



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Failure Analysis and Prevention

General Procedure of Failure Analysis: Background Info & Preliminary Examination

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Back ground info

- General information: name of part/system, section, department
- Design: Specification of metal, detailed part drawing, standard
- Manufacturing: Process, process parameter, handling, transformation, inspection standards, if any
- Service conditions: Type, magnitude, variation, temperature, pressure, environment, corrosion



Back ground info

- Photographic record: Important from subsequent legal implications point of view
- Selection of sample for study (failed/new): for comparing old /used one with new for observing effect of service, if any



Back ground info

- Abnormal conditions: Repair, temperature, loading, misalignment etc.
- Wreckage analysis:
 - position of each & every before disturbed: photography, sketches, tabulation etc.
 - Inventory



Preliminary examination of failed part

- Thorough examination of parts before cleaning
- Presence of soil, debris, paint, oil etc. can suggest failure sequence
- All these things present should be recorded
- Observation using unaided eye
 - Exceptional depth of focus
 - Ability to examine a) large area and b) detect change in texture and colour
 - Look for path cracks on the fracture surfaces



Preliminary examination of failed part

- Look for evidences at the breakdown site which may be lost if not vigilant
- These observations can indicate
 - Abnormal condition or abuse in service
 - General assessment of basic design and workmanship
 - Dimensions of all parts with photographs and sketches



Photographing fractures

- To show fractured part including pieces & their size, location and how were they related with assembly
- Examine the fracture surfaces using direct light from different angles to reveal fracture characteristics
- Identifying the areas of interest and need to be focused
- Mentioning photographs and their magnification

