Course Description

Course name	**#402 - Industrial Failure and Root Cause Investigation - Technology Focus**
Duration	**2 days**
Format	**Public classroom, Inhouse events and Online**

Overview

Mrs. Elisabet Blom, MSc, Vibration Specialist and Owner, Tremula Teknologi AB, Sweden.

Failure investigation is always a trauma for the organization. A trauma in which everybody is involved, from the CEO to workers at all levels. The critical first couple of minutes, hours or days should include them all. It is not unusual that the whole investigation can take months or even years. This course will include investigation faces, what to do, how to do it and how to handle personnel and equipment.

Technical challenges in a failure investigation are **not** locked in on a root cause from the beginning. To make this type of error there must be an open-minded working routine. This 2-day course will provide the engineers with a systematic thinking tool together with overview of different failure mechanisms. This course concentrates on the toolbox and how not to get caught in one possible root cause.

The course will discuss different fatigue mechanisms and reasons for them to occur.

For best learning experience, combine this course with course **#401 Industrial Failure and Root Cause Investigation - for Management.** This combination will benefit of a discount rate when attending both courses the same week.

Technical Focus

The technical focus is to explain how to handle an investigation from a technical point of view. This course will describe mechanisms and how to include and exclude different possible cause/causes of failure.

The course will discuss several different reasons for a particular type of damage. There is no reason to exclude causes unless they are proved unbelievable. We need a good management tool and good systematics. We will also discuss measurement possibilities and tools to predict future damage of the same type.

Course Content

This 2-day course processes the root cause analysis. How to create analysis and how to manage it. What should a root cause analysis contain? How to begin and how to conclude? The course will give tools to handle failure and what to discuss and how to achieve proper results.

Who Should Attend
This is a highly technical course. Best suitable for masters, engineers and technicians that will be present in a failure investigation. Aiming also to the person that will manage the investigation group as well as those who will precipitate as specialists and can handle knowledge about the site and their routines.

Course Daily Schedule

Day 1 first half

What is the definition of a failure?

- *Short summary of "Management During Investigation"*

Fish bone diagram

- *Theory*
- *Practical exercise*

Day 1 second half

Mechanisms for failures, overview

Mechanisms of mechanical failures and examples

- *Over load*
    - *Transients*
    - *Static overload*
- *Low cycle fatigue*
    - *Mechanical fatigue*
    - *Thermal fatigue*
- *High cycle fatigue*
- *Materials*
- *Chemistry*
- *Enviroment*

Day 2

This day is concentrated on explaining different mechanisms and how to prevent them. Correct design is always the best way to provide failures but sometimes it fails anyway.

- ***Overload failures***
    - *Early warning*
    - *Audit*
- ***Transient***
    - *Examples*
    - *Pipe vibrations*
    - *Electrical influences*
- ***Vibrations***
    - *Lateral vibration*
    - *Torsional vibration*
    - *Resonance*

Methods for identification using the fish bone diagram made day 1.

Discussion and experiences of failures in the group.

Instructor Biography

Mrs. Elisabet Blom, MSc, Vibration Specialist and Owner, Tremula Teknologi AB, Sweden, received her Master of Science in Mechanical Engineering in 1990 from Linköping University in Sweden. Her main thesis subject was fluid mechanics and thermodynamics. She also holds a bachelor's degree in chemistry from 1984. For the last 25 years Mrs. Blom has worked with vibration measurements. The combination of mechanical engineering and chemistry has been a powerful tool in concluding Root Cause Analysis on complex problems.

Mrs. Blom has been a part of the Vibration Department of ABB STAL (now Siemens Power Systems) as well as ÅF-Process Measurements and trouble shooting in energy. The last 10 years she has worked as an independent consultant with focus on measuring. Vibrations have been the main focus but solving a complex problem needs complex measurements combining skills in vibrations, acoustics, temperature, flow, pressure etc. Most projects have been for industry and in industry on site, as measurements done in controlled environment are hard to come by.

During the years Mrs. Blom has taught measuring courses at Linköping University and lectured in seminars and at various conferences.

Mrs. Blom joined the Continuing Education Institute-Europe faculty in 2017.