

	Scope Of Work	Bulk Material Services
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Title: **Ash Mechanical Maintenance at Tutuka Power Station**
(As and when required)

Alternative Reference Number: **Not Applicable**

Area of Applicability: **Eskom RoteK Industries SOC Ltd**

Functional Area: **Bulk Material Services-Tutuka Power Station**

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1. Description of the service

1.1 Executive overview

The Ash Handling Plant scope of work covers all the six (6) units from unit 1 to 6, and the Common inside Ash Handling Plant at Tutuka Power Station as well as the Ash Disposal Facility on the Ash Dump.

1.2 Purpose

The purpose of this scope of work is to stipulate the work that must be performed during the mechanical maintenance of the Ash Handling Plant. The mechanical maintenance of the Ash Handling Plant includes the following but not limited to: -

- Coarse ash conveyors,
 - Conditioner conveyors,
 - Transverse and cross conveyors, overland conveyors,
 - Stacker (Main) system and spreader (Standby) system,
 - The emergency off-loading and on loading facilities at TT02 (Emergency Ash Storage Facility),
 - The brine water pipeline from the TT02 area to the ash dump sprayers and both the pump stations at the ash dump with all its pipelines,
 - Hosepipes and sprayers are part of this scope,
 - The potable water supply line from TT02 to the ash dump head tank is part of the scope.
- and all ancillary included as indicated in this document.

2. SCOPE OF WORK (Works information)

The maintenance of the plant must consider, but not be limited to the following:

- Six (6) conditioner conveyors with its chutes and moving heads.
 - Six (6) short coarse ash conveyors with its chutes.
 - Six (6) long coarse ash conveyors with its chutes and moving heads.
 - Two (2) transverse conveyors with its chutes and moving heads.
 - Two (2) cross conveyors with its chutes and moving heads.
 - The link point (transfer points) between cross and overland conveyors with ancillary services.
 - The complete overland conveyors system with ancillary.
 - Transfer point between overland conveyors and shuttle conveyors.
 - The main and standby extendable systems with ancillary.
 - Shiftable conveyor.
 - The tripper cars, stacker and spreader.
 - Brine water supply pipe from TT02 to the ash dump sprayers.
 - South clean and dirty water dam pump houses with all its piping and ancillary
 - North clean water dam pump house with all its piping and ancillary.
 - Portable water supply line.
- The scope of work is for the plant inspection, and recording all plant defects on a daily basis, perform preventative maintenance, corrective maintenance, periodic maintenance, chute repairs, chute tiles repairs, deflector plate repairs, plant repairs, lubrications, conveyor belt replacements, belt extensions, belt splicing, belt insert, belt repair, re-lagging of pulleys, idler inspection and replacements, skirting thickness measurement and replacements, handling of sleepers and rails for the spreader machine, and the shifting of the stacker machine.
- The *Contractor shall* maintain the defect record list for the period of the contract and track the similar failure defects. The contract shall provide *Eskom Contract Supervisor* with the weekly report of all reported

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defects and inspections conducted. The *Contractor* will be provided with the template of the report upon the commencement of the *contract*.

- The *Contractor* is to do coarse Ash Handling Plant inspections once a week on all the units. Any repairs, scraper cleaning and adjustments, idlers' replacements, skirtings' replacements, plumber blocks greasing, pulley laggings replacements, pulley replacements, belt replacement, chute repairs, chute tiling, moving head repairs, etc should be planned with the relevant *Production Manager*, so that the *Unit Operating Supervisor* can arrange for emergency dumping at the grizzly conveyors.
- The *Contractor* is to do conditioner conveyors inspections once a week on all six (6) conditioner conveyors. Any repairs, scraper cleaning and adjustments, idler replacements, skirtings' replacements, plumber block greasing, pulley lagging replacements, pulley replacements, belt replacement, moving head repair work, chute repairs, chute tiling, etc should be planned with the relevant *Production Manager*. There are three (3) conditioners conveyor running per week, while the remaining three (3) conditioner conveyors are standing for cleaning and maintenance purposes. Usually, these conveyor belt changeovers take place every Thursday.
- One (1) transverse conveyor and one (1) cross conveyor stream are normally in operation for a week and then changed over every Thursday. One (1) ash stream will be running whilst the other streams are on standby for maintenance and cleaning. The proposal is that the ***Cleaning Contractor*** (separate running contract already appointed) is to clean the upstream chutes, these transverse conveyors chutes and cross conveyor chutes first, and let these conveyors run empty at TT02. Then maintenance can be done on the relevant conveyor stream. The moving heads cleaning by the ***Cleaning Contractor*** (already appointed), and maintenance on these transverse and cross conveyors can also be performed during this period **(Important to note that the cleaning is not part of this scope it will be performed by the cleaning Contractor and only the scrappers will be cleaned and adjusted by the maintenance Contractor)**.
- The *contractor* is responsible for the training of the belts and observe that the ash on loading to the cross conveyors and overland conveyors is in the middle of the carry belt. The *Contractor* is to perform inspection and repairs on the transverse and cross conveyors moving head systems. This involves pinion and plumber block repairs, rail repairs, , wheels greasing and travel wheel repairs. The *Contractor* is to advice *Eskom* which spare parts he/she requires for repairs.
- The *Contractor* is to do the TT02 emergency onloading conveyor system (in loading feeder) inspections once a week. Any repairs, scraper cleaning and adjustments, idler replacements, skirtings' replacements, plumber block greasing, pulley lagging replacements, pulley replacements, belt replacement, chute repairs, chute tiling, etc should be planned with the relevant *Production Manager*.
- Due to the overland conveyor roof construction, the *Contractor* needs to walk between the conveyors for the ash overland conveyors inspections. This conveyors inspection should be conducted at least twice per week. The one (1) conveyor stream runs for seven (7) days, and then the other belt runs for seven (7) days. The conveyors inspection should be performed, whilst the belt is running, and the necessary repairs must be done under the plant permit system.
- The *Contractor* is responsible for belt scraper cleaning, adjustments, and replacements. The V – plough inspections, repairs or replacements is also part of the scope of work.
- The *Contractor* is to check the gearbox oil levels once per week and to lubricate the pulley bearings once per month.
- The *Contractor* needs to take fluid coupling oil samples from the four (4) fluid couplings and to analyse this oil for any particles and water ingress, once a month. In case of any dirty oil, then the relevant fluid coupling oil needs replacement. These fluid coupling oils in general need replacement every six (6) months. The grid couplings at the gearboxes input shafts and at the gearboxes output shafts needs greasing every three (3) months.
- The inspection of the winch ropes, wheels and trolley car system must be once per month, and this must be done by a qualified rigger.

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Note: If the *Contractor* notes, that there is a conveyor drive vibration problem, they must inform *Employer*, so that *Employer* can do vibration readings.

- The *Contractor* is responsible for monitoring the stock levels of every item of these conveyor systems. The ash stacker system is operational approximately 80% of the time, and the standby spreader machine approximately 20% of the time. The spreader system is only in operation during the shifting process of the stacker system, for stacker maintenance and stacker system break downs. The *Contractor* is to inspect the stacker system every day, due to the high load factor of this system.
- Any repairs, replacements and chute cleaning must be planned so that other disciplines also can have an opportunity to perform maintenance. The **Cleaning Contractor** needs to clean the ash chutes on the stacker system two times per week and in this period the **Maintenance Contractor** can do the necessary repairs, scraper cleaning and adjustments. In most cases the conveyor bearing greasing can be performed under plant in operation permit. But if there are dangerous moving parts close by, then plant isolation permit must be taken for save bearing greasing actions. The number of bearings which require greasing on the total ash stacker plant is approximately 214.
- The re-lagging of pulleys, replacements of the boom and link conveyor belts can be planned during the stacker shifts. The inspection of the extendable and shiftable conveyors' winch take-up systems must be done once per month. This must be done by qualified riggers. The power cable reel and control cable reel systems on the stacker tripper car must be inspected by the *Contractor* once a week and to perform the required repairs.
- The inspection, lubrication and repairs on the stacker tripper car and stacker machine bogie wheels pins, bushes, bogie wheels, equalizer beams, drive tumblers with its bushes and shafts, crawler idler and its bushes and shafts, crawler system, stacker slewing and luffing systems are part of the scope of work. The luffing cylinder replacement and the power pack refurbishment is also part of this scope.
- The stacker crawler tension adjustment needs to be done by the *Contractor*, and any worn component of these crawlers must be replaced by the *Contractor*. The *Contractor* is to replace all tripper car travel drives. The *Contractor* must also replace the stacker top slew pins and beams between the stacker and link conveyor. The stacker tripper car front-end boogie supports steel work and link conveyor tail-end support pin needs replacement.
- The *Contractor* must also inspect all the gearboxes oil levels and top-up when and as required. The number of gearboxes on the plant at the stacker system is 21.
- The testing of structure welding, pin joints and bogie wheel system must be performed once per year.
- The inspection and maintenance of all the storm brakes on the boom conveyor slewing system and tripper car is part of the *scope of work*.
- The ash stacker system requires shifting every six (6) months and the *Contractor* must perform the total scope of work. This involves main extendable tripper car rail extension, shifting of the shiftable conveyor to the new position, pulling of the main extendable tripper car to the new position, driving of the ash stacker to the new position and the removal of all anchor plates and the installation of all anchor plates. The *Contractor* is to build new conveyor modules and perform belt extension every two (2) shifts. The installation of all idlers is part of the scope of work. The conveyor module extension is 80 meters. The two splices must also be performed by the *Contractor*.
- The *Contractor* is responsible to handle the 3, 3 kV cables during the shift. New cable joints, once per year, needs to be done by the **EMD Contractor**. **Employer** will do the **C&I** part of this shift. The *Contractor* must also repair any rail failures during the stacker shifting process.
- The *Contractor's* land surveyor must set out the centre pins for the extendible conveyor and shiftable conveyor before the shiftable conveyor tail end station and shiftable conveyor plat forms can be constructed before the stacker shift starts.

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- During conveyors extending and shifting the *Contractor* must ensure that the survey for align straight the belt through its length from the tail end to the discharge chute is conducted and review by *Employer* whenever the extension or shifting take place. The *Contractor* shall ensure that the belt is straight, and all possible misalignment of the conveyor structure is within recommended coordinates. The *Contractor* must issue weekly reports to *Employer's Engineering* which may suggest engineering solution or change of maintenance frequency.
- The *contractor* must also perform spreader system plant inspection two times per week; perform the required repairs, scraper cleaning and replacements. The contractor must make sure that this is on standby and reliable in case of stacker system failure. Since this system is standing most of the time, there is more than enough time to perform the required maintenance work. The contractor must also ensure that the spreader system must not operate more than 15% of the time. The contractor must keep record of the running hours of the stacker and spreader systems. This will ensure that the two ash dumps are in balance.
- The spreader boom conveyor support cables, major structure, pivot points and bogie wheels support steel work must be tested at the welding joints. This testing frequency is once per year. The contractor must also perform rail extension in front of the machine, so that this machine can stack the ash at the crest of the ash dump. The standby extendable conveyor requires belt extension three times per year. Please note it is depended on the usage of this machine.
- The standby extendable conveyor needs surveying and shifting of modules, so that this conveyor only has one (1) horizontal radius of 5 000 meters. It will help with the belt training. The conveyor length is 3 700 meters. The conveyor length extension is 80 meters, and the belt splices is part of the scope of work. The contractor must also assemble the conveyor modules on the plant. The handling of these modules and belting must be performed by the contractor. The handling of the rails and sleepers are part of the scope of work. The length of each rail is approximately 18 meters.
- The 11kV to 3, 3 kV transformer also require shifting to the location. This normally happens once per year. The shifting of this transformer is part of the scope of work. The **EMD Contractor** will perform the cable joints.
- The contractor is responsible off all the lubrications and inspections and top ups of all the gearboxes and fluid coupling. The number of greasing points is 94. The number of gearboxes involved with the standby system including the shuttle conveyor is 15. The contractor is also to check the spreader luffing hydraulic system, which involves the maintaining of the oil level, repairs of any oil leaks and the replacement of the oil filters. The inspection and maintaining of the power and control cable reel gearboxes and magnet couplings are also part of the scope of work. The spreader eight travel drives need replacement.
- There are four critical scoop fluid couplings at the Ash Overland Conveyor belts on north and south overland conveyors. These couplings require filling up of oil after repair or after inspection, oil leak inspection, and visual inspection in terms of vibration monitoring, alignment with electric motors and gearboxes as well as temperature monitoring. The oil coolers must be inspected for any leaks, condition of the cooling fins, oil circulation, fan operations and be inspected every week. The contractor shall ensure that there is no oil/grease leak around the gearboxes, pulleys, couplings and motors. Any oil or grease spillage found around ash plant must be investigated and documented.
- The contractor is also responsible for the north and south dam pump stations. The pumps and pipelines inspections frequency should be at least two times per month. If any repairs are required on these pumps, it is part of the maintenance scope of work. The brine water pipeline and potable water pipelines from TT02 to the sprayers and potable head tank must be inspected by the contractor and any repairs and HDPE pipe welding need to be performed by the contractor.
- The South and North dams pump houses need to be inspected, and these pumps needs test running once every week. Any water leaks need to be repaired. The sump pump sump needs to be inspected, and the sump pumps needs to be tested once a week, to make sure that it is available to drain any water from these pump house floors. Any water leak on the discharge pipeline needs to be repaired by the Contractor.

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- In terms of spares the contractor is responsible for ensuring that the spares are levelled up and all the spares available are readily available and in good working conditions whenever required. Eskom has a routable process where the contractor can be very aware that the spare is no longer repairable. If the spare is no longer repairable or the cost of repairing is 70% or more than one of the new spares the new spare must be bought based on routable process.
- The contractor shall review the current recommended spares and advise where there is a need to adjust the spares required to ensure that Ash Plant Facility is reliable, available and maintainable to suit operating and maintenance philosophy. The contractor shall have a capability of conducting reliability centre maintenance where the contractor will adhere to automated preventative maintenance stored in the system.
- If there is any steel work repairs and steel sections, replacement need on the conveyors and stacker/spreader system, then the contractor needs to do these steel work repairs.
- The contractor is also responsible for any lifting which may be required during heavy equipment removal, handling and installation.

3. QUALITY

The contractor shall prepare a method statement for each activity to be executed and quality control documents which are required to be sent for approval before any work can be executed. The Employer's Contract Supervisor of the area shall give a good ahead for any repair and installation that will be required.

The bolts and nuts shall always meet the design specification. If the contractor is not sure about the specification, he/she should consult with the Eskom Engineer of the area.

All welding repairs and structural repairs must be done with accordance to Eskom latest version of welding rule book. All design standards must be adhered to, and Welding Procedure Specification (WPS) must be approved. Welding Procedure Specification (WPS) must be supported by welding qualification records and welder's qualifications.

The *Maintenance* shall include as a minimum the following activities and interventions:

Approval of Method Statement and quality control plan – hold point for Employer's Contractor Supervisor.

4. Procedures, Guidelines & Other Documents

- Quality Control Plan.
- Method Statement.

5. Employer's requirements for the service

- The contractor must have sufficient manpower to maintain the inside and outside running plant, during the stacker shifting period or during the belt and rail extension on the spreader machine. This may be achieved through additional resources. They may then reduce their work force in alignment with the BOQ, during the normal operation of the ash conveyor plant.
- The contractor is also responsible for the general site and workshop housekeeping.
- The contractor must have at least ten responsible persons who can take out plant isolation permits, and he/she must supply sufficient manpower for standby purposes. The working hours during plant breakdowns must not exceed the hours as specified by law.
- The contractor must be able to replace tired workers. There should be sufficient personnel that the Contractor can work at four places at the same time. Each team needs to work independently from other teams

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by have its own responsible person and artisans. The artisan of each team will communicate among the different teams and with operating and to his/her supervisors with two-way radios.

- The contractor is responsible to dispose scrape metal in the correct bins and the spares and tools must be safe keeping in the stores in a neatly manner. The contractor's personnel must be transported in buses with safety belts from his/her home to work and back to home every day and the contractor may not transport his personal behind bakkies (LDV). The contractor is also to provide daily transport for his/her personal on site. The stacker and spreader systems are about 8 kilometres from the Power Station.
- The contractor must perform toolbox meeting every morning before any work can start and the contractor must also inspect the tools for safe usage. The contractor is to perform a risk assessment before any task is performed and he/she is to refer to the attached "Safety and health & environmental requirements for contractors" to insure safe working environment. The contractor is responsible for lifting slings and chain blocks inspection.

Note: All lifting equipment must comply to the requirements of the OHSA Driven Machinery Regulations. In case for replacements of any gearbox, pulley and fluid drive, the contractor must take the defected gearbox, pulley or fluid drive to Eskom's Main Stores for repairs. All spares, including belts must be handled by the contractor. The contractor may use the crane with the operator and the tractor and trailer from Eskom.

- Contractor to provide rigging equipment up to 15 Tons.
- Contractor to provide Hydraulic bearing puller on an "as and when required" basis to perform work. Alignment Technicians must be able to perform laser alignment and provide certificates after every alignment activity.
- All work will be issued via SAP Maintenance system.
- The *Employer's* Lifesaving rules, Safety rules / procedures to be adhered to.
- Standby crew to attend to breakdowns on an "as and when required" basis.
- All Artisans to be authorized in terms of Plant Safety Regulations (PSR) within 6 months after the contract has been awarded.
- The *Contractor* must provide Quality Control Plan documents for approval by *Service Manager* prior to performing any activity.
- The *Contractor* to provide proof of experience (CVs) and qualifications for all personnel.
- The Artisan must have a Red Seal qualification (section 28 will not be allowed)
- In the case of absence for more than two days (Sick or Annual Leave) a substitute for same skill must be available to maintain the plant.
- In the case where one or more employees of the *Contractor* are requested to leave site for other reasons than Annual leave or negotiated leave with the *Service Manager*, the personnel must be replaced immediately with the same skill level, qualifications and experience
- Rigging tools and electrical equipment to be inspected regularly and filed as per the OHSACT requirement.
- All PPE to be provided by *Contractor* at own costs must be SABS approved
- Good housekeeping must be always kept. The *Contractor* must clean and remove all debris after completing a task.
- All communications must be printed and filed on *Service Manager's* file.
- Timesheets to be logged and signed by Contract Supervisor and *Contractor*.
- Daily attendance register must be submitted daily to the Contract Supervisor.
- Site Manager to provide weekly plant status report.
- Provide SANS approved Safety harnesses as per the Safety Requirements of the *Employer*.
- Yearly induction must be attended by all personnel.
- Workshop portable tools to be provided by the *Contractor*.
- *Contractor* to provide QCP's and programme.
- Safety Officer to provide monthly safety report.

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