Eskom	Specification – Substation Engineering	Technology

Title: **SPECIFICATION FOR THE PROCUREMENT OF STRUCTURAL ENGINEERING SOFTWARE**

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1. INTRODUCTION

Substation Engineering requires structural engineering software for the design of structures within Transmission and Distribution. The software will be used to encourage design of durable, sustainable, and economic structures for Eskom. Need for the software has arisen due to the following:

1. The complexity of the engineering problems (example been dynamic loading due to short circuit currents) we are currently facing drives the need for software with superior functionalities.
2. With the enormous workload we currently have, doing designs using first principles is reducing our efficiency and affecting our workflow.
3. The integrity of several of the components found on Substations can only be checked using Finite Element Analysis. There are no closed form solutions to these problems. Design codes such as the Eurocode directly suggest the use of Finite Element Analysis. Thus, software has now become an absolute necessity for our business.

There are two types of software we require. The first software is one with advanced capabilities that can be used to perform non-linear and dynamic analysis. The second software is the traditional Structural Engineering types that can perform linear static analysis of frames and then integrate with design modules. The specification for each type of software is covered below.

2. SOFTWARE REQUIREMENTS

2.1 SOFTWARE TYPE 1

Software 1 shall be a Finite Element Analysis software capable of performing the following analysis types:

- Linear static analysis
- Linear bifurcation analysis
- Non-linear Static Analysis (material, geometric and contact capabilities) with the following control options:
    1. Load control
    2. Displacement control
    3. Arc-length
- Natural frequency analysis

- Harmonic analysis and frequency response function
- Linear transient dynamic analysis
- Non-linear transient dynamic analysis
- Response spectrum analysis

The ideal software shall have the following mesh types/features:

- Two and three noded beam elements
- QUAD 4 and QUAD 8 plate elements. TRI 3 and TRI 6 plate elements
- Solid elements
- Links
- Auto-mesher
- Ability to clean a mesh, and tools to refine meshes
- Quality control tools for the meshes

Other important features of the required software are:

- Have the ability to create and clean geometry
- The license should be available on a server so that users in different locations can access it.
- A library of section sizes for beam elements shall be included as part of the software package
- The Finite Element Software shall be convenient for Civil and Structural Engineering Infrastructure

2.2 SOFTWARE TYPE 2

Software 2 shall be a Structural Engineering software capable of performing the following analysis and design types:

- Linear static analysis
- Linear bifurcation analysis
- Natural frequency analysis
- Steel design module including composite design
- Concrete design module
- Timber design module
- Masonry design module
- Geotech design module

- A library of section sizes for beam elements shall be included as part of the software package
- The license should be available on a server so that users in different locations can access it.
- Appropriate integration with CAD packages

3. AUTHORISATION

This document has been seen and accepted by:

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4. REVISIONS

Date	Rev.	Compiler/s	Remarks
30/08/2023	0	A. Mayet	First Issue

5. DEVELOPMENTAL TEAM

The following people were involved in the development of this document:

- Azhar Mayet

6. ACKNOWLEDGEMENTS

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