



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Failure Analysis and Prevention

General Procedure of Failure Analysis: Question for analysis and report of FA

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Questionnaire

- Reduces possibility of overlooking of some aspects of FA
- Better clarity on directions that should be looked into as per case



Check list

- Sequence of failure
- Fracture/crack initiation site
- Cracking from surface/sub-surface
- Presence of stress raisers, if any
- How long the crack was present before fracture
- Intensity of loading
- Type of load: static , cyclic

Check list

- Type of stress: tensile, shear, bending
- Failure mechanism
- Temperature at the time of failure
- Role of wear in failure
- Possibility of corrosion, if any; if yes then type of corrosion
- Conformance of material with specification
- Class of materials

Check list

- Adequacy of load resisting cross sectional area
- Contribution of materials specification
- Contribution of mechanical properties
- Role of heat treatment in failure
- Possibility of improper manufacturing
- Possibility of improper assembly
- Possibility of improper repair; If yes, how was it repaired



Check list

- Run-in condition procedure
- Possibility of maintenance / lubrication issue
- Possibility of abuse in service
- Can design be better
- Likely hood of similar fracture/failures
- What is to be done to avoid repetition failures

Reporting of FA

- Report should be
 - Clear
 - Concisely
 - Logically



Reporting

- General headings to be included
 - Description of the failed part
 - Service conditions at the time of failure
 - Manufacturing and processing history of the failed component
 - Mechanical study of failure
 - Metallurgical evaluation of quality/ fracture
 - Summary of mechanisms that caused fracture/failure
 - Recommendations to avoid failure

Few more points

- Above guide is generic
- As per case different sections will prepared
- Lengthy reports will be have abstract/executive summary
- Glossary of terms be prepared for better understanding
- Appendixes be used for calculations, equations, results of chemical, mechanical and metallurgical tests for keeping proper flow of report and clarity.