

15 July 2011

TO WHOM IT MAY CONCERN:

This is to certify that P _____ was employed full time at Bateman Mineral Recovery (BMR) with the designation as "Millwright" from 01-12-1998 until 30-06-2010.

In South Africa a Millwright's duties consist of both Mechanical and Electrical installation, maintenance and repair. Below we have separated both areas of skill.

During his period of employment as a Millwright artisan, P _____ performed the following duties, tasks and responsibilities:

- ↓ Following established OHS rules and regulations and maintaining a safe and clean environment in the work place.
- ↓ Plan to perform daily plant equipment inspections
- ↓ Assessing of plant equipment upgrades and planning of completing activities, responsible for new electrical installations, maintenance & fault detection on low voltage circuits (240Vac & 400Vac 3phase). Repair, replace or upgrade all defective electrical equipment and or cabling.
- ↓ Adhering to quality systems and procedures
- ↓ Compiling of information and giving feedback to management and relevant personnel
- ↓ Exceptional team work skills in all required areas
- ↓ Assist a mentor to new employees on all plant equipment
- ↓ Reading and interpreting of Electrical drawings on plant equipment
- ↓ Performing planned maintenance orders (PMO's)
- ↓ Attend to breakdowns
- ↓ Dismantling, repair and assembling of plant equipment, electrical motors est.
- ↓ Adhere to isolate and lock-out procedure on all machinery and equipment
- ↓ Adhere to all confined space and hot permit procedures

Plant equipment he worked on was as follow:

- Grizzly feeders
- Pan feeders
- Dewatering screens
- Sizing screens
- Jaw crushers
- Gyrasphere crushers
- Conveyor belts
- Centrifugal water pumps
- Vertical spindle water pumps
- Submersible water pumps
- Hydro-pneumatic APIC jigs

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- Blowers
- Compressors
- Bredel hose pumps
- Filter press
- Hydraulic hammer

His electrical duties and responsibilities were as follow:

1. Plan new electrical installations:

- Identify & arrange correct rating of all electrical components e.g. circuit breakers, main breakers, contactors and overloads with correct Amp ratings, push buttons, field isolators est.
- Identified the cabling path from MCC/ panel, identify new panel location, determine the length of electrical cables required, calculated the volt drop and selected correct size of cables and protection needed
- Identify and arrange switch and control gear to suite fault current, fault voltages, IP ratings

2. Installation of new electrical equipments:

- Arrange the Distribution Board electrical components lay-out
- Install main isolator/ circuit breaker, install termination connectors, control circuit breakers, earth and neutral bars, contactors and overloads, fuse holders
- Install and connect Amp (CT's) and Volt meters with selector switches
- Wiring the control and main circuit inside panel making use of electrical drawing
- install the electrical cables from the MCC to designated equipment in plant making use of cable trays, ladder cable trays, through conduit or buried underground (as per SANS 10142 Wiring Regulation Standards)
- Install field control wiring/ cabling to start/ stop stations/ switches, e-stops, proximity switches, limit switches, flow control switches, pressure switches
- Install main circuit cabling from panel to field isolator and from isolator to electrical motors/ equipment. Conduct C.O.C. test:
 - Installation insulation
 - Earth continuity
 - Polarity
 - Phase rotation
 - Transposition of earths and neutrals
 - Circuit conductor identification
 - Operation of installation
 - Fault loop impedence
 - Operation of earth leakages (RCD's)

3. Maintenance on electrical panels inside Main Control Center (MCC)

- Inspect main breaker condition
- Inspect contactor and contactor tips conditions
- Inspect overload conditions and verify overload setting
- Inspect timer conditions
- Inspect push button conditions
- Inspect all screws for loose connections
- Inspect panel door condition

- Inspect and measured all earth connections and conductors
 - Responsible for maintenance inside MCC inspecting all control panels, checking termination points for loose connections, signs of hot connections on cables, clean panels out from dust
 - Repair or replace all defective equipment and or cables
 - Ensure MCC is clean and panels are free from any obstructions and well ventilated
- 4. Plant Lighting:**
- Installation and maintenance or replacement of lighting on plant (fluid lights, fluorescent lights, BC and ES light fittings, Halogen spot lights, emergency exit lights)
- 5. Electrical Motors:**
- Installation, maintenance or replacement of various range of electrical motors (0.37Kw-210Kw three phase AC motors, single phase motors, DC motors)
 - Inspected electrical motor cabling & cable gland conditions and repaired or replaced defective cabling, glands as needed
 - Inspect termination points in terminal box conditions and repaired as needed
 - Dismantling, replacing bearings and assembling of electrical motor
 - Tested winding resistance to earth
 - Tested winding resistance between windings
 - Verified overload settings
 - Tested motor current readings
 - Inspect motor brush condition and brush tension (DC motors)
 - Inspect commutator condition (DC motors)
 - Installation and maintenance of Direct on line and Star Delta starters
 - Inspected motor brakes condition and replaced brake pads as needed
- 6. Transformer maintenance (2MVA)**
- Inspect load current
 - Inspect voltage
 - Inspect transformer oil temperature
 - Inspect transformer oil level
 - Inspect all protective devices and alarms
 - Inspect earth connections and surge arrestors conditions
 - Inspect pressure relieve devise
 - Inspect breather and breather jell condition
 - Inspect all auxiliary equipment
 - Inspect tap changer condition
 - Repair or replace all defective equipment as needed
- 7. Hand tools: maintenance and repairs on electrical hand tools (drilling machines, grinders, welding machines)**
- Inspect equipment physical condition and replaced/ repaired all defective parts
 - Inspect, replaces, repaired electrical cable and plug condition
 - Inspect, replaces, repaired brushes condition and brush tension
 - Inspect commutator condition and cleaned from carbon
 - Inspect on/ off switches condition and , replaces, repaired as needed

8. PLC maintenance:

- Inspect cabling condition
- Inspect all field connections condition, no loose connections
- Inspect PLC condition
- Replaced defective in or out put cards as needed
- Inspected panel and other connection points for loose connections
- Inspect control circuit breaker condition
- Inspect safety fuse holders condition
- Repaired or replaced all defective equipment as needed
- Inspected back-up battery condition

9. Diagrams and printed instructions used:

- Layout diagrams of Main Control Centers (MCC's)
- Layout diagrams of Sub Stations
- Layout diagrams of electrical panel/ cabinet wiring
- Layout for all socket outlets and lighting circuits
- Layout for all PLC wiring

His mechanical duties and responsibilities were as follow:

1. Grizzly feeders, Pan feeders, Dewatering & Sizing screens:

- Erect and assemble equipment structures
- Installation and commissioning of required screens and feeders
- Attend to maintenance, breakdowns, repairs or replacement of defective equipment on the following screen and feeder components:
 - Side liners
 - Screen panels
 - Woven mesh screens
 - Vibrating coil springs
 - Discharge chute liners
 - Discharge pipe lines
 - Vibration weights settings
 - Drive gearbox (oil levels, gear, shaft & bearing condition)
 - V-belt pulley' (condition & alignment)
 - V-belts (correct tension and condition)
 - Safety guards
 - Spray bar nozzles
 - Saunders spindle water flow control valves
 - Various range of ball valves
 - Pulley taper locks
 - Lubrication of all moving parts
 - Grizzly bars

2. Jaw Crushers (Osborn Telsmith):

- Installation and commissioning of Jaw crushers
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following Jaw crusher components

- Fixed jaw liners
- Swing jaw liners (Pitman)
- Cheek plates
- Liner wedges
- Pitman bearings
- V-belt pulley's (condition & correct alignment)
- V-belts (condition & correct tension)
- Toggle plates
- Draw back rods
- Toggle seats
- Safety guards
- Lubrication of all moving parts

3. Gyrasphere Crushers:

- Installation and commissioning of Jaw crushers
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following Jaw crusher components:
 - Mantle liner
 - Concave ring
 - Shaft nut
 - Burning ring
 - Inner piston ring
 - Hydraulic relieve cylinders
 - Countershaft box assembly
 - Power rotator assembly
 - Anti spin assembly and bottom plate
 - Hydraulic power pack unit, hose connections & hoses
 - Lube unit
 - Labyrinth seals
 - Fly wheel
 - Oil seals and filters
 - Thrust bearing
 - Wear plates
 - Eccentric shaft sleeve
 - V-belt pulley's (condition & correct alignment)
 - V-belts (Condition & correct tension)
 - Safety guards
 - Hydraulic pumps
 - Crown gear
 - Pinion gear

4. Conveyor belts:

- Installation and commissioning of conveyor belts
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following conveyor belt components:
 - Drive and non-drive end pulley's
 - Shaft bearings and Plummer blocks (various range of bearings)

- Trough idlers
- Return idlers
- Drive motor
- Gearbox
- V-belt pulley's (condition & correct alignment)
- V-belt (condition & correct tension)
- Lubrication of moving parts
- Pull wire units
- Safety guards
- Join conveyor belt with clip joints
- Ensure belt alignment

5. Centrifugal water pumps:

- Installation and commissioning of centrifugal water pumps
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following centrifugal water pump components:
 - Impellers (steel and rubber lined impellers)
 - Keeper plates
 - Cover plates
 - Volute liners (steel and rubber)
 - Frame plate liners
 - Expellers
 - Stuffing boxes
 - Gland assemblies
 - Lantern restrictors
 - Lantern rings
 - Shaft sleeves
 - Gland packing's
 - Bearing assemblies
 - Throat bushes
 - Cotters
 - Volute cover seals
 - O-rings
 - Shaft spacers
 - Positioning of electrical motors
 - Alignment of drive pulley's
 - V-belt pulley condition
 - V-belts condition and tension
 - Safety guards
 - Adjusting bolts
 - Lubrication of all moving parts

6. Vertical spindle pumps:

- Installation and commissioning of new vertical spindle pumps (various ranges and sizes)
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following vertical spindle pump components:
 - Bearing assemblies

- Impellers
- Shaft sleeves
- Volutes
- Volute cover seals
- Cover plates
- Discharge columns
- Strainers
- Discharge Y-pieces
- Spider couplings
- Lubrication of all moving parts
- Alignment of couplings

7. Separators and cyclones

- Installation and commissioning of new separators and cyclones
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following separator and cyclone components:
 - Feed boxes
 - Vortex finders
 - Overflow boxes
 - Cone frustums
 - Spigots
 - Discharge regulators
 - Overflow tee's and clamps
 - Pressure and vacuum gauges

8. Hydro-pneumatic APIC jigs:

- Installation and commissioning of hydro-pneumatic APIC jigs (various sizes)
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on hydro-pneumatic APIC jig components:
 - Pneumatic operated cylinders
 - Pneumatic operated directional control valves
 - Pneumatic pressure regulators
 - Pressure hoses and connections
 - ATS pneumatic operated valves (spring loaded)
 - Instrument to air pressure transducers
 - Polyurethane jig bed panels
 - Gate valves

9. Blowers and Compressors:

- Installation and commissioning of new blowers and compressors
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following blower and compressor components:
 - Air filters
 - Oil filters
 - V-belt pulley condition
 - V-belts (condition & correct tension)
 - Pulley alignment

- Safety guards condition
- Cooling radiators condition
- Cooling fan condition
- Oil levels
- Pressure relieve safety valves
- Lubrication of all moving parts
- Base support rubbers
- Pressure gauges
- Pressure hoses and connections

10. Bredel hose pumps

- Installation and commissioning of new Bredel hose pumps
- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following Bredel hose pump components:
 - Gearboxes and oil levels
 - Rotors
 - Contact shoes with shims
 - Rubber hoses
 - Glycerin levels

11. Filter press:

- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following filter press components:
 - Filter clothes
 - Pressure plates
 - Hydraulic pack units, hoses and connections
 - Hydraulic cylinders
 - Directional control valves

12. Hydraulic hammer (Rammer)

- Attending to maintenance, breakdowns, repairs or replacement of defective equipment on the following Hydraulic hammer (Rammer) components:
 - Hydraulic cylinders, hoses and connections
 - Hydraulic directional control valve banks (Joystick operated)
 - Hydraulic pack unit
 - Moil
 - Hammer piston unit
 - Pins and bushes
 - Oil filters
 - Lubrication of all moving parts

13. Tools and measuring instruments used:

- Multi meters
- HT line tester
- Meggers
- Tong testers
- Lux tester

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- Phase rotation tester
- Side cutters
- Linesman pliers
- Lifting equipment – chain blocks, slings, D-shackles
- Ladders: Extension ladders; Fold-up ladders
- Portable Grinders
- Welding machines
- Scaffolding
- Electrical extensions
- Portable drilling machines
- Pedestal drilling machines
- Bench grinders
- Screwdriver sets (including flat and Phillips)
- Hammers
- Chisels
- Hacksaw
- Tape measure
- Water level
- Jig saw
- Steel measuring rulers
- Taper gauges
- Spanner set
- Socket set
- Gas cutting equipment (Oxygen & Acetylene)
- DTI clock gauges
- Engineer squares
- Pneumatic grinders
- Pliers (long-nosed and circlip) and water pump pliers
- Crimping pliers
- Abrasives – files, hole saws, cutting discs, grinding discs etc
- Shifting spanners
- Vice grips
- Allen key sets (metric and imperial)
- Lifting equipment
- Scribes
- Finer
- Micrometers

Regards



Former acting BMR Managing Director
Bateman Chief Financial Officer

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Ferrometals

Ferrometals

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August 5, 2011

TO WHOM IT MAY CONCERN:

This is to certify that [redacted] was employed full time at Samancor Ferro-metals, Ferroveld division, with the designation as "Millwright" from 01-02-1994 until 30-11-1998

In South Africa a Millwright's duties consist of both Mechanical and Electrical installation, maintenance and repair. Below we have separated both areas of skill.

During his period of employment as a Millwright artisan, [redacted] performed the following duties, tasks and responsibilities:

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- ↓ Reading and interpreting of Electrical drawings on plant equipment
- ↓ Performing planned maintenance orders (PMO's)
- ↓ Attend to breakdowns
- ↓ Dismantling, repair and assembling of plant equipment, electrical motors est.
- ↓ Adhere to isolate and lock-out procedure on all machinery and equipment
- ↓ Adhere to all confined space and hot permit procedures

Plant equipment he worked on was as follow:

- Stork 50 Direct drive pumps
- Viking LQ224 Internal gear pumps
- Conveyor belts
- Redler elevator and horizontal enclosed chain conveyors
- Overhead cranes (Demag10ton, Morris 5ton, Lasch 5ton, Stahl 5ton)
- BETH Pulsation cleaning filter system
- EIRICH paste mixers
- Inductive type pre-heaters (3x200KVA transformers)
- Oil bank heaters (electrical elements)
- Skip hoist system

- Calsinating furnaces (Transformers - 1.5MVA single phase 6600 Volts step down 13 taps)
- HARDING Ball mill 6ft x 7ft
- Weighing scales
- Tubular vibration feeders
- Sizing screens

His electrical duties and responsibilities were as follow:

1. Plan new electrical installations:

- Identify & arrange correct rating of all electrical components e.g. circuit breakers, main breakers, contactors and overloads with correct Amp ratings, push buttons, field isolators est.
- Identified the cabling path from MCC/ panel, identify new panel location, determine the length of electrical cables required, calculated the volt drop and selected correct size of cables and protection needed
- Identify and arrange switch and control gear to suite fault current, fault voltages, IP ratings

2. Installation of new electrical equipment:

- Arrange the Distribution Board electrical components lay-out
- Install main isolator/ circuit breaker, install termination connectors, control circuit breakers, earth and neutral bars, contactors and overloads, fuse holders
- Install and connect Amp (CT's) and Volt meters with selector switches
- Wiring the control and main circuit inside panel making use of electrical drawing
- install the electrical cables from the MCC to designated equipment in plant making use of cable trays, ladder cable trays, through conduit or buried underground (as per SANS 10142 Wiring Regulation Standards)
- Install field control wiring/ cabling to start/ stop stations/ switches, e-stops, proximity switches, limit switches, flow control switches, pressure switches
- Install main circuit cabling from panel to field isolator and from isolator to electrical motors/ equipment. Conduct C.O.C. test:

1. Installation insulation
2. Earth continuity
3. Polarity
4. Phase rotation
5. Transposition of earths and neutrals
6. Circuit conductor identification
7. Operation of installation
8. Fault loop impedance
9. Operation of earth leakages (RCD's)

3. Maintenance on electrical panels inside Main Control Center (MCC)

- Inspect main breaker condition
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 - Inspect all screws for loose connections
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 - Repair or replace all defective equipment and or cables
 - Ensure MCC is clean and panels are free from any obstructions and well ventilated
4. **Plant Lighting:**
- Installation and maintenance or replacement of lighting on plant (fluid lights, fluorescent lights, BC and ES light fittings, Halogen spot lights, emergency exit lights)
5. **Electrical Motors:**
- Installation, maintenance or replacement of various range of electrical motors (0.37Kw-160Kw three phase AC motors, single phase motors, DC motors)
 - Inspected electrical motor cabling & cable gland conditions and repaired or replaced defective cabling, glands as needed
 - Inspect termination points in terminal box conditions and reaired as needed
 - Dismantling, replacing bearings and assembling of electrical motor
 - Tested winding resistance to earth
 - Tested winding resistance between windings
 - Verified overload settings
 - Tested motor current readings
 - Inspect motor brush condition and brush tension (DC motors)
 - Inspect commutator condition (DC motors)
 - Installation and maintenance of Direct on line and Star Delta starters
 - Inspected motor brakes condition and replaced brake pads as needed
6. **Transformers maintenance (1.5 MVA, 200KVA)**
- Inspect load current
 - Inspect voltage
 - Inspect transformer oil temperature
 - Inspect transformer oil level
 - Inspect all protective devices and alarms
 - Inspect earth connections and surge arrestors conditions
 - Inspect pressure relieve devise
 - Inspect breather and breather jell condition
 - Inspect all auxiliary equipment
 - Inspect tap changer condition
 - Repair or replace all defective equipment as needed
7. **Hand tools: maintenance and repairs on electrical hand tools (drilling machines, grinders, welding machines)**
- Inspect equipment physical condition and replaced/ repaired all defective parts
 - Inspect, replaces, repaired electrical cable and plug condition
 - Inspect, replaces, repaired brushes condition and brush tension

- Inspect commutator condition and cleaned from carbon
- Inspect on/ off switches condition and , replaces, repaired as needed

8. PLC maintenance:

- Inspect cabling condition
- Inspect all field connections condition, no loose connections
- Inspect PLC condition
- Replaced defective in or out put cards as needed
- Inspected panel and other connection points for loose connections
- Inspect control circuit breaker condition
- Inspect safety fuse holders condition
- Repaired or replaced all defective equipment as needed
- Inspected back-up battery condition

Diagrams and printed instructions used:

- Layout diagrams of Main Control Centre's (MCC's)
- Layout diagrams of Sub Stations
- Layout diagrams of electrical panel/ cabinet wiring
- Layout for all socket outlets and lighting circuits
- Layout for all PLC wiring

His mechanical duties and responsibilities were as follow:

1. Duty description

- **Stork 50 Direct drive positive displacement pumps**

Duties consisted of:

- Disassembling of pump and replacing impeller
- Disassembling of pump and replacing shaft bearings
- Disassembling of pump and replacing shaft sleeve bush
- Replacing of gland packing's
- Disassembling of pump, repair or replacing of pressure relieve valve
- Reassembling pump
- Maintaining of and lubricating of bearings on pump and electrical motor
- Installation and alignment of pump with electrical motor
- Testing pump for correct operation

- **Conveyor belts:**

Duties consisted of:

- Ensuring ultimate belt alignment
- Maintaining, lubricating and replacing of shaft bearings
- Repairing of damaged conveyor with clip joints
- Maintaining on and replacing all trough idlers and return idlers
- Maintaining on and replacing tail and head pulleys
- Ensuring all safety guards to be on standard
- Installation, connecting, testing and maintenance on 3 phase electrical motor on drive
- Installation, alignment and maintenance on drive gearbox with electrical motor

- **Redler elevator and horizontal enclosed chain conveyors**

Duties consisted of:

- Ensure ultimate belt alignment
- Maintaining, lubricating and replacing shaft bearings
- Repairing of damaged conveyor links
- Maintaining and replacing of all worn runners
- Maintaining and replacing of tail and head sprocket pulleys
- Ensuring all safety guards and enclosure plates to be on standard
- Installation, alignment and maintenance on drive gearbox with electrical motor
- Test chain for correct operation

- **Overhead cranes**

Duties consisted of:

- Maintaining, lubrication and replacing of travel wheel bearings
- Maintenance or replacing of hoist steel lifting ropes
- Maintaining and replacing of hoist catches
- Maintaining and repairing travel wheel gearboxes
- Maintaining, inspecting and repairing of overhead crane gantries
- Maintaining, lubrication and replacing of hoist shaft bearings
- Maintaining, repairing and replacing of hoist gearbox
- Alignment of hoist gearbox with electrical motor
- Maintaining, testing of hoist and travel electrical motors
- Alignment of electrical motors with drive shaft couplings

- **Beth Pulsation cleaning filter system**

Duties consisted of:

- Maintaining, inspecting, repairing or replacing pneumatic cylinders on gates
- Maintaining, inspecting, repairing or replacing of pneumatic directional control valves (dcv's) controlling pneumatic cylinders
- Replacing defective dust bags
- Maintaining, inspecting, repairing or replacing suction fan
- Lubricating, replacing all bearings on gates and suction drive shaft
- Maintaining, inspecting, repairing on pneumatic vibration hooters
- Maintaining and testing electrical motor on suction fan
- Aligning electrical motor with drive shaft coupling
- Maintaining pneumatic cylinders electrical control circuit with timers
- Maintaining all electrical cabling and connection

- **Eirich Paste mixers**

Duties consisted of:

- Maintaining and repairing work on mixer drive gearbox grease lubricate system

- Removing and disassembling mixer drive gearbox, replacing bearings and defective gears, reassembling, installing and testing of installed mixer drive gearbox
 - Maintaining, repairing mixer discharge gate hydraulic pack unit e.g., replacing hydraulic pump, repairing or replacing of directional control valves, pressure relieve valves, replacing of hydraulic cylinder operating gate unit, change oil filters and oil
 - Removing, disassembling gate unit, replacing bearings and all other defective parts, lubricating bearings, reassembling of gate unit, installation and testing for correct operation
 - Maintaining and lubricating mixer scraper bearing assembly units
 - Disassembling mixer scraper bearing assembly units, replacing bearings and drive shaft, lubricating bearings, reassembling unit, installation and testing
 - Unbolt, removing and replacing of scraper arm units
 - Removing and disassembling mixer scraper arms gearboxes, replacing bearings and defective gears, reassembling, lubricating, installation and testing of mixer drive gearbox
 - Maintaining, replacing, connecting and testing of mixer drive gearbox lubricating system electrical motor
 - Maintaining, replacing, connecting and testing of mixer drive gearbox electrical motor
 - Maintaining, replacing, connecting and testing of mixer discharge gate hydraulic pack unit
 - Maintaining, replacing, connecting and testing of mixer scraper arms gearboxes
 - Maintaining and lubricating of mixer girth gear
- **Skip hoist systems**
Duties consisted of:
 - Maintaining, lubricating, replacing of travel wheel bearings
 - Maintaining and replacing of hoist steel lifting ropes
 - Maintaining and replacing of hoist catches
 - Maintaining and repairing travel wheel gearboxes
 - Maintaining, inspecting or repairing overhead crane gantries
 - Maintaining, lubricating or replacing of hoist shaft bearings
 - Maintaining, repairing or replacing of hoist gearbox
 - Aligning hoist gearbox with electrical motor
 - Maintaining and testing of hoist and travel electrical motors
 - Aligning of electrical motors with drive shaft couplings
- **1.5 MVA Calsinating furnaces**
Duties consisted of:
 - Replacing of electrode contact shoes
 - Maintaining of electrode contact shoe water cooling system
 - Replacing of Saunders valves, gate valve, ball vales and butterfly valves on furnace water system
 - Replacing of discharge scrapers on furnace
 - Maintaining or replacing furnace discharge variable speed gearbox
 - Maintaining, replacing or connecting and testing furnace discharge variable speed gearbox electrical motor

- **Harding Ball mill**

Duties consisted of:

- Maintaining and lubricating ball mill girth gear
- Replacing defective gears on girth gear
- Maintaining and lubricating ball mill drive and non-drive end bearings
- Replacing ball mill liners

- Maintaining and inspecting oil level and condition of fluid drive unit on ball mill
- Maintaining and lubricating of pinion gear driving girth gear
- Removing, installation, aligning and testing of new pinion gear and fluid drive unit

Tools and measuring instruments used:

- Multi meters
- HT line tester
- Meggers
- Tong testers
- Lux tester
- Phase rotation tester
- Side cutters
- Linesman pliers
- Lifting equipment – chain blocks, slings, D-shackles
- Ladders: Extension ladders; Fold-up ladders
- Portable Grinders
- Welding machines
- Scaffolding
- Electrical extensions
- Portable drilling machines
- Pedestal drilling machines
- Bench grinders
- Screwdriver sets (including flat and Phillips)
- Hammers
- Chisels
- Hacksaw
- Tape measure
- Water level
- Jig saw
- Steel measuring rulers
- Taper gauges
- Spanner set
- Socket set
- Gas cutting equipment (Oxygen & Acetylene)
- DTI clock gauges
- Engineer squares
- Pneumatic grinders
- Pliers (long-nosed and circlip) and water pump pliers
- Crimping pliers
- Abrasives – files, hole saws, cutting discs, grinding discs etc
- Shifting spanners

- Vice grips
- Allen key sets (metric and imperial)
- Lifting equipment
- Scribers
- Finnier
- Micrometers



05 August 2011
Date