



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Failure Analysis and Prevention

General Procedure of Failure Analysis: STEPS

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General procedure for failure analysis

- In the field of engineering, mechanical components are:
 - made using variety of materials
 - processed by different manufacturing processes and
 - used in extremely wide range of the service conditions.
- Potential causes of failure of the components and their mechanism also numerous.



Establishing FA procedure

- Therefore, procedure of the failure analysis of each component should be different
- FA procedure for each case must be developed after giving proper thought on
 - possible sequence of events before failure
 - proper evaluation of the situation
 - proper consideration of
 - material, manufacturing process, service history and actual working condition etc.



Avoid hurriedness

- Failure analyst tends to jump into conclusions based on half information and tries to prepare the samples for metallographic studies to look explore the deficiency in the material itself.
- This kind of quickness is uncalled for and in this process vital clues, evidences and information can be lost from the surface of the fractured components.



So how to go ahead

- Steps for FA are generic and need not to be followed in the specified sequence.
- The sequence of steps for FA will largely be determined by the findings of the investigation at any stage.
- Main objective of collecting evidences regarding causes of the failure is to establish sequence of events prior to the failure
- Provide suitable recommendations to prevent the similar failure in future.



General procedure for FA

- Collection of back ground information about failed components: Mfg, design, service
- Preliminary examination of failed components: parts, conditions, locations, photography, inventory
- Selection, preservation and cleaning of the sample
- Assessing the presence of discontinuity and defect in failed component by non-destructive testing



General procedure for FA

- Evaluation of the mechanical properties of the failed components
- Macroscopic observation of fracture surfaces and components
- Microscopic examination of fracture surfaces and components
- Metallographic examination of failed components including chemical analysis
- Establishing the fracture mechanism



General procedure for FA

- Failure analysis using fracture mechanics approach
- Conducting test under simulated conditions
- Analysis of findings of investigation
- Report writing with recommendation

