Eskom Rotek Industries	Scope of Work	Turbo Gen Services

Title:	**Maintenance and Servicing of TGS Sites Workshops Machines**	Unique Identifier:	**N/A**
		Alternative Reference Number:	**N/A**
		Area of Applicability:	**Eskom Rotek Industries SOC Ltd**
		Documentation Type:	**Scope of Work**
		Revision:	**0**
		Total Pages:	**Page 1 of 29**
		Next Review Date:	**N/A**
		Disclosure Classification:	**CONTROLLED DISCLOSURE**

Compiled by	**Functional Responsibility**	**Approved by**
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Date: 11 May 2024	Date: 11 May 2024	Date: 11/05/2024

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FIGURES

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TABLES

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.

At each site where Turbo Gen Services (TGS) operates, which are the Eskom Power Stations (Generation), there are workshops and machinery used for maintenance purposes in order to support the power generation operations. These power stations are located in and around the Mpumalanga and Limpopo provinces. The machines vary in type ranging from small to large lathes, horizontal and vertical boring machines, milling and grinding machines, each machine requires specific maintenance strategy.

This scope makes provision for the development of a maintenance and service contract for all the TGS Sites Workshops Machines as per the requirement of their respective Maintenance Strategies.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document covers the maintenance and services requirement for the TGS Sites Workshops Machines as per their respective maintenance strategies. The scope also covers the minimum requirements to be met by the Service Provider which will ensure that the aforementioned machinery are inspected and maintained according to the

highest standard and effectiveness required by the client (ERI). The contract also entails the services of as and when required (breakdown purposes).

The processes identified on this document are a guide to the process to be followed but is not definite. The OEM's requirements are the minimum standards to be met by the maintenance and/or service to be rendered. In the context of this document, TGS Sites Workshops Machinery entails the machines located at the Camden, Duvha, Matla, Tutuka, Lethabo, Matimba, Kriel, Kendal, Majuba, Komati, Hendrina, Grootvlei and Arnot Power Stations. Camden is located along the N2 South approximately 25km from Ermelo Town of Mpumalanga. Majuba is located off-the-N11 at approximately 45km from Majuba Town of KwaZulu Natal. Matla and Kriel are located approximately 25km from the Kriel Town of Mpumalanga. Arnot and Hendrina are located East of Emalahleni Town of Mpumalanga, along the N4 and the N11 respectively. Kendal is located along the N12, approximately 55km West of Emalahleni Town of Mpumalanga. Tutuka is located at approximately 40km South of Emalahleni Town of Mpumalanga, along the R547. Lethabo is located at approximately 20km South-East of Vaal Town in the Free State while Matimba is located about 10km North-West of Lephalale Town of Limpopo. Grootvlei Power Station is situated approximately 21 km's South-East of Balfour in Mpumalanga Province.

2.1.1 Purpose

The aim of this document is to define the scope of work for the maintenance and service provision of the TGS Sites Workshops Machinery.

2.1.2 Applicability

This document shall apply throughout Eskom Rotek Industries SOC (LTD) TGS Sites Workshops Machinery Maintenance and Services processes.

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

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)

2.3 DEFINITIONS

Definition	Description
ERI	Eskom Rotek Industries SOC LTD, the Client
TGS	Turbo Gen Service, an ERI Business Unit
Sites	Workshops located at different Power Stations
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
Approval Authority	Approving the scope for tendering purposes
Authorising Personnel	Reviewing and authorising the scope
Service Provider	Execution of the approved scope

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 TGS Sites Workshops Machines are assets used for ensuring on-time and effective delivery of the works executed within the Eskom Power Stations TGS Workshops. The maintenance of these machines is critical to the operation of the power stations and the TGS Maintenance and Projects Departments, thus the service delivery to the TGS clients. The maintenance of these machines is required to be conducted at an interval as specified by the OEM's and the condition monitoring report. The maintenance and service executed on these machines are both planned and unplanned work as the requirement may be. The minimum maintenance and/or service intervals are quarterly (3months), whereby the 3 months can be classified as minor service while the 6 months can be classified as a major service as per the OEM and the Maintenance Strategy Requirements, and also on an as and when required (breakdown) purposes.

A well-structured maintenance and service programme is essential for any operation. In having numerous different machines that require regular services and maintenance, an adoption of an effective maintenance plan will ensure that:

- Machine down time resulting from breakdown are limited,
- The quality of production will be improved,
- The life of the machine will be improved, and,

- The costs of repairs and maintenance will be reduced.

As part of a full maintenance proposal, the scope of work should be divided into a well-structured on-going maintenance program as well as a breakdown services. The maintenance program must be tailored for each machine so as to specifically address the needs of each piece of machinery. This must include regular inspections of the equipment as well as the servicing of such equipment at the required intervals. The machine reliability and availability promotes and supports the daily production schedules and plans. This scope, while entailing the maintenance of the machine as they stand, also seeks to build a history of utilization and maintenance. Therefore, where a maintenance regime is not in place, the service provider shall work with the client to develop one in accordance with the OEM minimum requirements.

3.2 SITE INFORMATION

The scope entails works to be executed at different sites; i.e. Camden, Tutuka, Majuba, Duvha, Komati, Matla, Krilel, Kendal, Hendrina, Arnot, Lethabo, Grootvlei and Matimba Power Stations

3.3 PLANT DESCRIPTION

The plant description of the machines to me maintained and/or serviced is tabulated on the tables below.

Table 1: Camden Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Late machine	32E258002200	PROTH	1
2	Shaping machine	11032197	SLOTMACH	1
3	Milling machine (new)	980000081570	Pinnacle-10726	1
4	Milling machine (old)	32E258001500	LAGUN	1
5	Surface grinder	980000081568	PROTH -10712	1
6	Power Saw Machine	980000081569	COSEN 10727	1
7	Radial Drilling Machine		RAD32X1000/3801072	1

Table 2: Duvha Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Lathe machine	34E532111331	CYL660G	1

2	Radial Arm drill machine	34E432010100	Heckert	1
3	Milling machine	34E432010600	Simplon	1
4	Surface Grinder	831081-1	Kent	1
5	Pedestal Grinder	34E532010776/1	Bosch	1
6	Pedestal Grinder	11020564	Bosch	1
7	Drill machine	34E532015400	Heckert	1
8	Power saw	34E432004000	Ercole 240	1

Table 3: Matla Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Pedestal Drill	10919297	ERLO TCA-40	1
2	Pedestal Drill	34E545029380	ERLO TCA-40	1
3	Wire Brush Machine	34E452012100	Sprecher+Schuh	1
4	Wire Brush Machine	10919327	Sprecher+Schuh	1
5	Stone Grinder	10919328	Crown	1
6	Stone Grinder	10919329	Crown	1
7	Stone Grinder	10919334	Crown	1
8	Hydraulic Press (pump & jack)	10918937	Enerpac	1
9	Lathe Machine	10919344	Colchester	1
10	Surface grinder	10919399	Kent	1
11	Shaping Machine	34E452006400	no name plate	1
12	Power Saw Machine	10919393	Cosen	1

Table 4: Tutuka Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Late machine	11036977	Trent SN 50	1
2	Milling machine	10920044	TA Mill Master	1
3	Surface grinder	11036979	Proth	1
4	Power Saw Machine	10920048	TA SawMaster	1
5	Drilling Machine TSAR 32	11036978	TSAR 32	1
6	Drilling Machine (small)	10920041	Strands Type: S 68	1
7	Hydraulic test bench (Denison pumps x 2 off	Tutuka	Type: Denison PV6 Bench Pump	2
8	H-Frame Hydraulic Press (pump & jack)	10919975	Enepac	1

Table 5: Lethabo Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Bench Grinder (Small)	99E544004831	Felisatti	1
2	Bench Grinder (Big)	99E544004832	Felisatti	1
3	Lathe Machine	34E544039319	CY PML (660x2000g)	1
4	Milling Machine	34E544039124	Pinnacle	1

5	Drilling Machine	99E544039521	Strands	1
6	Surface Grinder	34E652004600	Proth	1
7	Pipe Threading Machine	34E343000500	Ridgid	1
8	Power pack presser	34E652003000	Enerpac	1
9	Band/Power Saw	34E652000600	Carif	1

Table 6: Matimba Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Late machine(old)	99E531000790	OKUMA	1
2	Late machine(new)	11022819	CY6250B/2000	1
3	Milling machine (new)	11022820	JINSHIN	1
4	Milling machine (old)	99E531000792	SIM GROUP JAPAN	1
5	Surface grinder(old)	99E531001693	PROTH INDUSTRIAL CO.LTD	1
6	Surface grinder(new)	11022821	PROTH INDUSTRIAL CO.LTD	1
7	Power Saw Machine(old)	99E531000795	CARIF 200	1
8	Pedestal grinder	99E531000793	TYPE 38 (PM012948)	1
9	Pedestal drill(old)	99E531001695	KITCHEN&WADE LTD	1
10	Pedestal drill(old)	99E531000791	PAINTED.NOT VISIBLE	1
11	Pedestal drill(old)	99E531001696	MAC OLIVE PRECISION ENGINEERING	1
12	Vertical band saw	99E531001816	FU HO FACTORY CO.LTD	1
13	Sand blasting machine	34E531000400	PAINTED.NOT VISIBLE	1
14	Power Saw Machine(new)	11022822	COSEN MACHINERY INDUSTRIAL CO.LTD	1

Table 7: Kriel Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Lathe Machine	34E546021353	Trens Trencin	1
2	Surface grinder	34E546012300	Rema	1
3	Drilling Machine	99E546008123	Mitco	1
4	Milling Machine	34E453007600	Cicinnati	1
5	Surface grinder	34E453012500	Crown	1
6	Power Saw	34E453012600	No info	1
7	Big surface grinder	99E546008252	Rema	1
8	Buffing Machine	34E453012700	Rema	1
9	Drilling Machine	34E453007800	Heckert	1

Table 8: Kendal Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Late machine	34E454004200	Tezsan	1
2	Milling machine	99E541002721	Lagun	1
3	Jig Saw	34E554234500	Fabris	1

4	Circular Saw 220V	34E541031057	Rema	1
5	Small grinder	99E541002685	TA Grind Master	1
6	Pedestal Drill	34E455400560	Mitco	1
7	Lathe Machine	34E454005500	Kilser	1

Table 9: Majuba Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	GRINDER WITH STONE BRUSH AIR	99E533003385	Ingersol Rand	1
2	Pedestal Grinding Machine	34E534008800	TA Grind Master	1
3	MILLING MACHINE SUPERMAX	39E650014500	Supermax	1
4	Band Saw Blade Machine	34E534011690	Cocco	1
5	Geared Head Precision Lathe	34E534011683	TA Turnmaster	1
6	MILLING MACHINE	980000118806	Manford	1
7	Surface Grinder Model SGS 122	34E534011696	Flee Port	1
8	Lathe Machine MITCO 360S	34E662004700	Mitco	1
9	Dilling Machine	34E553105778	Rexon	1
10	Welding Machine	99E534004122	Tonco	1
11	Pedestal Drilling Machine	99E534004138	Radial	1

Table 10: Komati Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Bench Grinder (Big)	34E553068937	MARPOL	1
2	Bench Grinder (Small)	34E516011224	MARPOL	1
3	Lathe Machine	34E516007400	TA TURN MASTER	1
4	Milling Machine	34E516007800	TA Mill Master	1
5	Drilling Machine	34E516011203	TA DRILL MASTER	1
7	Pipe Threading Machine	34E516007300	RIDGED 535 SERIES	1
8	Pedestal Drill	34E516007700	TA TURN MASTER	1
9	Surface Grinder	34E516007600	TA Grind Master	1
10	Power Saw Machine	34E516007500	TA SAW MASTER	1

Table 11: Hendrina Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Power Saw	99E543000927	NO NAME ON IT	1
2	Pedestal Grinder(COMM)	99E543001118	KENIA	1
3	Surface Grinder	10913127	KENT	1
4	Pedestal Grinder(big)	99E543000927	KENIA	1
5	Pedestal Grinder(Medium)	HEA-2510-01	METABO	1
6	Milling Machine	34E625000100	CINCINNATI	1
7	Lathe machine	34E435000500	TOS TRENCIN	1
8	Pedestal Drilling Machine	34E435014000	MITCO	1

9	Pedestal Drilling Machine	New	TA DRILL MASTER	1
10	Pedestal Drilling Machine	99E543001120	MACO MACHINE TOOLS	1

Table 12: Arnot Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Radial drill machine	980000081575	Tool Equip Allied	1
2	Jen Lian Milling Machine	980000081574	Pinnacle	1

Table 13: Grootvlei Power Station

No	*Identification*	*Asset number*	*Machine Make*	*Quantity*
1	Radial Drilling Machine	TBC	TBC	1
2	Hack Saw Machine	TBC	TBC	1
3	Surface Grinder	TBC	TBC	1
4	Centre Lathe (conventional)	TBC	TBC	1
5	Professional Bench Grinder	TBC	TBC	2

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 details of the works is divided according to the machine location, machine type and duration requirement.

Prior to commencement of any work, the Service provider must make available all load testing and calibration certificates of all tools and tackles, apparatus, special instruments, measurement equipment as and when required, that they will be using.

3.4.1 SPECIFIC TASKS FOR EACH MACHINE

The work shall entail but is not limited to:

3.4.1.1 CNC Machines
a. Service the hydraulic unit
b. Check Gearbox and change oil
c. Service coolant pump
d. Open slide way covers and clean underneath
e. Clean and check slide way cover wipers
f. Clean all under way's for excess coolant and oil flow
g. Service the headstock chiller/cooler unit
h. Service headstock lubrication system
i. Check lubrication valves are correctly operational
j. Apply grease to lubrication points
k. Grease the inner moving parts of all the axis covers
l. Grease the tailstock linear guides
m. Check the interlock and safety devices on machine
n. Clean the equipment and inside the control cabinet
o. Change the filters for the electrical cabinet
p. Service ball screw and milling spindle chiller / cooler unit
q. Check and clean fans, servo drive fans
r. Check the wiring and clean the cables
s. Check all electrical connectors and connections
t. Check the screw bearings for noise
u. Check all hydraulic pipes for signs of wear
v. Check the coolant pipes and connections for signs of leakages
w. Check and clean linear guide wipers
x. Check headstock alignment
y. Check and set X centre height and set if needed.
z. Check and set Turret alignment
aa. Check and set Tailstock alignment
bb. Check chuck and chuck cylinder function.

cc. Check Chuck base jaws for cracks

dd. Measure the backlash on each axis and set if needed

ee. Service Coolant tank (Check filters)

ff. Check machine work Light

3.4.1.2 Conventional Lathes

Head Stock:

a. Drain oil.
b. Clean inside of headstock.
c. Check that sight glass is in good condition and that oil is clearly visible, replace if necessary.
d. Fill up with oil.
e. Remove cover and check lubrication system.
f. Ensure all bearings are getting lubrication.
g. Check that clutches are being lubricated.
h. Dismantle main spindle bearings.
i. Check brake lubrication.
j. Engage clutches and check adjustment, adjust if required.
k. Check condition of pulleys and belts.
l. Check clearance on main spindle bearings and adjust if required.
m. Dismantle clutch from machine
n. Repair clutch assembly.
o. Dismantle clutch assembly from apron box.

Feed box:

a. Test operation of feed box.
b. Check all levers and selectors, repair where necessary.
c. Drain oil.
d. Check that sight glass is in good condition and that oil is clearly visible, replace if necessary.
e. Fill up with oil.
f. Inspect lead screws and nuts on long travel

Saddle and apron gearbox:

a. Drain oil from apron box.
b. Remove apron gearbox and shafts.
c. Clean all shafts (feed, screw and direction shafts).
d. Check and clean half-nuts.
e. Clean apron box.
f. Check that sight glass is in good condition and that oil is clearly visible, replace if necessary.
g. Check condition of all handles and levers.
h. Check for backlash on compound slide.
i. Remove compound slide.
j. Strip and clean compound slide.
k. 11. Check for backlash on cross travel.
l. 12. Strip cross slide from saddle.
m. 13. Clean all cross slide components.
n. 14. Strip and remove saddle from machine.
o. 15. Clean saddle and reassemble.
p. 16. Reassemble cross slide.
q. 17. Reassemble compound slide.
r. 18. Reassemble apron box and shafts.
s. 19. Check all wipers, replace if required.
t. 20. Check long travel rack for good working condition.
u. 21. Repair /replace lead screws and nuts

Tailstock:

a. Strip and clean and reassemble.
b. Check clamping lever of tailstock quill for good working condition.
c. Check condition of quill, check for marks and check lubrication.
d. Check clamping screw on tail stock is in good working condition.
e. Check tailstock hand wheel for good working condition.
f. Check back lash on spindle and nut.
g. Check wipers on tailstock, replace if required.
h. Clean tailstock.

Coolant system:

a. Check operation of water pump.
b. Ensure that water pump is securely fastened.
c. Check condition of all pipes and valves.
d. Check condition of swarf pan.
e. Replace coolant pump pipes if required.

Chucks:

a. Check 3 jaw chucks.
b. Strip and clean.
c. Reassemble.
d. Check 4 jaw chucks.
e. Strip and clean.
f. Reassemble.

Steadies:

a. Check steadies.
b. Strip steadies.
c. Clean steadies.
d. Reassemble steadies.

Machine bed:

a. Hone the slide ways to remove any high spots on the slides.
b. Level bed. Clean machine.

Electrical:

a. Clean panel and assess condition of all electrical components.
b. Test all electrical functions of machine.

3.4.1.3 Cropper Machine

Mechanical:

a. Dismantle all machine covers from machine.
b. Drain oil from hydraulic power pack.
c. Clean sight glass on power pack.
d. Open power pack.
e. Clean inside of power pack.

f. Replace oil filter / clean oil strainer.
g. Check for oil leaks on hydraulic main hydraulic cylinders.
h. If the above mentioned cylinders are leaking, dismantle cylinders from machine
i. Inspect all slides on machine.
j. Check all hydraulic pipes and connections for wear. Replace damaged pipes and fittings if required.
k. Ensure that the machine is lubricating all slides.
l. Test machine for correct operation.
m. Check bearing wear.
n. Calibrate stoppers on machines.
o. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
p. Removal of all old Lubricants from site after completion of the work on each machine

Electrical Details:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check counter and readout system on machine for correct operation.
g. Check all interlocks and safety devices on machine for correct operation.
h. Test and Check Lights on machine and repair, install if required.

3.4.1.4 Guillotine

Mechanical:

a. Dismantle all machine covers from machine.
b. Drain oil from hydraulic power pack.
c. Clean sight glass on power pack.
d. Open power pack.
e. Clean inside of power pack.

f. Replace oil filter / clean oil strainer.
g. Check for oil leaks on hydraulic main hydraulic cylinders.
h. If the above mentioned cylinders are leaking, dismantle cylinders from machine
i. Inspect all slides on machine.
j. Check all hydraulic pipes and connections for wear. Replace damaged pipes and fittings if required.
k. Ensure that the machine is lubricating all slides.
l. Test machine for correct operation.
m. Check bearing wear.
n. Calibrate stoppers on machines.
o. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
p. Remove all old Lubricants from site after completion of the work on each machine

Electrical:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check counter and readout system on machine for correct operation.
g. Check all interlocks and safety devices on machine for correct operation.
h. Test and Check Lights on machine and repair, install if required.

3.4.1.5 Milling Machine

Mechanical:

X-Axis

a. Clean and inspect x-axis slides.
b. Inspect the acme lead screws or ball screws and replace if required.
c. Replace of the ball screw end bearings.

d. Tension ball screw
e. Check lubrication on the axis.
f. Inspect slide wipers where needed.
g. Check the backlash on the axis.

Y-Axis:

a. Clean and inspect x-axis slides.
b. Inspect the acme lead screws or ball screws and replace if required.
c. Replace of the ball screw end bearings.
d. Tension ball screw.
e. Check lubrication on the axis.
f. Inspect slide wipers and replace where needed.
g. Check the backlash
h. Clean slide way covers and monitor condition.
i. Check the condition of the spindle belt.
j. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
k. Removal of all old Lubricants from site after completion of the work on each machine assembly from apron box.

Z-Axis

a. Clean and inspect x-axis slides.
b. Inspect the acme lead screws or ball screws and replace if required
c. Replace of the ball screw end bearings.
d. Tension ball screw.
e. Check lubrication on the axis.
f. Inspect slide wipers where needed.
g. Check the backlash on the axis
h. Clean slide way covers and monitor condition.
i. Check machine level and re-level if necessary.
j. Inspect oil levels and oil leaks.
k. Inspect oil level glass visibilities.
l. Inspect feed gearbox.

m. Inspect gears and bearing.
n. Service lubrication system.
o. Inspect all levers for operation.
p. Monitor machine function
q. Inspect milling head and grease.
r. Inspect coolant ipes.
s. Clean the machine

Electrical Details:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check counter and readout system on machine for correct operation.
g. Check all interlocks and safety devices on machine for correct operation.
h. Test and Check Lights on machine and repair, install if required.

3.4.1.6 Pedestal Drill

Mechanical:

a. Dismantle all machine covers from machine.
b. Drain oil from gearbox.
c. Clean sight oil level site glass.
d. Replace oil filter / clean oil strainer.
e. Check for oil leaks gearbox.
f. Replace all bearing where necessary.
g. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
h. Removal of all old Lubricants from site after completion of the work on each machine

Electrical:

a. Test all limit switches for correct operation.

b. Test all control panel switches, all motors and replace contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check all interlocks and safety devices on machine for correct operation.
g. Test and check lights on machine and repair, install if required.

3.4.1.7 Roller Machine

Mechanical:

a. Dismantle all machine covers from machine.
b. Drain oil from hydraulic power pack.
c. Clean sight glass on power pack.
d. Open power pack.
e. Clean inside of power pack.
f. Replace oil filter / clean oil strainer.
g. Check for oil leaks on hydraulic main hydraulic cylinders.
h. If the above mentioned cylinders are leaking, dismantle cylinders from machine and repair
i. Check all hydraulic pipes and connections for wear. Replace damaged pipes and fittings if required.
j. Ensure that the machine is lubricating all slides.
k. Test machine for correct operation.
l. Check bearing wear.
m. Calibrate stoppers on machines.
n. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
o. Removal of all old Lubricants from site after completion of the work on each machine

Electrical Details:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.

c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check counter and readout system on machine for correct operation.
g. Check all interlocks and safety devices on machine for correct operation.
h. Test and check lights on machine and repair, install if required.

3.4.1.8 Band Saws

Mechanical

a. Dismantle all machine covers from machine.
b. Drain, clean strainer and replace oil in hydraulic power pack.
c. Clean sight glass or replace site glass on power pack tank.
d. Inspect all slides and blade guides.
e. Replace faulty components.
f. Check and service hydraulic system.
g. Grease all lubrication points.
h. Check all leavers and selectors and repair where required.
i. Check for backlash on internals.
j. Strip bearings from machine, replace bearing if required.
k. Inspect all gears, keys, gear selectors and internal piping. Repair gears, keys where required.
l. Replace all damaged internal piping.
m. Check for oil leaks on column cylinders. If cylinders are leaking, dismantle cylinders and repair cylinder.
n. Check drive train on all axes and repair if required.
o. Check all lubrication distribution points; ensure that all lubrication points work.
p. Clean coolant tank and clean coolant system pump pick-up filter.
q. Replace coolant pipes if required.
r. Check all hydraulic pipes and connections on machine replace if required.
s. Fill all oils on machine including lubrications system.

t. Perform final geometric test on Machine according to ISO Standards.

u. Test Machine for correct operation.

w. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)

x. Removal of all old Lubricants from site after completion of the work on each machine assembly from apron box.

Electrical:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check all interlocks and safety devices on machine for correct operation.
f. Check emergency stops for correct opera.
g. Check counter system on machine for correct operation.
h. Test and check lights on machine and repair, install if required

3.4.1.9 Bending Break

Mechanical:

a. Dismantle all machine covers from machine.
b. Drain oil from hydraulic power pack.
c. Clean sight glass on power pack.
d. Open power pack.
e. Clean inside of power pack.
f. Replace oil filter / clean oil strainer.
g. Check for oil leaks on hydraulic main hydraulic cylinders. If the above mentioned cylinders are leaking, dismantle cylinders from machine
h. Inspect all slides on machine.
i. Check all hydraulic pipes and connections for wear. Replace damaged pipes and fittings if required.
j. Ensure that the machine is lubricating all slides.
k. Test machine for correct operation.
l. Check bearing wear.

m. Calibrate stoppers on machines.
n. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
o. Removal of all old Lubricants from site after completion of the work on each machine

Electrical Details:

a. Test all limit switches for correct operation.
b. Test all control panel switches, all motors and contactors.
c. Clean out electrical panel.
d. Check panel for hot connections.
e. Check emergency stops for correct operation.
f. Check counter and readout system on machine for correct operation.
g. Check all interlocks and safety devices on machine for correct operation.
h. Test and Check Lights on machine and repair, install if required.

3.4.2 MAINTENANCE INTERVALS

The inspection and maintenance intervals shall be quarterly and on an as and when required basis. This will be the breakdown circumstances.

3.5 DELIVERABLES

The service provider shall ensure that the reports and documentation pertaining the service and maintenance of the machines are submitted to the Client's Representative. Below is a table that entails the minimum details to be contained in the report.
The agreed template will be provided to the Service Provider upon finalization of the contract and prior to the initial rendering of the services.

Table 14: Report Minimum Required Information

System	Report Content
Housekeeping	The initial housekeeping prior to the execution of the task and the resulting housekeeping condition after the execution of the task

Machine condition	The condition of the machines prior to starting the maintenance and the condition of the machine after the maintenance has been completed
Lock-out facility	The condition of the lockout system to ensure the safety of both the Service Provider and the Client's personnel
Out-of-Normal Condition	The identification of any out of normal condition on the machine, both prior and post servicing and maintenance execution
Electrical System	The condition of the electrical system of the machine
Environmental Condition	Identification of any environmental contravention, *if any*, in relation to, *but not limited*, the drip tray conditions, oil or grease leaks, etc.
Cooperation Between Service Provider and the Client	Ease of access to the machine and cooperation by the Client's personnel for the execution of the task.
Parts and Consumables	Details of all parts and consumables used
Duration	The duration of the task from start to finish
Machine Specification	The details of the machine maintained which shall include the name, serial number, asset number, design specs and data of the machine.
Recommendations	Any recommendations outside of the contractual agreement of the execution contract of this scope of work.
Service Report	Detailed service report of all work done and list of all replacement parts used

3.6 ASSESSMENT CRITERIA

Upon completion of the maintenance task, the Service Provider shall ensure that a Client's Representative, *to be identified as and when required,* inspects and signs off the work executed prior to the acceptance of the work as complete in accordance with the contract by the Client's Representative. The Servicer Provider shall ensure that records are kept for the duration of the contract while the Client's Representative shall ensure that records are kept safe for the duration as stipulated in the maintenance philosophy.

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.

3.8 ELIGIBILITY EVALUATION CRITERIA

The Service Provider intending to tender for this work shall ensure they are and/or employ qualified and competent personnel in the field of Maintenance. Notwithstanding other requirements that may arise during the tender process, the following are the minimum requirements.

3.8.1 Qualified Trade Tested Artisans

3.8.2 Proof on Knowledge of Machinery Safety

3.8.3 Proof of Knowledge of the OHS Act requirements

3.8.4 Must have worked on similar machines before, e.g. Lathes, Milling machines, etc.

3.8.5 Must be capable of undertaking the magnitude of the work as per the contract

3.8.6 Must be mobile and readily available for breakdowns at all the areas of operations

3.9 GENERAL CONSTRAINTS

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

3.9.1 Working in an operational environment where machines and equipment are being handled.

3.9.2 Negotiating with Production Managers to arrange planned shutdowns specifics within the contractual interval requirements

3.9.3 Minimizing down periods as production will still be taking place in and around the vicinity of the working area.

3.9.4 Working in areas where there are vehicle and pedestrian traffic.

3.9.5 Accuracy of existing information may be outdated and need to be verified on site prior to proceeding with any work.

3.10 TERMS AND CONDITIONS

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

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 PM Orders.
e) Issue the service report for the work done and fully signed by the responsible Technician or Supervisor.
f) Respond to the call out within 6 hours after receiving a call out.
g) Hand over the replacement (parts removed from the machine) parts to the Client.

4. AUTHORISATION

Name & Surname	Designation
Sinqobile Nene	Plant Maintenance Manager
Nhlakanipho Blose	Maintenance Service Manager

5. REVISIONS

Date	Rev.	Compiler	Remarks
May 2024	1	S Nene	Scope of Work for the Maintenance and Servicing of the Maintenance

Date	Rev.	Compiler	Remarks
			Sites Workshop Machinery Contract

6. DEVELOPMENT TEAM

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

- Sinqobile Nene
- Nhlakanipho Blose

7. ACKNOWLEDGEMENTS

- Plant Maintenance Team
- Maintenance Team