Eskom	Scope of Work	Tutuka Power Station

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1. Introduction

Tutuka Power Station seeks to go out on a main Mill drive gearboxes refurbishment tender contract – for a period of five (5) years – whose specifications are detailed and/or listed in **Appendix A** (Bill of Material). The refurbishment of gearboxes will be done on an as-need basis by the Employer.

The evaluation of the of the tender is based on the tenderer's ability to meet both mandatory and qualitative requirements specified in the Technical Evaluation Strategy (TES). A weighted score card approach will be used to evaluate the tenders against the Employer's requirement.

2. Supporting Clauses

2.1 Scope

This document outlines the scope of work (SOW) for refurbishment of Tutuka Power Station main Mill drive gearboxes, the roles and responsibilities, and the conditions for acceptance of refurbished gearboxes.

2.1.1 Purpose

The purpose of this document is to provide thescope of work and technical information for refurbishment of main Mill drive gearboxes for Tutuka Power Station as well as to ensure that the gearboxes are properly refurbished in accordance to the specifications and technical requirements.

2.1.2 Applicability

This document is intended for, and shall be applicable to, Tutuka Power Station Generation Division. Within the Business Unit, it may be used by all relevant stakeholders involved with the technical tender evaluation process for the refurbishment of Tutuka Mill Gearboxes.

2.1.3 Effective date

This document will be effective from the date of its authorisation.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

[2] 36-681 Generation Plant Safety Regulations

[3] 32-727 SHEQ Policy

[4] 240-84513751: Material Specification and Certification Guideline for Power Generation Plant

[5] 240-54820279: Receive Materials

[6] BS EN 10204 (2004) - Metallic products -Types of Inspection Documents

[7] Table 2 – List of Standards applicable for use

2.2.2 Informative

N/A

2.3 Definitions

Definition	Explanation
Contractor	Service provider contracted to provide a specific spares & documentation to Tutuka Power Station. Referred to as the Supplier on this document.
Employer	Tutuka Power Station
Disclosure Classification	Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
ISO	International Organisation for Standardisation
KPI	Key Performance Indicator
OEM	Original Equipment Manufacturer
OHS	Occupational Health & Safety
PSR	Plant Safety Regulations
SHEQ	Safety, Health, Environmental & Quality
SOW	Scope Of Work
TES	Technical Evaluation Strategy

2.5 Roles and Responsibilities

2.5.1 Contractor

a) Collecting and transporting of gearbox.
b) Transportation and delivery of gearbox.
c) Stripping and quoting including cleaning of gears, shafts, casing and cover plates.
d) Carrying out of repairs on:
   - Input shaft bearing:
   - Intermediate shaft bearing:
   - Output shaft bearing:
   - First stage reduction input shaft with pinion gear:
   - First stage reduction wheel:
   - Second stage reduction input shaft with pinion gear:
   - Second stage reduction wheel:
   - Second stage reduction shaft:

e) Submission of all QCP for all to be done for Eskom maintenance and engineering review and approval prior to work commencement.

f) Taking of assembled measurements and tests

g) Reports to be submitted to Eskom, both soft and hardcopy formats

h) Supply Original Equipment Manufacturer (OEM) data sheet or documentation where applicable on every delivery. Spares to be supplied in their original OEM packaging still sealed.

i) Contractor shall submit all documentation as requested by the Employer.

2.5.2 Employer

a) Compiles and submit scope of work with technical specifications and technical drawings where required.

b) Performs Quality Control of all spares or lubricants on delivery at the Employer premises.

c) Reviews an approves refurbishment QCPs.

2.6 Process for Monitoring

This document will be a once-off document to state the scope of work to supply and delivery of various Milling Plant spares and associated accessories contract.

2.7 Related/Supporting Documents

N/A

3. Scope

The detailed refurbishment scope includes main scope (sections 3.1 through 3.6) and additional scope (section 3.7) as detailed below.

3.1. Collecting and transporting of gearbox.
3.2. Stripping and quoting including cleaning of gears, shafts, casing and cover plates.
3.3. Carrying out of repairs on:

(a) Input shaft bearing:
- Bearing to be replacement with NTN bearings. Bearings to be verified before installing that it is genuine. Verification to be submitted to Eskom.
- Input shaft (E432230XU (2 off))

(b) Intermediate shaft bearing:
- Bearing to be replacement with NTN bearings. Bearings to be verified before installing that it is genuine. Verification to be submitted to Eskom.
- Intermediate shaft (E432240 (2 off))

(c) Output shaft bearing:
- Bearing to be replacement with NTN bearings. Bearings to be verified before installing that it is genuine. Verification to be submitted to Eskom.
- Input shaft (E32252DF (2 off))

(d) First stage reduction input shaft with pinion gear:
- To be replaced with new manufactured
- Repair shaft seal landings.
- Teeth 15
- Left Hand helical angle
- Module 14
- Pressure angle 20°0’
- Helix angle 13°32’10”
- Material 655M13 (EN36A).
- Case hardened and tempered to 61 to 63 HRC to depth of 2 to 3 mm.
- Face width 230 mm
- Bearing landing internal shoulder width 620 mm, shaft length to be accordingly to include bearing journals and achieve specified floats.
- Input shaft diameter 140 mm with tolerances +0.027 to +0.042 length 135 mm with tolerance 0 to 1 mm.
- Key on shaft to be cut to fit key size 36 x 20 125 (new key to be supplied).
- Key on input shaft to be supplied and fitted - size 36 x 20 125.
- Shaft external length from gearbox centre 685 mm with ± 1 mm tolerance.
- Bearings bench float 0.20 to 0.34 mm.
- Drive End bearing Fixed
- Non drive end bearing free with 0.4 to 0.6 mm clearance on both sides.
- Backlash to first reduction wheel between 0.70 and 1.4 mm.

(e) First stage reduction wheel:
- To be replaced with new manufactured
- Teeth 35
- Right Hand helical angle
- Module 14
- Pressure angle 20°0’
- Helix angle 13°32’10”
- Material 655M13 (EN36A).
- Case hardened and tempered to 61 to 63 HRC to depth of 2 to 3 mm.
- Face width 230 mm
- Wheel key on shaft to be cut to fit key size 50 x 28 245 (new key to be supplied).

(f) Second stage reduction input shaft with pinion gear:
- Replace with newly manufactured.
- Teeth 16
- Left Hand helical angle
- Module 18
- Pressure angle 20°0’
- Helix angle 12°39’24”
- Material 655M13 (EN36A).
- Case hardened and tempered to 61 to 63 HRC to depth of 2 to 3 mm.
- Face width 250 mm

- Bearing landing internal shoulder width 575 mm, shaft length to be accordingly to include bearing journals and achieve specified floats.
- Wheel key on shaft to be cut to fit key size 50 x 28 x 245 mm (new key to be supplied)
- Bearings bench float 0.26 to 0.42 mm.
- Gearbox Non Drive End bearing Fixed
- Gearbox drive end bearing free with 0.4 to 0.6 mm clearance on both sides.
- Backlash to second reduction wheel between 0.90 and 1.80 mm.

(g) Second stage reduction wheel:

- Replace with newly manufactured.
- Teeth 42
- Right Hand helical angle
- Module 18
- Pressure angle 20°0'
- Helix angle 12°39'24"
- Material 655M13 (EN36A).
- Case hardened and tempered to 61 to 63 HRC to depth of 2 to 3 mm.
- Face width 250 mm
- Wheel key on shaft to be cut to fit key size 63 x 32 x 270 mm (new key to be supplied)

(h) Second stage reduction shaft:

- Replace with new shaft.
- Repair shaft seal landings.
- Bearing landing internal shoulder width 600 mm, shaft length to be accordingly to include bearing journals and achieve specified floats.
- Output shaft diameter 250 mm with tolerances +0.050 to +0.079 length 355.6 mm with tolerance 0 to 1 mm.
- Output key on shaft 2 off spaced 120° to be cut to fit key size 56 x 32 350 (new keys to be supplied).
- Material 070M55 (EN9) as forged condition.
- Shaft external length from gearbox centre 925 mm with ± 1 mm tolerance.
- Gearbox drive end bearing free with 0.4 to 0.6 mm clearance on both sides, bearing on output shaft side fixed.
- End play after mounting between 0.12 and 0.2 mm

3.4. Submission of all QCP for all to be done for Eskom maintenance and engineering review and approval prior to work commencement.

3.5. Taking of assembled measurements and tests:

- Backlash measurements (2 off matting gears).
- Bearing bend floats (4 off).
- First and second pinion shaft free bearing clearances (2 off).
- Shaft installed floats installed (1 off).
- Gear contact surface (2 off) – minimum requirement of 80% of tooth contact.
- Lubrication spray nozzle verifications (4 off gears and 6 off bearings), pictures to be submitted.
- No load test run to running speed (Input 982 RPM)
- Vibration measurements on all 6 bearings (Radial horizontal, radial vertical and axial)
- Temperature on all 6 bearings to be taken after 60 minutes of no load test running.

3.6. Reports to be submitted to Eskom, both soft and hardcopy formats:

- Bearing Verification that genuine documentation
- QCP documents
- NDT reports
- Cooler pressure test certificate
- Backlash measurements
- Bearing clearances
- Bearing installed floats
- No load test results
- Final gear profile ground reports
- Material and heat treatment certificates if new components were machined

3.7. Additional scope:

- Cleaning and flushing of lubrication system
- All Lubrication system piping to bearings to be replaced (6 off)
- All gear mating lubrication nozzles to be replaced (4 off)
- Cooler to be hydraulic pressure tested on the installed position for 30 minute at pressure of 900 kPa and certificate issued
- If any leaks are found during the pressure test of the cooler, it shall be repaired and pressure test repeated until successful.
- Viton seal to be used on shaft covers (2 off)
- Input shaft: 168 x 141 x 12.7 mm.
- Output shaft: 260 x 304 x 20 mm (split seal).
- Casing skimming (1 x top casing and 1 x bottom casing).
- Casing line and bore (6 x bearing landings).
- Casing internal and external sandblasted, cleaned and corrosion resistant coating to be applied (1 x top casing and 1 x bottom casing).
- Casing external sandblasted, cleaned and corrosion resistant coating to be applied (1 x top casing and 1 x bottom casing).
- All fasteners to be replaced with Gr 8.8 (High tensile). All casing studs (10 off) and front and rear casing bolts (12 off) must be installed with Nylocs. At least 3 threads to protrude Nyloc nuts.
- Replace oil level dipstick – Oil level below casing joint is between 200 and 230 mm, dipstick high and low marking should correspond to this oil level.
- Oil sight glass to be replaced (Glass and vertical brass tube) – length 75 mm
- Breather to be replaced.
- If Required
- Replace Cooling Water thermostatic control valve – Horne EA1-3S-25A(1 off).
- Manufacture and supply thermostatic Gooseneck pipe work. Gooseneck sample to be collected from site for fitment. Sample to be returned.
- Replace cooler external Brass/copper Nuts and Ferrels – To be returned to original design to allow installation of original (sample) thermostatic valve gooseneck. External length 22 mm, depth of internal reses 15 mm.

4. Description of the works

The works is to refurbish main Mill drive gearbox (**Appendix A: Bill of material**) and accessories as detailed in scope.

4.1 Documentation

The following are the *Contractor*'s requirements:

a) The *Contractor* will ensure proper handling of the gearboxes (from procurement of equipment, storage and transportation).

b) The refurbishment on the gearbox must be carried out in accordance with the specification as per works information / scope of works.

c) The *contractor* will supply any additional information such as brochure, general arrangement drawing, certificates, detailed specification, data sheet, Settings Document for programmable electronic cards etc. Check sheets or drawings for quality inspections.

d) The *Contractor* shall supply preservation and storage procedure/s, where applicable.

e) The Employer may make clarification sessions available to either prospective *Supplier*/s in order to further assist the prospective *contractor*'s to meet the requirements of the work to be performed by the *Contractor*.

f) The *Contractor* must ensure that all components supplied must be individually packed in such a way as to protect the parts during transport and storage. The packaging must also include the necessary labels to identify the items.

4.2 Acceptance of Spares

4.2.1 Spares Identification

Each spare is identifiable by means of an Eskom SAP Material number (as is used in the Power Station), part description, OEM and/or OEM part number.

4.2.2 Packaging

I. Different spare types shall be packaged separately such that each spare type can be stored separately. Packaging shall be such that the spare can be identified without opening

the packaging. Packaging shall be of material that will not be damaged, to an extent possible, by harsh weather conditions during transportation. If that is not possible, then the packaging shall be protected against such conditions.

II. Where possible, packaging to be such that procured spares can be positively identified through the packaging. Where this is not possible, the packaging to be such that it allows opening and closing of packaging and still maintain the packaging integrity thereafter.

III. Delivery packaging shall include as a minimum the following details:

a) Purchase Order Number

b) Part Description

c) Part number

d) Eskom SAP Material number

e) Drawing number, where applicable

f) Physical address of Tutuka Power Station and the *Supplier*

g) Contact details of the *Supplier*

h) Delivery note number

4.2.3 Acceptance of spares

a) No incorrect, damaged or faulty spares will be accepted.

b) All the spares will be inspected and accepted by Engineering and/or OEM Technician before payment could be processed.

c) Data capturing forms information must be supplied and must meet an acceptable level.

d) The contractor must ensure that the collection, refurbishment, testing, delivery, and preservation of the gearboxes is done in compliance with preservation specifications and good engineering practice.

e) The Supplier to advise the Purchasers warehouse/stores on effective storage of spares and preservation.

f) Upon delivery of the goods at the Eskom stores, an inspection of goods and the receipt must be conducted by the End-user and the Supplier with 48 hours of delivery. There must be an approved list of appointed quality inspectors available with specimen signatures, and this must be updated annually. As per Work Instruction, Receive Materials – 240-54820279.

g) The Supplier must supply the Purchaser with warrantee certificates, test certificates and the complete data book of spares at the time of delivery which shall be uploaded into the SAP system Goods Receipt document as per Work Instruction, Receive Materials - 240-54820279.

h) The contractor must deliver the goods as per the agreed to delivery times.

i) The contractor to provide 3.1 Material certificates as a minimum, where applicable.

4.3 Spares Management

The Purchaser may request the contractor to provide accurate description of all spare parts included in the spares list.

4.4 Equipment Required

The contractor and his sub-contractor must possess the tools and equipment to satisfy the requirements for the scope.

4.5 Workshop

The contractor and his sub-contractor are required to have suitable premises with the required tools and equipment to be able to execute the scope of work and/or refurbish the gearboxes. Eskom reserves the right to inspect the workshop premises to make sure that it is kept up to standard.

4.6 Planned KEY PERFORMANCE INDICATORS (KPI)

a) The KPI's will be used to determine the successful performance of the scope. The Supplier is required to perform in order to meet these targets. The KPI's are to be agreed to between parties and are subject to change on an annual basis, based on the need.

- First committed delivery date
- Quality

- Non-compliance to the agreed Scope of Work, hold points and Quality Control Plans

5. Acceptance

This document has been seen and accepted by:

Name	Designation
RF Mametsa	Materials Manager
Henry Hlatshwayo	Boiler System Engineer
Pikela Chauke	Boiler Senior Engineer

6. Revisions

Date	Rev.	Compiler	Remarks
August 2025	1	TH Hlatshwayo	Tutuka Power Station Supply and Main Mill Drive Gearbox Refurbishment

7. Development Team

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

- Henry Hlatshwayo
- Pikela Chauke

8. Acknowledgements

APPENDIX A: Bill of Material and Specifications – Main Mill Drive Gearbox

Gearbox Mill Designation	ABC Main Gearbox	DEF Main Gearbox
Stock No.	176932	176881
Identification code	M20-01	M19-01
OEM	David Brown	David Brown
Type	360 x 535 CRS	360 x 535 CRS
Power transferred (kW)	1320	1320
Input speed (RPM)	982	982
Output speed (RPM)	160	160
Number of stages	2	2
First stage gears	15 to 35 teeth	15 to 35 teeth
Second stage gears	16 to 42 teeth	16 to 42 teeth
First stage shaft centers distance (mm)	360	360
Second stage shaft centers distance (mm)	535	535
Assembly designation	L-R (AGMA 6010-F97)	R-L (AGMA 6010-F97)
Input rotation direction end-view	Clock Wise	Counter Clock Wise