FAILURE INVESTIGATION AND ASSESSMENT OF LIFTING EQUIPMENT

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Reported by Goh Zhu Di, Lim Kie Yong and Dr David Y H Tay
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Chapter 1

Introduction
INTRODUCTION

Matcor Technology & Services Pte Ltd

Based in Singapore

Independent consultancy company in Materials and Corrosion for 25 years

Support Asia Pacific, North America, Africa and Europe

Specializes in the following areas:
  - Forensic investigations
  - Condition and metallurgical assessment
  - Structural integrity assessment
  - Remaining life assessment
  - Failure Analysis
  - In-House Laboratory Testing
INTRODUCTION

Judy Goh - Consultant

Experience in forensic engineering and equipment life assessment

Specializes in technical and life assessment of statutory equipment for extensions

Provides consultation services for application of corporate level approvals (CLA) with Ministry of Manpower, Singapore.

Speaker for the Aerospace Technology Seminar in 2013 organized by AELD and RSAF

Speaker for the Crane Safety Symposium in 2014 organized by WSH and Ministry of Manpower
Chapter 2

Forensic Engineering Investigation
FORENSIC ENGINEERING INVESTIGATION

Systematic and scientific investigation of a failed system or component to establish the primary mode and root cause of failures
FORENSIC ENGINEERING INVESTIGATION

- Engage consultant for investigation due to an incident or accident
- Conduct site investigations
- Carry out laboratory test and analysis
- Carry out NDT
- Ascertain root cause
- Report
- Documentation and photo taking
- Gathering evidence
- Research
- Litigation Technical Witness

- Sketches and drawing reviews
- Investigation and interviews
- Deploy specialist disciplines
Chapter 3

Analytical Methods Used in Forensic Investigation
ANALYTICAL METHODS USED IN INVESTIGATION

- Data Collection and Review of Background Information

- Preliminary Evaluation

- Visual and Macroscopic Examination
  (Sometimes aided with NDT)

- Application of Techniques
  (Fractography, Energy Dispersive X-ray (EDX) analysis, Metallographic, Hardness Test and Other Relevant Tests)

- Overall Evaluation and Proper Interpretation of Test Results and Available Background Information
Chapter 4

Crane Accidents and Failures
CRANE ACCIDENTS AND FAILURES
CRANE ACCIDENTS AND FAILURES
Chapter 5

Case Study 1
CASE STUDY 1
Detachment of Superstructure of Mobile Crane
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Detachment of Superstructure of Mobile Crane
CASE STUDY 1
Detachment of Superstructure of Mobile Crane

Fatigue

A Combination of Fatigue & Overload

Overload
CASE STUDY 1
Detachment of Superstructure of Mobile Crane

Lifting history: Frequent overloading lifting operations beyond capacity

Latest lifting operation was found to be carrying load beyond capacity

Pre-existing fatigue failures in almost half of the number of bolts
Chapter 6

Case Study 2
CASE STUDY 2
Broken Boom Hoist Wire Rope From A Crawler Tower Crane
CASE STUDY 2
Broken Boom Hoist Wire Rope From A Crawler Tower Crane

One fracture end of boom hoist wire rope near the moving bridle

Wound up hoisting wire rope
CASE STUDY 2
Broken Boom Hoist Wire Rope From A Crawler Tower Crane
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CASE STUDY 2
Broken Boom Hoist Wire Rope From A Crawler Tower Crane

Mode of Failure: General corrosion and corrosion fatigue over time in service

Root Cause: Inadequate greasing and poor maintenance of wire ropes
Chapter 7

Condition Assessment of Mobile Crane
CONDITION ASSESSMENT OF MOBILE CRANES

- Review operational and maintenance records
- Risk assessment and development of inspection plan
- Inspection with the aid of NDT
- Overall review and evaluation of the crane condition
CONDITION ASSESSMENT OF MOBILE CRANES
Thank You