

This event has been validated with 2ECSA CPD points on completion SAAMA2018225

## Advanced Steel Design of Structures Workshop 2ECSA CPD Points On Completion "Columns, Beams, Trusses and Composed Sections"

Date: 5<sup>th</sup> – 6<sup>th</sup> December 2024  
Virtual: On Microsoft Teams  
Venue: Protected by Marriot Hotel Johannesburg Wanderers

### **Workshop Overview**

What is the importance of structural steel design?

Bridges, buildings, industrial warehouses, high-rise towers, and other numerous structures utilize steel in their design and construction to ensure maximum strength and withstanding the external structural forces. Steel is the only viable option in constructing these structures apart from reinforced concrete for various reasons, including high stiffness levels, high strength, toughness, resistance to force, and ductility. It is relatively less heavy and has a high speed of construction with a very competitive low cost as compared to other materials. In other regions of the world, it is the favorite construction material superseding reinforced concrete because of its easy use when erecting temporary structures.

This workshop will highlight deep insights on bolt designs, welded connections that will be used in steel structures, compression, and tension members design, batten plates, lacing systems, beams design, bases design when to use steel, lateral restraint, combined axial and bending resistance, stress, & strain yield strength levels, how steel fails, shear resistance, bending, & axial resistance. On completion participants will be able to design all the steel elements structures and all the connections.

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*Our experienced facilitator*



## **Prof. Jeffrey Mahachi**

Dr. Jeffrey Mahachi is a registered professional engineer and a registered construction project manager. Jeffrey holds a PhD in structural engineering from the University of the Witwatersrand, a Masters degree in structural engineering from Surrey University (UK), a Masters degree in Information Technology from the University of Pretoria, and a BSc Civil Engineering (Hons) degree from the University of Zimbabwe. Jeffrey has worked as a project manager and research engineer at CSIR Building Technology, lectured at the University of the Witwatersrand and has done consulting work in civil and structural engineering. He has written two books on structural engineering and presented several papers at international and local conferences and seminars.

### **What is the purpose of structural design training?**

Steel design is a crucial course that applies in numerous industries with high-demand skills and this course will upskill the participants with required skills to design the commonly used designs. The knowledge and skills gained from this course can be applied to various fields that use steel structures, but it can be of more interest to the petroleum industry because there is a continuous modification of structures in the facilities located on-shore to enable the structures to handle more load for more machine holding. This workshop is considered crucial for integrity management in this kind of change.

### **Highlights in this workshop will include:**

- ❖ International and local standards with technical practice in the required structures
- ❖ Case studies from different industry
- ❖ Pitfalls in steel construction and steel capabilities
- ❖ Steel structure elements design
- ❖ The new trend of integrity management system will be presented

### **Course Objectives:**

- ❖ Be familiar with the "Steel Structure" design
- ❖ Extreme understanding of the modern tools and techniques for risk-based inspection for a better maintenance plan.
- ❖ Understand the loads applied on the steel structure in oil, gas and petrochemical plant
- ❖ Ultimate experience and skills needed to design high-quality steel structures
- ❖ Understanding of load application on steel structure and how to deal with tension and compression stress
- ❖ Understanding of load application on steel structure and how to deal with tension and compression stress



- ❖ Use of modern methods and techniques in the steel structure design
- ❖ Know the design of the steel structure on machines
- ❖ Be intimately familiar with pipe rack design

## Training Methodology

Dr. Jeffrey Mahachi accumulated tremendous experience over the past years in engineering as an academic and he has published relevant books on the subject. He will utilize a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented.

## Individual Benefits.

- ❖ Magnified understanding of all the steel design details
- ❖ Intensified exposure and confidence to take up high-level positions due to embraced skills.
- ❖ Enhanced and well-developed design of elements skills
- ❖ Accumulate the skill to enhance quality of all phases of the steel structure projects in oil & gas
- ❖ Improved handling and working with advanced technology to achieve operations excellence by producing quality designs that will reduce risks of occupational hazards.
- ❖ Complete understanding of the existing steel structures and risk foresight
- ❖ Ability to lead others when doing structural steel designs

## Organizational Benefits

- ❖ Diminished costs of repair and maintenance by having durable designs
- ❖ Improve the organization project by enhancing the quality of engineering review for steel structure design
- ❖ Appropriate handling of all steel structure designing process
- ❖ Quality investments by having better and more durable steel structures for a long lifetime
- ❖ Improved vendor credibility due to producing high-quality steel designs
- ❖ Magnified profits due to satisfied clients who will benefit from better designs
- ❖ Well supervised steel structure designing process to minimize costs

## Who Should Attend?

- ❖ Civil Engineers
- ❖ Design Structural Engineers
- ❖ Supervision Engineer
- ❖ Project Planners
- ❖ Steel Fabricator
- Construction Engineers

## Course Outline

### Introduction to Structural Steel Design Training.

- ❖ Various steel sections
- ❖ Computational of loads for different designs





- ❖ How and why steel structures failure
- ❖ Techniques to get an acceptable level of safety easily
- ❖ National Building Regulations & Standards

## **Tension Member Design:**

- ❖ Effective length
- ❖ Concept of effective width and shear lag in tension members
- ❖ Design of bolted connections in tension
- ❖ Design of welded connections in tension

## **Design of welded connections in tension**

- ❖ Stability of columns
- ❖ Failure modes
- ❖ The effective length of compression members in braced and unbraced frames
- ❖ Cross-section classification
- ❖ Design of compression members
- ❖ SANS code approach to design of angle sections
- ❖ Design of compound sections

## **Beams Designs:**

- ❖ Beams and Cross-section classification
- ❖ Deflection in beams design
- ❖ Lateral-torsional buckling of beams
- ❖ Shear resistance of beams
- ❖ Design of restrained beams
- ❖ Design of unrestrained beams
- ❖ Using different software for simulation

## **Steel Connections:**

- ❖ Introduction to bolted connections
- ❖ Bolts in shear and tension
- ❖ Eccentric bolted connections
- ❖ Introduction to steel welds and their types
- ❖ Fillet welds design
- ❖ Eccentric welded connections

## **Design of Base Plates:**

- ❖ Base plates best designs for concentrically loaded columns
- ❖ Base plates design for eccentrically loaded columns

## **Beam-Column Design:**

- ❖ Defining a beam-column
- ❖ Cross-section classification



- ❖ Stability of beam-columns
- ❖ Design of beam-columns

## **Design of Plate Girders:**

- ❖ Defining a plate girder
- ❖ General considerations in plate girders
- ❖ The behavior of transverse web stiffness
- ❖ Design of steel girders to SANS 10162

## **Composite Sections:**

- ❖ Defining composite construction
- ❖ Elastic analysis of composite sections
- ❖ Composite section moment capacity
- ❖ Composite section deflections
- ❖ Design of composite beams to SANS 10162

## **Steel Building:**

- ❖ Conceptual design of frames
- ❖ Roof construction types
- ❖ Wind loading on industrial buildings
- ❖ Analysis and design of industrial buildings
- ❖ General fire resistance of steel buildings

## **Delegate Note:**

- 1) On completion all the delegates will receive a 2ECSA CPD points certificate through accreditation number: SAAMA2018225.
- 2) All the delegates are required to send their copy of ID/passport for issuing of CPD points certificate.
- 3) The presentation will be uploaded and shared with all registered delegates before the event commences and all the recorded training videos will be available after every session.
- 4) Kindly complete the registration form below to reserve your seat today and send it back to [info@alliancetc.co.za](mailto:info@alliancetc.co.za) for enrolment.
- 5) All the delegates attending in person are required to bring along their laptops for streaming the presentation and installation of Professor Mahachi's App.
- 6) There's an additional cost to the conference fee for Design of Structural Steelwork to SANS 10162 (Bluebook and Smart App/ Spreadsheet for Solutions).





Registration Form

Please write in BLOCK CAPITALS

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Company name: \_\_\_\_\_

Business Address: \_\_\_\_\_

Vat: \_\_\_\_\_

City: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Fax: \_\_\_\_\_

Att: Bright

info@alliancetc.co.za

Event Date: 5<sup>th</sup> – 6<sup>th</sup> December 2024

Virtual

In-person

Protea by Marriot Hotel Johannesburg Wanderers

Design of Structural Steelwork(Bluebook hard Copy) @R1499.99 additional to workshop fee.

Smart App/ Excel Spread for Solutions @ R499.99

Delegate Details:

1.First Names \_\_\_\_\_

Position: \_\_\_\_\_

Email: \_\_\_\_\_

2.First Names: \_\_\_\_\_

Position: \_\_\_\_\_

Email: \_\_\_\_\_

3.First Names: \_\_\_\_\_

Position: \_\_\_\_\_

Email: \_\_\_\_\_

4.First Names: \_\_\_\_\_



Position: \_\_\_\_\_

Email: \_\_\_\_\_

5.First Names: \_\_\_\_\_

Position: \_\_\_\_\_

Email: \_\_\_\_\_

Price per Delegate:R9 999.99(USD550)   
Virtual Price:R8 999.99(USD485)  Available

PayPal available for all international delegates, but pricing excl bank charges

**Authorization**

**Signatory must be authorized to sign on behalf of the contracting Organization:**

First Name: \_\_\_\_\_

Position: \_\_\_\_\_

Email Address: \_\_\_\_\_

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