

Title: **Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda Machine.**

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1. INTRODUCTION

The manage maintenance base is based on best practices identified from the Equipment Reliability Process, existing within Eskom's best practices and operational experience, with inputs from a number of industry subject matter experts (SME). This is a generic process that provides standard capabilities that are utilised during operating and maintenance engineering phases of the assets lifecycle.

Effective maintenance entails a process whereby maintenance strategies are developed. These strategies include the maintenance and/or inspection execution process and their frequencies. The maintenance strategies further identify and categorize the maintenance to be conducted according to their criticality. Original Equipment Manufacturers (OEM's) develop the minimum inspection and maintenance requirement to ensure that the equipment operates within the design specifications and thus ensuring the expected life cycle of the equipment.

This scope makes provision for the Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda CNC Machine. The equipment shall be supplied and installed on a Skoda Machine located at Rosherville Works.

2. SUPPORTING CLAUSES

2.1 SCOPE

This scope makes provision for the development of a Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda Machine. The equipment shall be supplied and installed on a Skoda Machine located at Rosherville Works.

2.1.1 Purpose

The aim of this document is to define the scope of work for the Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda Machine.

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2.1.2 Applicability

This scope is applicable the work that is to be carried out on the Skoda CNC Machines at Rosherville Works.

2.2 NORMATIVE/INFORMATIVE REFERENCES

N/A

2.2.1 Normative

Parties using this document shall apply the most recent edition of the standards for best practices and in line with Eskom specifications that are indicated in this document.

- [1] SANS 1973-1 - Low-voltage switchgear and control gear ASSEMBLIES Part 1: Type-tested ASSEMBLIES with stated deviations and a rated short-circuit withstand strength above 10 kA
- [2] SANS 1973-3 - Low-voltage switchgear and control gear ASSEMBLIES Part 3: Safety of ASSEMBLIES with a rated prospective short-circuit current of up to and including 10 kA
- [3] SANS 10142 - 1 - The wiring of premises Part 1: Low-voltage installations
- [4] SANS 10142 - 2 - The wiring of premises Part 2: Medium-voltage installations above 1 kV a.c. not exceeding 22kV A.C. and up to and including 3 MVA installed capacity.
- [5] SANS 12100 - Safety of Machinery

2.2.2 Informative

Parties using this document shall apply and have knowledge of the most recent edition of the standards as listed below.

- [6] ISO 9001 - Quality Management Systems.
- [7] ISO 14001 – Effective Environmental Management System
- [8] OHSAS 18001 – Occupational Health and Safety Standards
- [9] OHS Act 85 of 1993, *specifically*: General Machinery Regulation (GMR), Electrical Installation Regulations (EIR), Electrical Machinery Regulations (EMR) and Driven Machinery Regulations (DMR)

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2.3 DEFINITIONS

Definition	Description
ERI	Eskom Rotek Industries SOC LTD, the Client
TGS	Turbo Gen Service, an ERI Business Unit
Plant Maintenance	A TGS Department responsible for maintenance effectiveness and control.

2.3.1 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

The following are abbreviations and their descriptions are specific to this document.

Abbreviation	Description
CNC	Computer Numeric Control
RPM	Revolutions Per Minute (speed)
PM	Preventative Maintenance
CM	Corrective Maintenance
PdM	Predictive Maintenance
CMMS	Computerized Maintenance Management System

2.5 ROLES AND RESPONSIBILITIES

Roles	Responsibilities
Scope Compiler	Compilation of the scope of work
Functional Responsibility	Reviewing and acceptance of the scope
Support Personnel	Support and acceptance of the scope
Authorising Personnel	Reviewing and authorising the scope
Service Provider	Execution of the approved scope

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2.6 PROCESS FOR MONITORING

Requirements	Monitoring Process
Computerised Management Process (SAP)	Monitoring of the execution progress

2.7 RELATED/SUPPORTING DOCUMENTS

- 240-109494936 – Lathe Machines Maintenance Philosophy
- 240-109495432 – Vertical Boring Mill Maintenance Philosophy
- 240-109500246 – Horizontal Boring Mill Maintenance Philosophy

3. SCOPE OF WORK

3.1 BACKGROUND

The Rosherville Workshops has a number of machines used for production purposes. These machines, specifically the CNC machines utilise mainly Siemens controllers and electronic components as per the OEM requirement. The controllers used have a built-in program and thus a replacement part must be compatible with the existing program. The Skoda machines needs to be repaired in order to fulfil its intended application.

3.2 SITE INFORMATION

The scope entails works to be executed at Eskom Rotek Industries SOC LTD located at 03 Lower Germiston Road on Roshland Road, Rosherville, Cleveland, Johannesburg South.

3.3 PLANT DESCRIPTION

The plant to be worked on is a SKODA CNC Machine located at the TGS Workshop.

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3.4 DETAILS OF THE WORKS

The specific tasks to be conducted are detailed below. The detailed tasks are the bare minimum and binding as the minimum contractual agreement between the Client and the Service Provider. OEM requirements that may, or may not, be different from the detailed scope will be considered as and when it may arise. Upon any realization of such, the Service Provider and the Client's Representative will agree on the most effective, feasible and cost effect manner to proceed.

The full scope is for the Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda Machine. Below is the minimum requirements to be fulfilled by the Service Provider:

- 3.4.1 Assess the Skoda Machine for its full functionality including but not limited to ensuring that the Client's requirements are met, all the axis are functional (x,y and z), the control system is of the latest technology, etc.
- 3.4.2 Design a new Rotating Nut Ball Screw based drive train for the X-axis of the machine.
- 3.4.3. Supply and manufacture all components as per design drawings, supplying a new 100 x 20 Ball Screw and nut assembly.
- 3.4.4. At a pre-agreed date, disconnect wiring from machine.
- 3.4.5. Remove the headstock, column and counterweight from the machine.
- 3.4.6. Remove and transport the saddle to where the work will be conducted, machine saddle to fit new designed rotating nut assembly.
- 3.4.7. Fit the Ball Screw assembly to the bed and saddle assembly after removing the existing drive train.
- 3.4.8. Please note that you will be re-using the existing motor and gearbox arrangement.
- 3.4.9. Transport the saddle back to ERI TGS Works.
- 3.4.10. Re-assemble the machine and re-connect the wiring.
- 3.4.11. Re-commission the machine and set all parameters correctly.

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3.4.12. Test machine and hand over to the Plant Maintenance, Works Engineering and Production Departments

3.4.13. Ensure that the machine is working according to the Client's expectation.

All OEM and Client's safety procedures and processes must be adhered to. All supplied equipment must have a written warranty document clearly indicating the inclusion and exclusion of the warranty and the duration (start and end date of the warranty).

3.5 DELIVERABLES

3.5.1. The Service Provider shall Design, Supply, Install and Commission a New Ball Screw Linear Drive System for the Skoda Machine at the Client's site in the presence of a Client's representative.

3.5.2. The Service Provider must hand over the machine in a working, acceptable and compliant condition.

3.5.3. It is the responsibility of the Service Provider to identify any issues that may prevent the machines from being returned to service on time if the identified issue was not part of the original scope.

3.5.4. The Client will only take ownership of the machine after they have satisfied themselves that all required work has been carried out in accordance with this scope and any other agreement that may arise during the process.

3.6 ASSESSMENT CRITERIA

Upon completion of the maintenance task, the Service Provider shall ensure that they have access to the OEM spares and programs that are used for the functioning of this CNC Machine. The Service Provider must have proven record or confirmation of any sort that they have and/or can work on such machines.

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3.7 WARRANTY

The work performed is warranted to be free from defects in material and workmanship from date of completion of the work to the next scheduled period. The warranty shall cover:

- 3.7.1 New electrical and Mechanical parts as stipulated by OEM.
- 3.7.2 Workmanship for 6 Months after acceptance of work by the Client
- 3.7.3 The product must be used in accordance with manufacturer's recommendations and must not have been subject to abuse, lack of maintenance, misuse, negligence, or unauthorized repairs or alterations. Should any defect in material or workmanship occur during the above time period in any product, as determined by the supplier inspection of the product, the Service Provider, agrees, at its discretion either to replace (not including installation) or repair the part or product free of charge.
- 3.7.4. The inclusions and exclusions on the warranty must be clearly indicated
- 3.7.5. The start and end date of the warranty must be clearly indicated

3.8 GENERAL CONSTRAINTS

The following are the general constraints that are to be considered:

- 3.8.1 Working in an operational environment where machines and equipment are being handled.
- 3.8.2 Minimizing downtime as production will still be taking place in and around the vicinity of the working area.
- 3.8.4 Accuracy of existing information may be outdated and need to be verified on site prior to proceeding with any work.

3.9 TERMS AND CONDITIONS

The successful Service Provider will be expected to adhere to the following minimum conditions:

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- a) Adherence and compliance to the health and safety standards set out by the Client.
- b) Provide adequate PPE to its employees.
- c) Provide its own working and fully functional tools.
- d) Fully sign and complete the completion and handover form to be provided by the Client
- e) Issue the service report for the work done and fully signed by the responsible Technician or Supervisor.
- f) Provide valid identification and medicals for the personnel who would be work.
- g) Hand over the replacement (parts removed from the machine) parts to the Client.

4. AUTHORISATION

Name & Surname	Designation
Singobile Nene	Plant Maintenance Manager
Sisa Pantshwa	Plant Engineer
Nhlakanipho Blose	Maintenance Service Manager

5. REVISIONS

Date	Rev.	Compiler	Remarks
April 2021	1	S Nene	Design, Supply, Installation and Commissioning of New Ball Screw Linear Drive System for the Skoda Machine

6. DEVELOPMENT TEAM

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

- Singobile Nene
- Sisa Pantshwa
- Nhlakanipho Blose

7. ACKNOWLEDGEMENTS

- Plant Maintenance Team

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