- Pressure min / max
 - ...
 - ...
 - ...

3 Main objectives for usage factor of 1

- Through wall crack
- Engineering crack around 3 mm
- Nnumber of cycles from 50 μm to 3 mm crack
- ...
- ...

4 Fatigue Exemption Rules

- Yes / No
- If Yes, describe the rules
 -
 -
 -
 -
 -
 -
 -
 -
 -

5 Ratcheting pre-analysis

- Yes / No
- If YES, describe the rules
 -
 -
 -
 -
 -
 -
 -
 -

6 Reference Method for base metal

6.1 Introduction

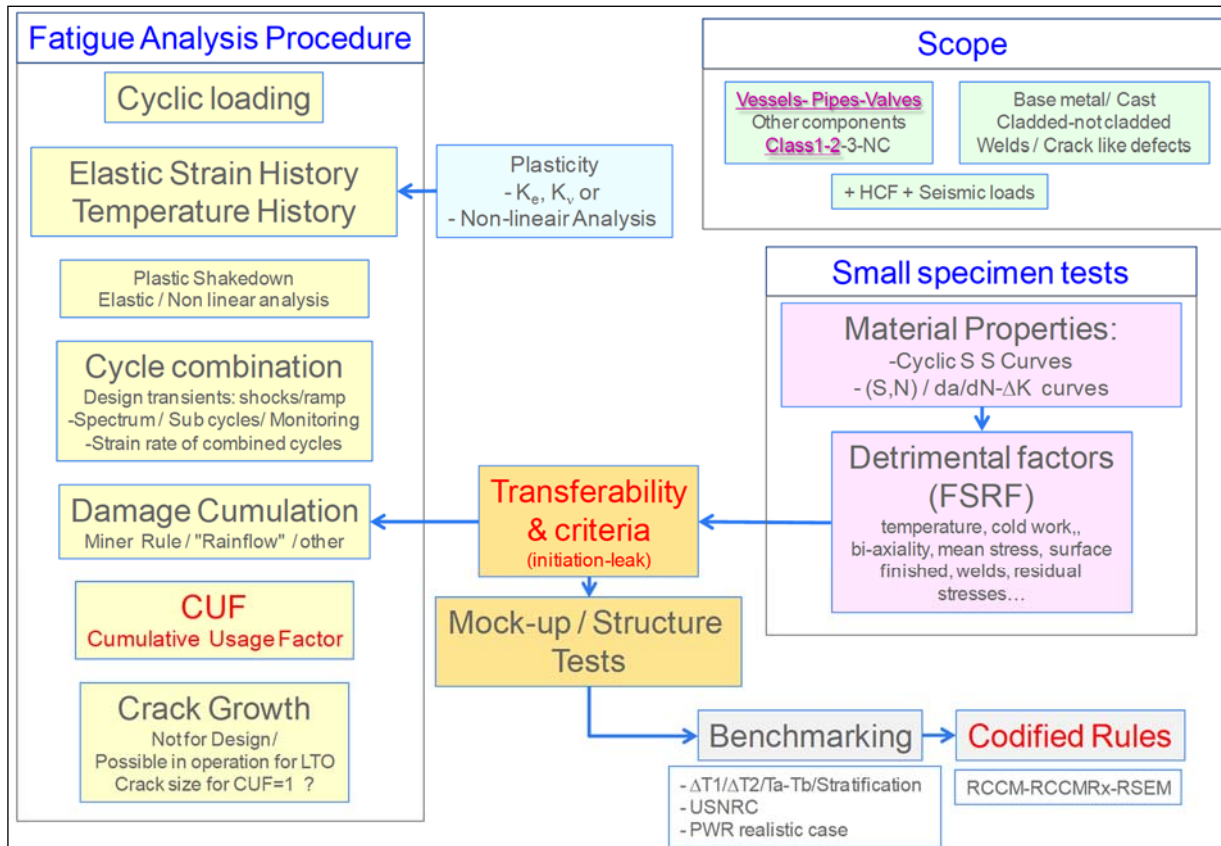


Figure 1 : General Fatigue Analysis Procedure and Validation

6.2 Basic Rules outside of discontinuities

6.2.1 Cyclic load definition

- **For each transient: Pressure - Temperature versus time**
- **Generally inner surface temperature / insulation on the outer surface**
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-
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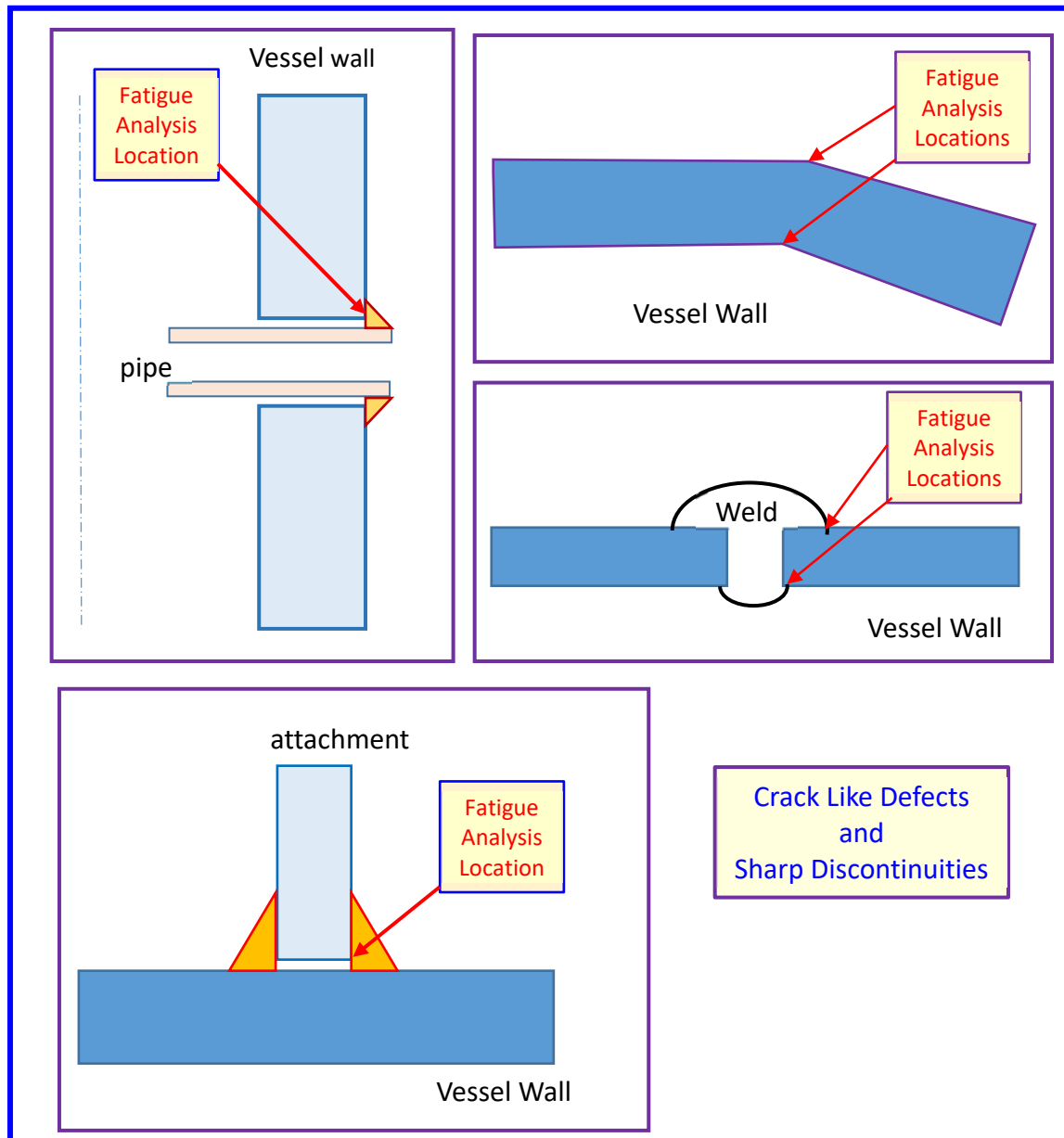
6.2.2 Elastic stress analysis

- **For each transient: evaluate all the stresses and strains versus time in the transient**
- **Parameter used for the analysis:**
 - Stresses?
 - Strains?
 - ...
- **Define an equivalent stress at each point you plan to perform the fatigue analyses:**
 - Von Mises?
 - Tresca?

- Describe the cycles combination rule
 - ...
 - ...
 - ...
 - ...
 - ...
 - ...
- Describe the plasticity correction: K_e , K_D , K_f
 - ...
 - ...
 - ...
- Is-it possible to analyze it with non-linear finite element ?
 - Yes / No
 - If yes describe the rule?
 - ...
 - ...
 - ...
- Use of cyclic stress-strain curve:
 - Yes / No:
 - If Yes, how?
 - ...
 - ...
 - ...
 - ...
- Final stress or strain amplitude for each transients and each locations
 - Use of stress or strain
- Selection of fatigue design curves
 - List of codified Fatigue curves
 - Number of cycles covered
 - ...
 - ...
- Describe the dedicated reduction factors
 - Mean stress
 - Surface finish
 - Wall Thickness
 - ...
 - ...
 - ...
- Define the allowable number of cycles
 -
- Evaluate the Usage factors for each locations
 -

Short Description of Specific Rules

1. Crack like Defects
2. Sharp discontinuity



3. Bolts

4. Bellows

5. Other specific cases

APPENDIX 1

Any appendix for detailed complementary presentation of any specific rules