Eskom Rotek Industries	Scope of Work	Turbo Gen Services

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FIGURES

No table of figures entries found.

TABLES

1. INTRODUCTION

The Manage maintenance base is based on best practices identified from the Equipment Reliability Process, existing within Eskom 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 includes the maintenance and/inspection execution process and their frequencies. The maintenance strategies further identified and categorize the maintenance to be conducted according to their criticality. Original Equipment Manufacturers (OEM's) develops 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.

The Rosherville Workshop located at Rosherville, located at approximately 10km South-East of the Johannesburg CBD in Gauteng and the Matla Workshop located at Matla Power Station which is approximately 20 km from the Kriel Town of Mpumalanga, have a number of machines/equipment that requires maintenance and service in pre-determined intervals. 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 strategies.

This scope makes provision for the development of a maintenance and service contract for all the Rosherville Works and Matla Works 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 Rosherville and Matla Works Machinery 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 said machinery are inspected and maintained according to the highest standard and effectiveness required by the Client (ERI).

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 Machinery entails the Rosherville and Matla Works Machinery.

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 Machinery.

2.1.2 Applicability

This document shall apply throughout Eskom Rotek Industries SOC LTD TGS 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
Works	A TGS Department responsible or production
Plant Maintenance	A TGS Department responsible for maintenance

Definition	Description
	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	End-user 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 Machines are assets used for ensuring on-time and effective delivery of the works executed within the works department at both Rosherville and Matla Works. The maintenance of these machines is critical to the operation of the works, 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 in these machines are both planned and unplanned work as the requirement may be.

A well-structured maintenance and service programme is essential for any manufacturing 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 service. 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.

3.2 SITE INFORMATION

The scope entails works to be executed at two different sites; i.e.; the Rosherville Works in Johannesburg, Gauteng and the Matla Works at Matla Power Station, Kriel Town, Mpumalanga.

3.3 PLANT DESCRIPTION

The plant description of the machines to me maintained and/or serviced is tabulated on the tables below. Table 1 contains the Matla Works Machines and Table 2 entails the description of the Rosherville Works machines. The Matla Works has a total of 21 machines which includes CNC Lathes, Conventional Lathes, Milling machines and surface grinding machines. The Rosherville Works has 44 machines of which 3 are located at the generator services section, 14 located at the bearings services and 27 located at the main works section of the workshop. Rosherville machines also entail a combination of lathes, milling and boring machines and grinding and drilling machines.

Table 1: Matla Works Machines

ASSET NUMBER	ASSET DESCRIPTION
980000080736	SURFACE GRINDING MACHINE
980000049091	MILLING MACHINE FORTWORTH VBM-5VHL
980000047433	LATHE UNIVERSAL MOD:SN-50C
980000049229	VERTICAL BORING MACHINE1.7MBE
980000049233	VERTICAL BORING MACHINE 1.4M
980000081785	HORIZONTAL BORING MILL SMTCL
980000082025	LATHE CENTRE TOS SN-50CX2M
980000082026	LATHE TOS SN50C
980000082027	LATHE TOS SN50CX2M
980000081777	MILLING MACHINE CNC
980000081778	LATHE HOWA CNC
980000081780	LATHE CNC TW 20
980000077408	LATHE TOS SN50C

Table 2: Rosherville Works Machines

ASSET NUMBER	ASSET DESCRIPTION
980000100682	SURFACE GRINDER PFG-2550AH
980000101834	NIPPEI CENTRE GRINDER (G 209)
980000101837	PRECISION GRINDER 1000U AUR
980000101838	PRECISION GRINDER 1000U(G 171
980000101848	COLCHESTER CENTRE LATHE (A 11
980000102062	LATHE UNIVERSAL CENTRE
980000102063	LATHE UNIVERSAL CENTRE
980000110435	LATHE HAAS CNC
980000110436	LATHE HAAS CNC
980000110437	LATHE HAAS CNC
980000110438	LATHE HAAS CNC
980000110439	MILLING MACHINE HAAS
980000110440	MILLING MACHINE HAAS
980000110380	WEBSTER AND BENNETT CNC
980000110387	DAINICHI LATHE SMALL
980000110392	BERTHIEZ MILL BT2

980000110430	DAINICHI LATHE LARGE
980000110386	BORING MACHINE SCHARMANN
980000110389	BERTHIEZ MILL BT1
980000110398	UNION BORING MILL
980000110410	INNSE BORING MILL
980000110421	SCHIESS BORING MILL
980000110403	WALDRICH CENTRE LATHE
TBA	SORALUCE VTC8000 VERTICAL
TBA	GARUTZPE 100 TON LATHE
TBA	JAURISTA 8 METRE HORIZONTAL
980000110429	BORING MILL SKODA
Physical Location	**BEARING SERVICES**
980000120320	Milling Machine
980000102857	Lathes
980000102858	Lathes
980000102859	Lathes
980000102860	Lathes
980000102687	Lathe Cw6280c
980000102692	Lathe Voest Alpine A 56
980000102861	Milling Machine
980000102862	Milling Machine
980000102863	Milling Machine
980000102864	Milling Machine
980000103296	Milling Machine Uh 1250a
980000110292	Horizontal Boring Mill
980000110293	Horizontal Boring Mill
Physical Location	**GENERATOR SERVICES**
980000099901	Surface Grinder
980000109282	Milling Machine
980000109272	Lathe Amco L1640g

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 details scope will be considered as and when it may arise. Upon any realization of such, the Service Provider and the Client's Plant Maintenance Manager will agree on the most effect, 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 the 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.

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 ATC Gearbox and change oil c. Service coolant pump d. Open slide way Cover s 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 operation j. Apply grease to lubrication points k. Grease the inner moving parts of the Z-Axis cover l. Grease the tailstock linear guides m. Check the interlock and safety devices on machine n. Clean the NC equipment and inside the control cabinet o. Change the filters fir the electrical cabinet p. Service ball screw and milling spindle chiller / cooler unit q. Check and clean fans, servo drive fans includes 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 bearing 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.
    a. Check for backlash on cross travel.
    b. Strip cross slide from saddle.
    c. Clean all cross slide components.
    d. Strip and remove saddle from machine.
    e. Clean saddle and reassemble.
    f. Reassemble cross slide.
    g. Reassemble compound slide.
    h. Reassemble apron box and shafts.

k. Check all wipers, replace if required.
l. Check long travel rack for good working condition.
m. 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.
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
i. Dismantle all machine covers from machine.
j. Drain, clean strainer and replace oil in hydraulic power pack.
k. Clean sight glass or replace site glass on power pack tank.
l. Inspect all slides and blade guides.
m. Replace faulty components.
n. Check and service hydraulic system.
o. Grease all lubrication points.
p. Check all leavers and selectors and repair where required.
q. Check for backlash on internals.
r. Strip bearings from machine, replace bearing if required.
s. Inspect all gears, keys, gear selectors and internal piping. Repair gears, keys where required.
t. Replace all damaged internal piping.
u. Check for oil leaks on column cylinders.
v. If cylinders are leaking, dismantle cylinders and repair cylinder.
w. Check drive train on all axes and repair if required.
x. Check all lubrication distribution points; ensure that all lubrication points work.
y. Clean coolant tank and clean coolant system pump pick-up filter.
z. Replace coolant pipes if required.

aa. Check all hydraulic pipes and connections on machine replace if required.
bb. Fill all oils on machine including lubrications system.
cc. Perform final geometric test on Machine according to ISO Standards.
dd. Test Machine for correct operation.
ee. w. Fill all oils on machine including lubrications system with new oil as per specification from OEM. (Wet service)
ff. 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:

i. Dismantle all machine covers from machine.
j. Drain oil from hydraulic power pack.
k. Clean sight glass on power pack.
l. Open power pack.
m. Clean inside of power pack.
n. Replace oil filter / clean oil strainer.
o. Check for oil leaks on hydraulic main hydraulic cylinders.
p. If the above mentioned cylinders are leaking, dismantle cylinders from machine
q. Inspect all slides on machine.
r. Check all hydraulic pipes and connections for wear. Replace damaged pipes and fittings if required.
s. Ensure that the machine is lubricating all slides.
t. Test machine for correct operation.
u. Check bearing wear.
v. Calibrate stoppers on machines.
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

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 following table below details the service and/or maintenance interval for each machine and the minimum tasks to be executed at each interval.

MACHINE TYPE AND SERVICE INTERVALS
1 x WALDRIC CNC LATHE *Max between centres = 22.86 meter* *Max load between centres = 125 ton* *Max swing diameter = 5 meter* *Max swing over slides = 4.42 meter* *Chuck diameter = 2.6 meter* *Max between centres = 22.86 meter* *Max load between centres = 125 ton*
3 Months Interval a. Run the machine to observe whether all the motions operate correctly. b. Pull the bed covers back and clean bed check for burrs and damages. c. Inspect “Y” axis rack and worn gears d. Check the worn gear oil e. Drain main oil tank and clean the tank and oil filters. f. Examine the saddle, slides and locking devices for wear and adjust if necessary. g. Inspect the cross slide ball screw and check the backlash. This will indicate the amount of wear on the ball screw. h. Inspect the tool post slides and spindles for wear and backlash. i. Open and drain cross slide oil tank and check Vogel system j. Clean cross slide oil tank and check flow level k. Check all oil pipes and oil pressure gauges while tank covers are off l. Check tail stock clamps and oil pressure check movement of quill m. Examine bearing steadies and check oil levels n. Examine headstock and check hydraulic gear change o. Check headstock oil level p. Examine wipers on all slides q. Inspect the hydrostatic pump, pipes and gauges. r. Examine the oil cooling systems. s. Check Vogel lubrication system on tool post blades t. Examine slide way covers for damage and wear oil wipers u. Replace filters on cabinet and motor fans v. Vacuum out all cabinets w. Check tightness of connections on all component x. Check contactors, replace damaged or faulty component y. Check brushes on D.C. Motors and tacho generator feedback

z. Run electrical motors and inspect for noise
aa. Check all and test limit switches
bb. Record electrical service outcomes/repairs carried out and all spares used

6 Months Intervals

a. Run the machine to observe whether all motions operates correctly (A-Axis, Z-Axis and Table)
b. Examine the saddle, slides and locking devices for wear and adjust if necessary for Both X-Axis and Axis Ram; slides, Gip, locking devices, Ball screw and axis lubrication)
c. Check Repair/replace hydrostatics (Pumps, Pipes connections, Gauges, Oil filters and cooling system)
d. Examine the cross slide spindle and locking devices, adjust if necessary
e. Inspect the tool post spindle and spindle for wear and backlash
f. Drain the headstock oil tank and clean the magnetic oil filters
g. Inspect all nuts, lock washers and bearing circlips
h. Examine the tailstock, movement of quill and oil level
i. Ball screw- check worn gear oil pressure, examine the cross slide spindle and check backlash as this will indicate the amount of wear on the ball screw
j. Inspect and repair where necessarily the Electrical Panels: panel door seals, panel lights, Door limit switches, panel cooling fans, heat exchanges, air conditioners and terminal connections.
k. Inspect and repair if necessarily Drivers:(PC Board, drive fans) AC Motors (Bearing, motor fan, Brushes, commutator), Switches: Limit switches (end travel limits, Machine limits), Pushbuttons and Lamps, linear scales, X-axis and Z-axis scale sealing lips, X-axis and Z-axis scale cable, Table encoder and encoder coupling, Earth on the income carriers

1 x DAINIICHI CNC LATHE	**1 x SAFOP CNC LATHE**
CNC CONTROL SINUMERIC 840 D MAX BETWEEN CENTERS = 12 METER MAX LOAD BETWEEN CENTERS =18 TON MAX LOAD ON STEADIES = 35 TON MAX SWING DIAMETER = 2.2 METER MAX SWING OVER SLIDES = 2 METER CHUCK DIAMETER = 2 METER MAXIMUM SPEED = 141 RPM	CNC CONTROL SINUMERIC 880 MAX BETWEEN CENTERS = 15 METER MAX LOAD BETWEEN CENTERS = 80 TON MAX LOAD ON STEADIES = 100 TON MAX SWING DIAMETER = 5.2 METER MAX SWING OVER SLIDES = 4 METER CHUCK DIAMETER = 2 METER MAXIMUMSPEED = 141 RPM

3 Monthly Interval

a. Run the machine to observe whether all the motions operate correctly.
b. Pull the bed covers back and clean bed check for burrs and damages.
c. Inspect “Y” axis rack and worn gears
d. Drain main oil tank and clean the tank and oil filters.
e. Examine the saddle, slides and locking devices for wear and adjust if necessary.
f. Inspect the cross slide ball screw and check the backlash. This will indicate the amount of wear on the ball screw.
g. Inspect the tool post slides and spindles for wear and backlash.
h. Examine the tailstock, movement of quill and oil level.

i. Inspect the hydrostatic pump, pipes and gauges.
j. Examine the oil cooling systems.
k. Check Vogel lubrication system on tool post blades
l. Remove the headstock top cover and inspect the lubrication system
m. Check the condition and tension of V-Belts of main drive
n. Check condition and tension of the belt on cross slides
o. Record mechanical service outcome, repairs carried out and all spares used
p. Replace filters on cabinet and motor fans
q. Vacuum out all cabinets
r. Check tightness of connections on all component
s. Check contactors, replace damaged or faulty component
t. Check brushes on D.C. Motors and tacho generator feedback
u. Run electrical motors and inspect for noise
v. Check all and test limit switches
w. Record electrical service outcomes/repairs carried out and all spares used

6 Monthly

a. Run the machine to observe whether all motions operates correctly
b. Examine the saddle, slides and locking devices for wear and adjust if necessary (slides, Gip, locking devices, Ball screw and axis lubrication)
c. Check Repair/replace hydrostatics (Pumps, Pipes connections, Gauges, Oil filters and cooling system)
d. Examine the cross slide spindle and locking devices, adjust if necessary
e. Inspect the tool post spindle and spindle for wear and backlash
f. Drain the headstock oil tank and clean the magnetic oil filters
g. Inspect all nuts, lock washers and bearing circlips
h. Examine the tailstock, movement of quill and oil level
i. Ball screw- check worn gear oil pressure, examine the cross slide spindle and check backlash as this will indicate the amount of wear on the ball screw
j. Panel door seals, Panel Lights, Limit Switches, Panel cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
k. AC Motors:
l. Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Fans, Brushes and Encoder
m. Limit Switches, Switches and Indicators:
n. End travel limits, machine limits, Pushbuttons and lamps
o. Drivers: PC Boards, Drive fans and DC Links
p. Machine lights and Linear scales:
q. Linear scale
r. X and Z- Axis scale sealing lips
s. X and Z scale cable
t. Body and lips
u. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

1 x SHIESS VERTICAL Boring Mill (CNC),	**1 x SCHIESS VERTICLE BORING MILL (CNC) 2VA**
CNC CONTROL SINUMERIC 850 SPINDEL DIAMETER = 200 mm	CNC CONTROL SINUMERIC 840D SL

MAX CROSS TRAVEL = 17.36 METER MAX VERTICLE TRAVEL = 5.5 METER	TABLE DIAMETER = 8 METER MAX SPINDLE SPEED = 25RPM MAX SWING = 10 METER MAX HEIGHT OF WORKPIECE=5.5 METER MAX LOAD = 250 TON DOUBLE RAM MINIMUM BORE DIAMETER RAM CAN ENTER = 500 MM HORIZONTAL TRAVEL OF RAIL SADDLE = 6100 MM

3 Monthly

a. Run the machine to observe whether all the motions operate correctly.
b. Check of the wipers and the slide ways for the formation of grooves
c. Inspection of the slide way covers
d. Check for wear of lead screws and their nuts(cross rail and column traverse drive)
e. Inspection of ropes, chains and belt drives (if any)
f. Geometrical checks
g. Cleaning of air filters on motors
h. Listen for excessive noise on pump units
i. Check oil-level and temperature in the oil containers
j. Check the degree of lubricant contamination and if required, obtain samples for analysis
k. Cleaning of filters , changing the filter inserts
l. Check function and pressure of the hydraulic and lubrication systems
m. Check for leaks on pipes, hoses, covers and spindle seals
n. Re-grease manually lubricated items with a grease gun
o. Check contacts for signs of arcing, if necessary clean or replace contacts
p. Check or replace air filters for cabinet and motor ventilation
q. Check the function of the central monitoring system
r. Check the function of all path limit switches
s. Check all bulbs of pilot lights, indicators and readouts

Check power consumption of the various drives

6 Monthly

a. Run the machine to observe whether all the motions operate correctly.
b. Examine the saddle, slides and locking devices for wear and adjust if necessary.
c. For X1-X2 Axis, Z1-Z2 Axis and C-Axis: Slides,- Gips,- Lubrication and - Ball screw
d. Hydraulic : -Pump, pipes, Gauges and oil filters
e. Belts: Spindle and live spindle, axis
f. Clamping Cylinder: Leaks, Pressure and functions
g. Open Covers: (Slides, Wipers, Lube metering and piping, Ball screw lube and Ball screw end bearing)
h. Electrical Panels: Panel door seals, Panel Lights, Limit Switches, Panel

cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
i. AC Motors: Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Bearings, Fans, Brushes and Encoder
j. Limit Switches, Switches and Indicators: End travel limits, machine limits, Pushbuttons and lamps
k. Drivers: PC Boards, Drive fans and DC Links
l. Machine lights and Linear scales: Lamps, body and lips
m. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

1 x INNSE CNC FLOOR TYPE HORIZONTAL BORING MILL

CNC CONTROL SINUMERIC 850

SPINDEL DIAMETER = 200 MM

SPINDLE SPEED MAX = 600 R/MIN

HIGH SPEED SPINDLE MAX SPEED= 2300 R/MIN

MAX CROSS TRAVEL= 17.36 METER

MAX VERTICLE TRAVEL = 5.5 METER

MAX SWING DIAMETER = 1 METER

COMBINED RAM AND SPINDLE TRAVEL = 1.96 METER

MAXIMUM FLOOR LOAD = 300 TON

CNC INTEGRATED ROTARY TABLE LOAD = 45 TON

RORARY TABLE DIMENSIONS= 3 X 3 METER

3 Monthly

a. Check for noise and temperature of gearboxes and bearings.
b. Check the guide play and backlash of straight guides remarks
c. Check of the wipers and the slide ways for the formation of grooves.
d. Inspection of the slide way covers remarks
e. Check for wear of lead screws and their nuts (cross rail and column traverse drive)
f. Inspection of ropes, chains and belt drives (if any)
g. Do geometrical checks
h. Cleaning of air filters on motors
i. listen for excessive noise on pump units
j. Check oil-level and temperature in the oil container
k. Check the degree of lubricant contamination and if required, obtain samples for analysis
l. Cleaning of filters and the filter inserts
m. Check function and pressure of the hydraulic and lubrication systems
n. Check for leaks on pipes, hoses, covers and spindle seals
o. Re-grease manually lubricated items with a grease gun
p. Replace filters on extraction fans and main dc motor
q. Remove dust accumulation from all electrical panels and operators
r. Pendants: Renew brushes on main dc motor and tacho generator, Check, replace contacts on contactors and relays, Check for correct operation of float, flow and pressure switches, proximity switches and transducers

s. Check and test limit switches
t. Replace any damage sprague tubing
u. Record electrical service outcomes / repairs carried out / all spares used:

6 Monthly

a. Run the machine to observe whether all motions operates correctly
b. Examine the saddle, slides and locking devices for wear and adjust if necessary (slides, Gip, locking devices, Ball screw and axis lubrication)
c. Check Repair/replace hydrostatics (Pumps, Pipes connections, Gauges, Oil filters and cooling system)
d. Examine the cross slide spindle and locking devices, adjust if necessary
e. Inspect the tool post spindle and spindle for wear and backlash
f. Drain the headstock oil tank and clean the magnetic oil filters
g. Inspect all nuts, lock washers and bearing circlips
h. Examine the tailstock, movement of quill and oil level
i. Ball screw- check worn gear oil pressure, examine the cross slide spindle and check backlash as this will indicate the amount of wear on the ball screw
j. Electrical Panels
k. Panel door seals, Panel Lights, Limit Switches, Panel cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
l. AC Motors:
m. Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Bearings, Fans, Brushes and Encoder
n. Limit Switches, Switches and Indicators:
o. End travel limits, machine limits, Pushbuttons and lamps
p. Drivers: PC Boards, Drive fans and DC Links
q. Machine lights and Linear scales (X1 & X2- Axis, Z1 & Z2-Axis and C-Axis):
r. Lamps, body and lips
s. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

1 x BERTHIEZ VERTICLE BORING MILL (CNC) (BT1)

CNC CONTROL SINUMERIC 840 D

TABLE DIAMETER = 3 METER

MAX SWING= 6,3 METER

MAX HEIGHT= 3 METER

MAX LOAD = 80 TON

“C “ AXES (SIDE ARM)

LIVE SPINDLE FOR MILLING & DRILLING = 1500 RPM

INDEXIBLE TURN TABLE

3 Monthly

a. Carry out geometric calibration checks of machine, pitch, yaw and roll along x, y & z axis.
b. Open concertina covers and inspect bridge slides
c. Check the condition of concertina covers

d. Check lubrication system and pipes for leaks
e. Check hydraulic power pack of clamping system and
f. clamps for leaks
g. Check HTD belts on axis drive system
h. Check slide way wipers for wear and damage
i. Check oil and filters of main gearbox
j. Check clamping system for operation and leaks
k. Record mechanical service outcomes / repairs carried out / spares used
l. Replace filters on extraction fans in electrical cabinets
m. Check contactors - replace faulty or worn components
n. Check soldered joints and condition of all pc boards
o. Tighten wires into connector blocks
p. Clean out electrical cabinets
q. Check if all limit switches are working correctly
r. Check pilot lamps
s. Check sprague tubing, replace if damage
t. Record electrical service outcomes / repairs carried out /

6 Monthly

a. Examine the saddle, slides and locking devices for wear and adjust if necessary.
b. Check ball screw, ball screw nuts, lock washers and bearings: axis lubrication gears, hydrostatic pump, pipes, gauges, oil filters and cooling system
c. Examine the oil cooling system.
d. Cross slide spindle: examine the cross slide spindle and locking devices, adjust if necessary.
e. Tool post spindle: inspect the tool post slides and spindles for wear and backlash.
f. Headstock: drain the headstock oil tank and clean the magnetic oil filters.
g. Fasteners: inspect all nuts, lock washers and bearing circlips. tailstock category
h. Examine the tailstock, movement of quill and oil level.
i. Bed: pull bed covers back and clean bed. Ball screw
j. Check worn gear oil pressure; examine the cross slide spindle and check backlash, as this will indicate the amount of wear on the ball screw.
k. Electrical Panels: Panel door seals, Panel Lights, Limit Switches, Panel cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
l. AC Motors: Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Bearings, Fans, Brushes and Encoder
m. Limit Switches, Switches and Indicators: End travel limits, machine limits, Pushbuttons and lamps
n. Drivers: PC Boards, Drive fans and DC Links
o. Machine lights and Linear scales: Lamps, body and lips
p. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

1 x **SCHARMAN FLOOR TYPE HORIZONTAL BORING MILL**	1 x **BERTHIEZ VERTICLE BORING MILL (CNC) (BT2)**
SPINDEL DIAMETER = 125 mm MAX CROSS TRAVEL = 4 METER MAX VERTICLE TRAVEL= 2.5 TON MAXIMUM SPINDLE TRAVEL = 1 METER ROTARY TABLE SIZE= 2000 x 2000 mm ROTARY TABLE LOAD	CNC CONTROL SINUMERIC 820 TABLE DIAMETER = 1.6 METER MAX SWING = 3,2 METER MAX HEIGHT = 1.8 METER MAX LOAD = 12 TON

3 Monthly

a. Carry out geometric calibration checks on machine
b. Pitch way and roll alone x, y & z axis: Inspect the condition of the extension steadies for spindle and slide ways of chuck
c. Repair all oil leaks and clean out filters replace if necessary
d. Remove access cover on headstock assembly and inspect bearings and gears for wear
e. Replace bearings if necessary
f. Open all slide covers and inspect slides for wear and damage
g. Check lubrication system, clean out tank and refill
h. Check wipers for wear and damage
i. Inspect counter balance chain and sheave wheels
j. run feeds of all axis to see condition of balls crew and for backlash
k. Inspect racks on machine for wear and damage
l. Check and adjust gibbs if necessary
m. Check slides and gibbs of facing head
n. Inspect clamping system for operation and leaks
o. Check feed clutches in table gearbox
p. Check table clamping
q. Record mechanical service outcomes / repairs carried out / all spares used
r. Replace filters on extraction fans in electrical cabinets
s. Check contactors - replace faulty or worn components
t. Check soldered joints and condition of all pc boards
u. Replace brushes on d.c motors (skoda, kearns & richards and scharmann
v. Tighten wires into connector blocks
w. Clean out electrical cabinets
x. Check if all limit switches are working correctly
y. Check pilot lamps
z. Check sprague tubing and replace if damaged

6 Monthly

a. Replace filters on extraction fans in electrical cabinets
b. Check contactors - replace faulty or worn components
c. Check soldered joints and condition of all pc boards
d. Replace brushes on d.c motors (skoda, kearns & richards and scharmann
e. Tighten wires into connector blocks
f. Clean out electrical cabinets
g. Check if all limit switches are working correctly

h. Check pilot lamps
i. Check sprague tubing and replace if damaged
j. Electrical Panels
k. Panel door seals, Panel Lights, Limit Switches, Panel cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
l. AC Motors:
m. Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Bearings, Fans, Brushes and Encoder
n. Limit Switches, Switches and Indicators:
o. End travel limits, machine limits, Pushbuttons and lamps
p. Drivers: PC Boards, Drive fans and DC Links
q. Machine lights and Linear scales (X1 & X2- Axis, Z1 & Z2-Axis and C-Axis):
r. Lamps, body and lips
s. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

6 X STANDARD MILLING MACHINE

1 X FORTHWORTH VBM-5VHL

1X CNC

1 X HAAS

1 X UH1250A

3 Monthly

a. Check and inspect slides for wear and damage
b. Check lubrication system, clean out tank and refill
c. Check and adjust gibes if it is necessary
d. Check and fill up oil of ram gearbox and feed gearbox if needed
e. Open up covers of ram gearbox and inspect gears
f. Check wipers for wear and damage
g. Check and repair leaks on pipes
h. Check if limit switches are working correct
i. Record the general condition of the machine
j. Record all repairs carried out / spares used
k. Record the condition of the power supply cable
l. Record the condition of the contactors
m. Record the condition of the isolator
n. Record the condition of the electric motor
o. Record the condition of the water supply motor and pump
p. Record the condition of the machine lights
q. Record the general condition of the machine
r. Record the asset number and calibration expiry date on the instruments used to perform electrical tests on machine:

6 Monthly

a. Where it applicable, carry out
b. Examine the saddle, slides and locking devices for wear and adjust if necessary.x1-x2 axis
c. slides: inspect and replace/fix where necessary:

d. lubrication/(ball screw): ball screw, slides, gip pump, pipes, oil filters, covers, slide covers, belts, spindles, live spindle, clamping cylinder, leaks, pressure, slides and wipers lube metering and piping: ball screw lub : ball screw end bearing
e. X-axis: clean and inspect x-axis slides.
f. Inspect the acme lead screws or ball screws and replace if required.
g. Replace of the ball screw end bearings.
h. Tension ball screw.
i. Check lubrication on the axis.
j. Inspect slide wipers where needed.
k. Check the backlash on the axis.
l. y-axis:
m. Clean and inspect x-axis slides.
n. Inspect the acme lead screws or ball screws and replace if required.
o. Replace of the ball screw end bearings.
p. Tension ball screw.
q. Check lubrication on the axis.
r. Electrical Panels: Panel door seals, Panel Lights, Limit Switches, Panel cooling fans, Heat exchangers and Air conditioners, Terminal connections and Trunking
s. AC Motors: Bearings, Motor fans, Brushes, Commutators, Headstock, Spindle motor, Bearings, Fans, Brushes and Encoder
t. Limit Switches, Switches and Indicators: End travel limits, machine limits, Pushbuttons and lamps
u. Drivers: PC Boards, Drive fans and DC Links
v. Machine lights and Linear scales (X1 & X2- Axis, Z1 & Z2-Axis and C-Axis): Lamps, body and lips
w. Pendant: Cables, Buttons, screen, Earth test and Earth on the income carrier

1 x SKODA FLOOR TYPE HORIZONTAL BORING MILL

SPINDEL DIAMETER = 160 mm

MAX CROSS TRAVEL = 6 METER

MAX VERTICLE TRAVEL = 2.4 METER

MAXIMUM SPINDLE TRAVEL = 1.2 METER

ROTARY TABLE SIZE

ROTARY TABLE LOAD = 20 TON

MAXIMUM FLOOR LOAD = 60 TON

1 X SMTCL

1 X JAURISTA 8 METER HORIZONYTAL

2 X STANDARD HORIZONTAL BORING MILL

3 Monthly

a. Remove access cover on headstock assembly & inspect bearings & gears for wear replace bearings if necessary.
b. Remove bed covers and inspect bed
c. Inspect the column wipers
d. Inspect the complete hydraulic system
e. Check all htd belts
f. Test run gearboxes
g. Record mechanical service outcomes / repairs carried out / all spares used:
h. Replace filters on extraction fans in electrical cabinets
i. Check contactors - replace faulty or worn components
j. Check soldered joints and condition of all pc boards
k. Replace brushes on d.c motors (skoda, kearns & richards and scharmann
l. Tighten wires into connector blocks
m. Clean out electrical cabinets
n. Check if all limit switches are working correctly
o. Check pilot lamps
p. Check sprague tubing, replace if damage
q. Record electrical service outcomes / repairs carried out / all spares used

6 Monthly

a. Examine the saddle, slides and locking devices for wear and adjust if necessary.x1-x2 axis
b. slides: inspect and replace/fix where necessary: lubrication/(ball screw), ball screw, slides, gip pump, pipes, oil filters, covers, slide covers, belts, spindles, live spindle, clamping cylinder, leaks, pressure, slides and wipers lube metering and piping: ball screw lub : ball screw end bearing
c. check electrical panels: panel door seals, panel lights
d. Door limit switches: panel cooling fans / heat exchangers / air conditioners.
e. Check and repair/replace drivers: pc boards, drive fans, ac motors, bearings, motor fans, table 1HP motor, brushes, commutator, etc.
f. Limit switches: end travel limits, machine limits
g. pushbuttons and lamps: pushbuttons, lamps, terminal box, hydraulic adaptor flex
h. check linear scales and repair: x-axis linear scales (motor feedback)

linear scale: x-axis scale sealing lips: x-axis scale cable, z-axis linear scales (motor feedback), linear scale, z-axis scale sealing lips, z-axis scale cable, encoder, table encoder, table encoder coupling, earth test, earth on the income carriers to L1, L2, L3

1 x **WEBSTER BENNET**

CNC CONTROL SINUMERIC 802D

TABLE DIAMETER = 1.4 METER

MAX SWING = 1.4 METER

MAX HEIGHT = 600 mm

MAX LOAD = 4 TON

MAX SPEED = 300 RPM

1 X SORALUCE VTC8000

3 Monthly

a. Run machine and check the motions for smoothness
b. Check the hydrostatic lubrication systems for leaks
c. Check all the oil levels in the tanks and change filters
d. Examine the gearbox oil levels, leaks and gears for backlash.
e. Check the counter balance systems and hydraulic power packs.
f. Change filters
g. Check wipers on two columns for wear
h. Check wipers on two rams for wear
i. Check concertina covers on bridge for damage
j. Check clamping system for operation and leaks
k. Record mechanical service outcomes / repairs carried out / spares used:
l. Replace filters on extraction fans in electrical cabinets
m. Check contactors - replace faulty or worn components
n. Check soldered joints and condition of all pc boards
o. Tighten wires into connector blocks
p. Clean out electrical cabinets
q. Check if all limit switches are working correctly
r. Check pilot lamps
s. Check sprague tubing, replace if damage
t. Record electrical service outcomes / repairs carried out / spares used:

6 Monthly

a. X-axis: clean and inspect x-axis slides.
    a. Inspect the acme lead screws or ball screws and replace if required.
    b. Replace of the ball screw end bearings.
    c. Tension ball screw.
    d. Check lubrication on the axis.
    e. Inspect slide wipers where needed.
    f. Check the backlash on the axis.
b. 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.
c. Check electrical panels
    a. panel door seals
    b. panel lights
    c. door limit switches
    d. panel cooling fans / heat exchangers / air conditioners:
    e. terminal connections
d. check and repair/replace drivers:
    a. pc boards
    b. drive fans

c. ac motors
d. bearings
e. motor fans
f. table 1ph7 motor
g. brushes:
h. commutator
i. bearings

e. Limit switches:, end travel limits machine limits
f. pushbuttons and lamps: pushbuttons, lamps, terminal box
g. hydraulic unit: adaptor flex, AC motor spraging
h. check linear scales and repair: x-axis linear scales (motor feedback)
i. linear scale x-axis scale sealing lips, x-axis scale, z-axis linear scales (motor feedback)
j. linear scale: z-axis scale sealing lips , z-axis scale, encoder table encoder table encoder coupling
k. earth test: earth on the income carriers to L1, L2, L3:

1 x CENTRE TOS SN50CX2M

1 x TOS SN50CX2M

2 x TOS SN50C

1 x HOWA CNC

1 x CNC TW 20

1 x COLCHESTER CENTRE LATHE A 11

2 x UNIVERSAL CENTRE

4 x HAAS CNC

2 x WEBSTER AND BENNETH CNC

1 x DAINICHI LATHE SMALL

1 x GARUTZPE 100 TON LATHE

4 x STANDARD 3M LATHE

1 x CW6280C

1 x VOEST ALPINE A 56

1 x AMCO L1640G

3 Monthly

a. clean and check slides for burrs, damage and wear
b. Check and adjust gibes if necessary
c. Check wipers for wear and damage
d. Check back lash on lead screw bronze nuts
e. Check and clean lead screw if open
f. Check if lubrication pump is working and that there is oil on the slides
Open top of headstock, inspect gears and bearings
g. Check if there is sufficient oil onto gears and bearings
h. Clean and check condition of quill and oil

i. Check condition of v-belts and tension of belts
j. Check cooling system if fitted
k. check tightness of connections on all components
l. Check contactors, replace damaged or faulty components run electrical motors and inspect for noise etc.
m. check and test limit switches: check the function of all switches in the control panel and operating panel
n. record electrical service outcomes / repairs carried out / al spares used:

1 x UNION FLOOR TYPE HORIZONTAL BORING MILL

SPINDEL DIAMETER = 130 mm
MAX CROSS TRAVEL = 5.6 METER
MAX VERTICLE TRAVEL = 1.4 METER
MAXIMUM SPINDLE TRAVEL = 1 METER
MAX SWING DIAMETER = 1.6 METER
ROTARY TABLE SIZE= 2200 x 2200 mm
ROTARY TABLE LOAD = 20 TON
MAXIMUM FLOOR LOAD = 60 TON

1 x SACEM FLOOR TYPE HORIZONTAL BORING MILL

SPINDEL DIAMETER = 90 mm

MAX CROSS TRAVEL = 2 METER

MAX VERTICLE TRAVEL = 1.2 meter

MAXIMUM SPINDLE TRAVEL = 1 METER

ROTARY TABLE SIZE = 1440 x 1200mm

ROTARY TABLE LOAD = 5 TON

MAXIMUM FLOOR LOAD = 3 Ton outrigger

3 Monthly

a. Carry out geometric calibration checks on machine, pitch yaw and roll alone w, y & z axis.
b. Inspect the condition of the extension steadies
c. Repair all oil leaks and clean out filters
d. Replace if necessary drive shaft
e. Remove access cover on headstock assembly and
f. Inspect bearings and gears for gear replace bearings if necessary
g. Open all slide covers and inspect slides for wear and damage
h. Check lubrication system, clean out tank and refill
i. Check wipers for wear and damage
j. Inspect counter balance ropes and sheave wheels
k. Run feeds of all axis to see wear on bronze nuts
l. Check and adjust gibes if necessary
m. Check slides and gibes of facing head
n. Change or filter oil of main hydraulic tank
o. Check for leaks on clamps

p. Record mechanical service outcomes / repairs carried out / all spares used
q. replace filters on extraction fans in electrical cabinets
r. Check contactors - replace faulty or worn components
s. Check soldered joints and condition of all pc boards
t. Replace brushes on D.C motors (skoda, kearns & richards and scharmann
u. Tighten wires into connector blocks
v. Clean out electrical cabinets
w. Check if all limit switches are working correctly
x. Check pilot lamps
y. Check sprague tubing, replace if damage
z. Record electrical service outcomes / repairs carried out / all spares used:

6 Monthly

a. Examine the saddle, slides and locking devices for wear and adjust if necessary.x1-x2 axis
b. slides: inspect and replace/fix where necessary: lubrication/(ball screw), ball screw, slides, gip pump, pipes, oil filters, covers, slide covers, belts, spindles, live spindle, clamping cylinder, leaks, pressure, slides and wipers lube metering and piping: ball screw lub : ball screw end bearing
c. check electrical panels: panel door seals, panel lights, door limit switches, panel cooling fans / heat exchangers / air conditioners, terminal connections
d. Check and repair/replace drivers: pc boards, drive, AC motors, bearings, motor fans, table 1HP motor, brushes, commutator, bearings
e. limit switches: end travel limits, machine limits
f. pushbuttons and lamps: pushbuttons , lamps, terminal box
g. hydraulic unit: adapter flex and AC motor
h. check linear scales and repair: x-axis linear scales (motor feedback)
i. linear scale: x-axis scale sealing lips: x-axis scale cable, z-axis linear scales (motor feedback)
j. Linear scale: z-axis scale sealing lips, z-axis scale cable, encoder, table encoder, table encoder coupling.
k. Earth test: Earth on the income carriers to L1, L2, L3:

1 X SURFACE GRINDER

1 X SURFACE PFG-2250AH GRINDER

1 X NIPPEI CENTRE 209

1 X PRECISION 1000U AUR

1 X PRECISION 1000 G 171

3 Monthly

a. Inspect machine external
b. Inspect spindle
c. Check lubricating oil
d. Inspect filter of lubrication tank
e. Check grinding liquid in the cooling tank
f. Inspect hydraulic system connections

g. Check hydraulic oil
h. Check parallel dresser
i. Check fix screws on the machine
j. Check level of e.m. chuck
k. Check machine level
l. Record all repairs carried out / all spares used
m. Inspect control panel and box
n. Inspect electric box
o. Inspect connection wires
p. Inspect motor on the machine
q. Check main circuit
r. Check that all cover screws are in place
s. Record the asset number and the calibration status of the test Instrument used to test the conductor insulation, polarity,
t. Termination and earth continuity on item.

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 Plant Maintenance Manager. 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 3: 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 task and the condition of the machine after the task 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 off all replacement parts used

3.6 ASSESSMENT CRITERIA

Upon completion of the task, the Service Provider shall ensure that a Client's Plant Maintenance representation, *to be identified as and when required,* inspects and signs of the work executed prior to the acceptance of the work as complete in accordance to the contract by the Client's Pant Maintenance Manager. The Servicer Provider shall ensure that records are kept for the duration of the contract while the Client's Plant Maintenance Manager shall ensure that records are kept safe for 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 to the following periods. The warranty shall cover:

a) New electrical and Mechanical parts as stipulated by OEM.

b) Workmanship for 6 Months after acceptance of work by the Client

c) 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 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.

d) Qualified Trade Tested Artisans

e) Proof on Knowledge of Machinery Safety

f) Proof of Knowledge of the OHS Act requirements.

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

h) Be capable of undertaking the magnitude of the work as per the contract.

i) Be mobile and readily available for breakdowns in Rosherville and Matla Works.

3.9 GENERAL CONSTRAINTS

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

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

b) Negotiating with Production Managers to arrange planned shutdowns specific within the contractual interval requirements

c) Minimizing down periods as production will still be taking place in and round the vicinity of the working area.

d) Working in areas where there are vehicle and pedestrian traffic.

e) 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 standards set out by the Client.
b) Provide adequate PPE to its employees.
c) Provide its own working 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
Matloke Mohlala	Plant Maintenance Technician

5. REVISIONS

Date	Rev.	Compiler	Remarks
June 2024	1	S Nene	Scope of Work for the Maintenance and Servicing of the Workshop Machinery Contract

6. DEVELOPMENT TEAM

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

- Plant Maintenance Department

7. ACKNOWLEDGEMENTS

- Plant Maintenance Team