



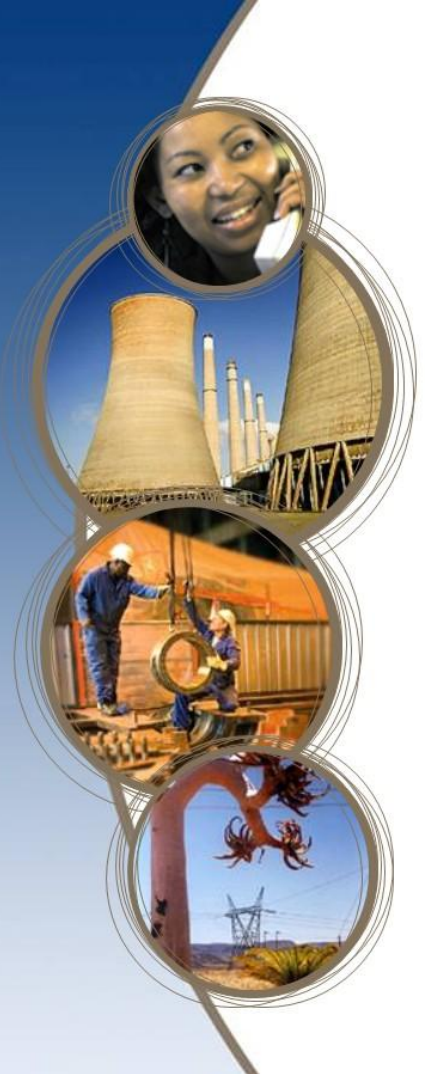
Steinbeis Advanced Risk Technologies Project

ESKOM RBI Implementation of Risk Based Inspection (RBI) Programme

at Eskom Head Office and 13 Power Stations

S. Jovanovic

Steinbeis, March 20, 2013





The client: Eskom

Company information

Eskom generates approximately 95% of the electricity used in South Africa and approximately 45% of the electricity used in Africa. Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. Additional power stations and major power lines are being built to meet rising electricity demand in South Africa. Eskom will continue to focus on improving and strengthening its core business of electricity generation, transmission, trading and distribution.

Eskom buys electricity from and sells electricity to the countries of the Southern African Development Community (SADC). The future involvement in African markets outside South Africa (that is the SADC countries connected to the South African grid and the rest of Africa) is limited to those projects that have a direct impact on ensuring security of supply for South Africa.



Customer:

Eskom Holdings SOC Limited, South Africa

Project Start/End: **Jan. 15, 2013 / Jan. 14, 2016**

Project value: approx. **4.3 million €**



The contract: Why Steinbeis R-Tech

Steinbeis Advanced Risk Technologies (R-Tech) was awarded the contract after a strong competition process involving leading global consulting companies, primarily due to

- its proven track record of accomplished RBI projects in Europe and Asia, and due to
- its leading role in establishing the new European approach and procedures for Risk Based Inspection and Management (RIMAP) which became a European pre-standard CEN-CWA15740:2008 and is currently under the process of becoming an EN standard.



Project background

- Consultancy services for the development and implementation of a RBI Management System for Eskom's 13 coal fired power plants and the Eskom head office.
- Alignment with the EU Pressure Equipment and European practice - which led inherently to the initiation of the Risk Based Inspection programme according to CWA 15740:2008 ("Steinbeis standard")
- Both the new-build projects and the currently ageing fleet are expected to benefit from RBI in terms of
 - Increased safety and availability
 - Improved economy



Project (technical) details

- The introduction of the new SA Pressure Equipment Regulation in 2009, has introduced a new standard (SANS 347) for categorization of pressure equipment and pressure piping
- Equipment is now (mandatory) classified as pressure equipment when operating at a pressure $\geq 50\text{kPa}$
- The certified Risk Based Inspection (RBI) programme, as part of a plant life cycle management strategy of Eskom prevent that, when “Exemption Eskom” falls away the need to revert back to 36 month testing (now 72 months!), as per the OHS Act.



RBI Advantages for Eskom

- The RBI allows graded approach to the inspections, in which the most critical equipment is subjected to a more rigorous inspection programme.
- RBI certified and approved user has the latitude to make a fitness-for-purpose decision based on the risk profile of the equipment.
- Risk analysis and inspection planning require a range of technical inputs and perspectives from different disciplines in order to create a stronger basis for decision-making.
- RBI Management System at each Site must be certified to international standards and re-certified 3-Yearly.



Project plan

1. Gap Analysis:

Head office and all Fossil-fired stations for 4 months
(Jan – May 2013)

2. Implementation Stage

Management System Development and Pilot Site:
At Lethabo Power Station for 13 months (2013/14) and
Roll-out (2014 to 2015)

3. Certification Stage

In parallel

- Training and education (Steinbeis University!)

Further Roll-out (under negotiation)

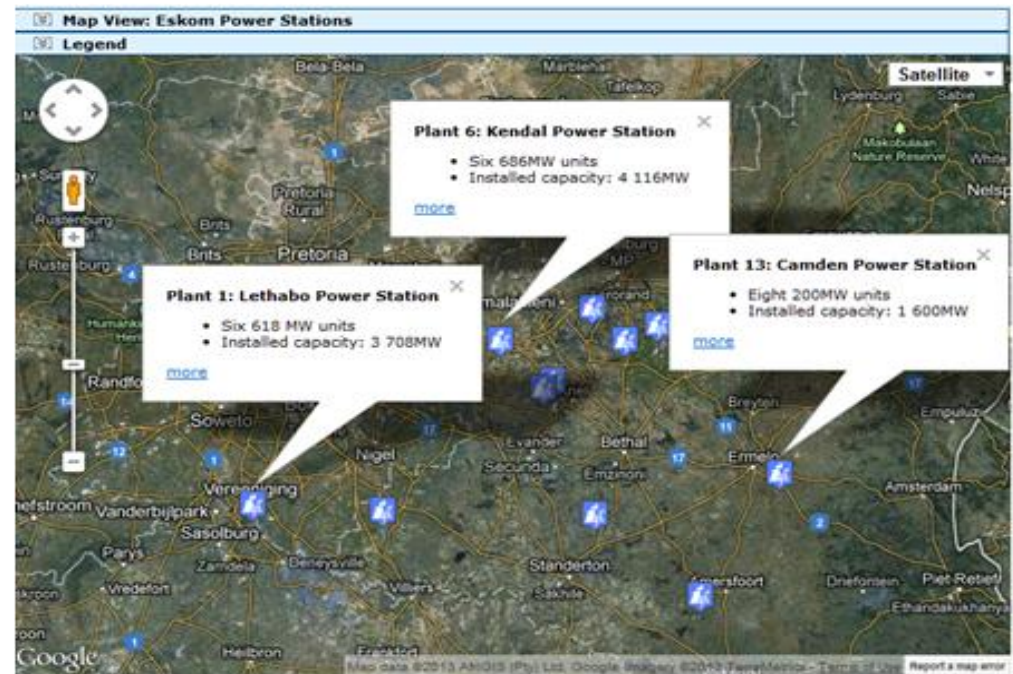
- Nuclear plants, other sites, after 2015



1st phase: Gap Analysis

The Gap Analysis stage consists of the following activities:

- Evaluate the current state of readiness for the RBI programme at the Employer's Head Office and 13 coal-fired power stations, which consists of 87 operating units
- Provide formal strategy and solutions to address the shortfalls identified by the Consultant
- Provide a formal



Education & Certification



ESKOM RBI PROJECT

Calendar of Courses - Course schedule for the period July-November, 2013

July, 2013

Module I.¹ (except I-R02)

July 8-17, 2013 (8.5 days structure) | Johannesburg | 6 CPs | *Tentative*

I-R01 INTRO: Introduction to Risk Management

Lecturer: **Dr. Marko Gerbec (Jozef Stefan Institute, Slovenia)**

The course covers the main topics of industrial safety, starting with different aspects of risks and terminology used in the field. The main part of the course is dedicated to the related EU directives. The course outlines goals, scope and required measures / obligations considering acute (accidents) and chronic (pollution) risks. Special focus is given to major accident prevention and related process safety risk assessment methodology.



I-R03 POWER: Risk Analysis in Power Industries

Lecturer: **Prof. Aleksandar S. Jovanovic (R-Tech, Germany)**

Knowledge of risk analysis applied specifically in power industry, starting with advantages and effectiveness of its application. It presents the regulatory basis and requirements, and elaborate commonly used methods through number of examples.



August, 2013

Module II.² (except II-R04a)

August 12-25, 2013 (2 weeks structure - 2x4,5 days) | Johannesburg | 6 CPs | *Tentative*

II-R04b RBI-POWER: Risk Based Inspection - Power

Lecturer: **Dr.-Ing. Daniel Baloš (R-Tech, Germany)**

The state-of-the-art knowledge of risk based approaches currently applied in power generation industries to the wide range of professionals involved in different activities in conventional power generation.



II-R05 RCM&RCFA: Reliability Centered Maintenance and Root Cause Failure Analysis

Lecturer: **Dr.-Ing. Daniel Baloš (R-Tech, Germany)**

Reliability Centered Maintenance (RCM) and Root Cause Failure Analysis (RCFA) as methodologies used for logical decision-making process for analysis and definition of the equipment maintenance requirements, as well as for accident prevention. The focus of the course is on the damage mechanisms appearing in different industries. A large number of well elaborated examples are included.



September, 2013³

Module IIIA/Module IIIB⁴ (courses merged)

September 2-17/18, 2013 | Johannesburg/Stuttgart | 8 CPs | *Tentative*

Lecturer: **Prof. Ulrich Krause (Otto von Guericke University Magdeburg, Germany)**

III-II-R07 CoF: Accident and Consequences Modeling

General techniques for accident modeling and explains different models of explosion. It elaborates gas and vapor explosion, as well as gas dispersion modeling, using examples for applied methods. The course includes modeling of fire and presents current models.



III-R08 FIRE: Fire Protection

The course starts with the theory of fire and extinguishment, and thoroughly explains fire protection principles. Further, the course gives details related to the fire protection concepts including legal background and requirements with special focus on industrial fires and risk analysis. The course introduces basic principles and application of fire modelling, explains the phenomenon of a fire and gives an overview of the fire models and their hierarchy and discusses particular models, including numerical. The theoretical part is complemented with number of examples, including calculations that illustrate the use of different fire models.



III-R09 ExP: Explosion Protection

The EU directive ATEX is presented in details, along with the principles of explosion prevention and protection. Its practical application in the industrial plants is explained on a series of real life examples.



October, 2013

Module IIIA/Module IIIC⁵ (courses merged)

October 14-23, 2013 | Johannesburg/Stuttgart | 5 CPs | *Tentative*

Lecturer: **Dolors Vinyoles, M.Sc. (Swissi Instituto Suizo de Seguridad, Spain)**

III-R06 HSSE: Health, Safety, Security and Environment

The course gives an overview of EU regulation in the field of HSSE (Health, Safety, Security and Environment), explains the objectives and requirements, as well as the state-of-the-art in the implementation including constraints and advantages. Special focus is on the Integrated Pollution Prevention and Control (IPPC) and Industrial Emission Directive (IED) and on the prevention of major accidents (Seveso).



III-R12 OSHA: Occupational Safety and Health

The course aims to explain the EU regulations in the field of safety and health of workers at work. Main topics include general principles concerning the prevention of occupational risks, the protection of safety and health, the elimination of risk and accident factors, the informing, consultation, balanced participation in accordance with national laws and/or practices and training of workers and their representatives, as well as general guidelines for the implementation of these principles.



November, 2013

Module IIIC (except IIIC-R12)

November 4-13, 2013 | Johannesburg/Stuttgart | 4 CPs | *Tentative*

Lecturer: **Joachim Freek, (DEKRA Akademie GmbH, Germany)**

III-R10 REACH: Risk Analysis of Chemicals

Principles of the EU regulation in the area of registration, evaluation and authorization of chemicals - REACH (EC Nr. 1907/2006). The course explains principles and obligations for manufacturers, importers and downstream users to ensure that they manufacture, place on the market or use such substances that do not adversely affect human health or the environment.



III-R11 ADR: Transport of Dangerous Materials

International and EU policies and legislative requirements related to the transport of dangerous materials and explains the European Agreement concerning the International Carriage of Dangerous Goods. It elaborates the main issues from ADR 2009 as well as safety measures and procedures in case of accidents.



Application

Navigate your browser to www.eskomrbi.risk-technologies.com, then select the **Calendar of courses** menu item. In order to apply, click on **register** at the respective course. Upon successful registration, you will receive a notification email and further instructions.

Questions?

If you have any questions or concerns, please contact:

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Conclusion

- Great industry project for Steinbeis (3 years, 4.3 mil €)
- Great industrial educational project for SHB-STI889: over 250 people expected to be trained, 4 in Germany on a long-term training
- Great potential of continuation after 2016
- Great potential for a real PPP (private public partnership)

