



**DESIGN, MANUFACTURE, SUPPLY,  
DELIVERY, INSTALLATION, TESTING,  
CALIBRATION AND COMMISSIONING OF 5  
OFF HEAVY DUTY CNC CONTROLLED  
MILLING MACHINES.**

**DURBAN MAIN CENTRE, 311 SOLOMON  
MAHLANGU DRIVE, ROSSBURGH.**

**REFERENCE No: FAI\_ DBN\_ SPEC\_007**

**Revision 0**

**Date of release: FEBRUARY 2025**

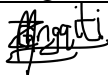
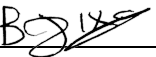
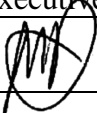
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## DOCUMENT AUTHORITIES

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## 1. INTRODUCTION / SCOPE of Work

This specification is for the:

#	TASK	REQUIRED
1	Design	✓
2	Manufacture	✓
3	Assess foundation	
4	Survey	
5	Supply	✓
6	Delivery	✓
7	Installation	✓
8	Testing	✓
9	Calibration	✓
10	Training	✓
11	Commissioning	✓

Of the specified:

#	ITEM	REQUIRED
1	Design, manufacture, supply, delivery, installation, testing, calibration and commissioning of 5 off heavy duty CNC controlled milling machine.	
2	Training for 10 Transnet Engineering personnel on how to use the supplied equipment.	
3	Submission of project completion documents.	

## 2. SITE INSPECTION

- 2.1 All prospective contractors shall be required to undertake a compulsory site inspection to fully acquaint themselves with all aspects involved.
- 2.2 Arrangements to visit the site and confirmation of the date and time of the site inspection shall be made with Transnet Engineering Contract Manager.
- 2.3 The site inspection certificate shall be completed and countersigned by the contract Manager on the day of the visit and must be submitted with the tender documents.

## 3. INFORMATION REQUIRED

- 3.1 Offers will not be considered unless full particulars and sufficient literature are provided at the tendering stage to enable Transnet Engineering Technical Officers the opportunity to assess each technical offer properly.
- 3.2 Prospective Contractors will complete the relevant questionnaire in full and must indicate whether their offer complies with each item of the specification.
- 3.3 Should there be insufficient space for furnishing full details; contractors shall provide the additional details in their covering letter. The additional details shall be numbered in accordance with the applicable clause specified in the specification.

- 3.4 As prospective contractors are considered to be experts in their field, they are obliged to identify any shortcomings, such as omissions or sub-standard requirements, to the completeness of this specification. These must be brought to the attention of Transnet Engineering at tender stage with alternatives to address these shortcomings. However, each offer shall be quoted for separately.

#### 4. TECHNICAL REQUIREMENTS

The following regulation and codes must be complied with:-

- **The Occupational Health and Safety Act – Act 85 of 1993.**

- 4.1 Except where otherwise provided for in the specification, all equipment offered will comply with the requirements of the relevant standard specifications of the SABS, if published, otherwise with the relevant standard of the British Standards Institution in force at the time of tendering.
- 4.2 Where equipment offered complies with the recognized standards of the country of manufacture and not specifically with the standards required by this specification, such equipment will be considered at the discretion of Management. In this case, tenders shall state fully all respects in which the equipment departs from the standard laid down in this specification.
- 4.3 The successful tender will at the conclusion of the installation provide a document along the lines “that the installation complies with national/international requirements and that all selected /designed items are compliant with Act 85 of 1995 and SABS practices applicable to the installation. The equipment has been commissioned/ calibrated and employees as specified have been trained and found competent to operate the plant.”

#### 5. SPECIFIC REQUIREMENTS

**Any person with the intention of tendering shall ensure that the information below is complied with.**

- 5.1 Operating Environment
- Indoors – workshop environment.
6. The machine specification.  
1 off 5 axis milling machine

Item no.	Requirements This specification covers the minimum requirements.
6.1	The following covers the minimum requirements for the required machinery.
6.2	Design, manufacture, supply, delivery, installation of 1 off 5 axis heavy duty CNC controlled milling machine.
6.3	5-axis simultaneous accuracy performance for 5-axis machining in mold cutting, highly precise contour finishing, milling, drilling, and tapping. Structural rigidity, optimized by double column/bridge type structure design to enable a wider machining range. Auto measurement compensation for rotation axis accuracy. Spindle vibration lower than 1 mm/sec. Auto measurement compensation for tool accuracy Not affected by spindle thermal variation and environment temperature change, thermal elongation

	less than 0.02mm Multi-axis synchronous head machining accuracy to meet the demand for parts processing.
<b>Item no.</b>	<b>Requirements</b> <b>This specification covers the minimum requirements.</b>
6.4	<b>2-axis head central control and monitoring protection system:</b> Spindle cutting vibration protection Spindle and motor overloading protection B/C rotating motor overloading protection Spindle overloading protected by software Spindle and structure temperature thermal compensation system Spindle cooling device  Twin hydraulic cylinders with pressured air assistance balancing system ( Tooling Auto lubrication system Lubrication oil collector Cutting fluid cooling system Enclosed sheet metal guard Air conditioner for electrical cabinet Working lamp Operation cycle finish and alarm RJ45 interface XYZ axis travel hard limits protection Remote monitoring software-Standard Auto power off function Foundation pads and bolts kits
6.5	X axis 4,100mm
6.6	Y axis 2700mm
6.7	Z axis: 1200mm
6.8	Port width: 2200mm
6.9	Table dimension: 4000mm x 1800mm
6.10	Max. table load: 12000kg
6.11	Spindle motor (Continuous/ 30 minutes rated) : 43Kw
6.12	Spindle speed: 12000 rpm
6.13	Cutting federate: 1-10,000 mm/min
6.14	Rapid traverse: 18 / 18 / 15 m/min
6.15	Positioning accuracy: $\pm 0.005/300$ , $\pm 0.008$ mm/Full travel
6.16	Repeatability: $\pm 0.002$ mm
6.17	<b>Dimensions:</b> • The supplier to indicate the overall dimensions of the equipment supplied. (Length, width and height)
6.18	<b>Tool changer:</b> • The machine to be equipped with an automatic tool changer.
6.19	<b>Cutters/Tools:</b> • The bidder to indicate which cutters/tools to be supplied as standard with the machine. • The bidder to indicate any cutters/tools that will be supplied if not considered as standard. (Cutters/Tools required by client).

6.20	<b>Speeds:</b> <ul style="list-style-type: none"> <li>The bidder to indicate all the different speeds for the equipment. (Spindle speed.)</li> </ul>
<b>Item no.</b>	<b>Requirements</b> <b>This specification covers the minimum requirements.</b>
6.21	<b>Safety Standards:</b> <ul style="list-style-type: none"> <li>The bidder to supply the design standards of the equipment/machine.</li> <li>The bidder to supply all the safety features build into the equipment/machine.</li> </ul>
6.22	<b>Electrical:</b> <ul style="list-style-type: none"> <li>Fixed control panel</li> <li>Lockable inter — locking main isolator.</li> <li>An emergency shut — off which must be easily accessible.</li> <li>The bidder to indicate all electrical components used in the equipment.</li> <li>The different types off drives used eg. Siemens, Fanuc, Commander, Yaskawa etc.</li> <li>All wiring diagrams shall be supplied.</li> </ul> <p>The bidder to indicate the minimum power required for the equipment to operate fully.</p>
6.23	<b>Software:</b> <ul style="list-style-type: none"> <li>The bidder to indicate which software will be supplied.</li> </ul> <p>Machine programming software shall be supplied.</p>
6.24	<b>Control</b> <ul style="list-style-type: none"> <li>Fanuc or Siemens CNC Control.</li> </ul>
6.25	<b>Machines support structure:</b> <ul style="list-style-type: none"> <li>The bidder shall be responsible for ensuring the reliable support stand for the machines.</li> <li>The bidder shall supply Transnet Engineering Durban with drawings. (Design Engineers to be registered at ECSA.)</li> <li>Full details to be provided.</li> </ul> <p>All calculations and design drawings must be made available to Transnet Engineering for approval before commencing with the project.</p>
6.26	<b>Heads to be supplied</b> <ul style="list-style-type: none"> <li>Direct Axis head</li> <li>L shaped head</li> <li>5 Axis head</li> </ul>
6.27	<p>Each machine shall be powered by 400v AC 50hz power.</p> <p>Supply and install power cabling, cable trunking from the electrical distribution box to the new machine. Install the fused isolator (lockable). Each phase of 3 phases to be lockable.</p> <p>Test and issue an electrical certificate of compliance in accordance with SANS 10142-1.</p>
6.28	testing, calibration and commissioning.
6.29	<p>The successful bidder shall supply the following documents in 1 set of PDF files in a USB memory stick and 3 sets of hard copies for each machine.</p> <p>Operation Operation Manual Maintenance Maintenance Manual Greasing Intervals with Locations Oil checking intervals with locations Trouble shooting guide and solutions Critical Spares List</p> <p><b>Electrical</b></p>

	<p>Electrical Schematics</p> <p>Electrical parts lists (including manufacturer and supplier part numbers).</p> <p>Details and backup of CNC and PLC Programmes.</p> <p><b>Mechanical</b></p> <p>Mechanical Assembly drawings</p> <p>Mechanical Parts Lists (including manufacturer and supplier part numbers).</p>
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7. The machine specification.  
2 off 5 axis milling machine

<u>Item no.</u>	<u>Requirements</u> This specification covers the minimum requirements.
7.1	The following covers the minimum requirements for the required machinery.
7.2	Design, manufacture, supply, delivery, installation of 2 off 5 axis heavy duty CNC controlled milling machine (centre tye)
7.3	X axis travel 1620mm
7.4	Y axis travel : 1260 mm
7.5	Z axis travel: 1050 mm
7.6	Table diameter : Ø1,500 mm
7.7	Max. table load (central area) 3000 kg
7.8	Spindle speed: 7000 rpm
7.9	Cutting feed rate 24 / 24 / 24 m/min
7.10	Rapid traverse (X/Y/Z) 40 / 40 / 24 m/min
7.11	<b>Dimensions:</b> • The supplier to indicate the overall dimensions of the equipment supplied. (Length, width and height)
7.12	<b>Tool changer:</b> • The machine to be equipped with an automatic tool changer.
7.13	<b>Cutters/Tools:</b> • The bidder to indicate which cutters/tools to be supplied as standard with the machine. • The bidder to indicate any cutters/tools that will be supplied if not considered as standard. (Cutters/Tools required by client).
7.14	<b>Speeds:</b> • The bidder to indicate all the different speeds for the equipment. (Spindle speed.)
7.15	<b>Safety Standards:</b> • The bidder to supply the design standards of the equipment/machine. • The bidder to supply all the safety features build into the equipment/machine.
7.16	<b>Electrical:</b> <ul style="list-style-type: none"> <li>• Fixed control panel</li> <li>• Lockable inter — locking main isolator.</li> <li>• An emergency shut — off which must be easily accessible.</li> <li>• The bidder to indicate all electrical components used in the equipment.</li> <li>• The different types off drives used eg. Siemens, Fanuc, Commander, Yaskawa etc.</li> <li>• All wiring diagrams shall be supplied.</li> </ul> <p>The bidder to indicate the minimum power required for the equipment to operate fully.</p>
7.17	<b>Software:</b> <ul style="list-style-type: none"> <li>• The bidder to indicate which software will be supplied.</li> </ul> <p>Machine programming software shall be supplied.</p>



<b>Item no.</b>	<b>Requirements</b> <b>This specification covers the minimum requirements.</b>
7.18	<b>Control</b> • Fanuc or Siemens CNC Control.
7.19	<b>Machines support structure:</b> <ul style="list-style-type: none"> <li>• The bidder shall be responsible for ensuring the reliable support stand for the machines.</li> <li>• The bidder shall supply Transnet Engineering Durban with drawings. (Design Engineers to be registered at ECSA.)</li> <li>• Full details to be provided.</li> </ul> All calculations and design drawings must be made available to Transnet Engineering for approval before commencing with the project.
7.20	<b>Heads to be supplied</b> <ul style="list-style-type: none"> <li>• Direct Axis head</li> <li>• L shaped head</li> <li>• 5 Axis head</li> </ul>
7.21	Each machine shall be powered by 400v AC 50hz power. Supply and install power cabling, cable trunking from the electrical distribution box to the new machine. Install the fused isolator (lockable). Each phase of 3 phases to be lockable. Test and issue an electrical certificate of compliance in accordance with SANS 10142-1.
7.22	testing, calibration and commissioning.
7.23	The successful bidder shall supply the following documents in 1 set of PDF files in a USB memory stick and 3 sets of hard copies for each machine. Operation Operation Manual Maintenance Maintenance Manual Greasing Intervals with Locations Oil checking intervals with locations Trouble shooting guide and solutions Critical Spares List <b>Electrical</b> Electrical Schematics Electrical parts lists (including manufacturer and supplier part numbers). Details and backup of CNC and PLC Programmes. <b>Mechanical</b> Mechanical Assembly drawings Mechanical Parts Lists (including manufacturer and supplier part numbers).

## 8. The machine specification.

### 2 off 3 axis milling machines

<b>Item no.</b>	<b>Requirements</b> <b>This specification covers the minimum requirements.</b>
8.1	The following covers the minimum requirements for the required machinery.
8.2	Design, manufacture, supply, delivery, installation of 2 off 3 axis heavy duty CNC controlled milling machine (bed type).

Item no.	Requirements
	<b>This specification covers the minimum requirements.</b>
8.3	Table length: 4000mm
8.4	Table width: 1000mm
8.5	Longitudinal travel: 4000mm
8.6	Cross travel: 1200mm
8.7	Vertical travel: 1600mm
8.8	Max. distance from table to spindle nose: 1600mm
8.9	Rapid feed (longitudinal axis): 40000 mm/min
8.10	Rapid feed (cross and vertical axis): 40000 mm/min
8.11	Working feed (longitudinal axis): 35000 mm/min
8.12	Working feed (cross and vertical axis): 35000mm/min
8.13	<b>Drives:</b>
8.14	Power : 30Kw
8.15	Speed of the spindle head: 6.000 (8.000) min <sup>-1</sup>
8.16	Accuracies acc. to ISO 230-2: 2006 Annex B Step cycle:
8.18	Positioning accuracy: 0,006 / 4.000mm
8.19	Allowed weight on the table: 10000kg
8.20	45° automatic head 360.000 positions
8.21	Coolant tank 22 + 5 bar
8.22	Complete enclosure open on top
8.23	<b>Dimensions:</b> • The supplier to indicate the overall dimensions of the equipment supplied. (Length, width and height)
8.24	<b>Tool changer:</b> • The machine to be equipped with an automatic tool changer.
8.25	<b>Cutters/Tools:</b> • The bidder to indicate which cutters/tools to be supplied as standard with the machine. • The bidder to indicate any cutters/tools that will be supplied if not considered as standard. (Cutters/Tools required by client).
8.26	<b>Speeds:</b> • The bidder to indicate all the different speeds for the equipment. (Spindle speed.)
8.27	<b>Safety Standards:</b> • The bidder to supply the design standards of the equipment/machine. • The bidder to supply all the safety features build into the equipment/machine.
8.28	<b>Electrical:</b> <ul style="list-style-type: none"> <li>• Fixed control panel</li> <li>• Lockable inter — locking main isolator.</li> <li>• An emergency shut — off which must be easily accessible.</li> <li>• The bidder to indicate all electrical components used in the equipment.</li> <li>• The different types off drives used eg. Siemens, Fanuc, Commander, Yaskawa etc.</li> <li>• All wiring diagrams shall be supplied.</li> </ul> <p>The bidder to indicate the minimum power required for the equipment to operate fully.</p>

<b>Item no.</b>	<b>Requirements</b> <b>This specification covers the minimum requirements.</b>
8.29	<b>Software:</b> <ul style="list-style-type: none"> <li>The bidder to indicate which software will be supplied.</li> </ul> Machine programming software shall be supplied.
8.30	<b>Control</b> <ul style="list-style-type: none"> <li>Fanuc or Siemens CNC Control.</li> </ul>
8.31	<b>Machines support structure:</b> <ul style="list-style-type: none"> <li>The bidder shall be responsible for ensuring the reliable support stand for the machines.</li> <li>The bidder shall supply Transnet Engineering Durban with drawings. (Design Engineers to be registered at ECSA.)</li> <li>Full details to be provided.</li> </ul> All calculations and design drawings must be made available to Transnet Engineering for approval before commencing with the project.
8.32	Each machine shall be powered by 400v AC 50hz power. Supply and install power cabling, cable trunking from the electrical distribution box to the new machine. Install the fused isolator (lockable). Each phase of 3 phases to be lockable. Test and issue an electrical certificate of compliance in accordance with SANS 10142-1.
8.33	Testing, calibration and commissioning.
8.34	The successful bidder shall supply the following documents in 1 set of PDF files in a USB memory stick and 3 sets of hard copies for each machine. <p>Operation  Operation Manual  Maintenance  Maintenance Manual  Greasing Intervals with Locations  Oil checking intervals with locations  Trouble shooting guide and solutions  Critical Spares List</p> <b>Electrical</b> <p>Electrical Schematics  Electrical parts lists (including manufacturer and supplier part numbers).  Details and backup of CNC and PLC Programmes.</p> <b>Mechanical</b> <p>Mechanical Assembly drawings  Mechanical Parts Lists (including manufacturer and supplier part numbers).</p>

➤ **Supply and delivery**

The equipment shall be supplied and delivered at Transnet Engineering, 311 Solomon Mahlangu Drive, Rossburgh.

➤ Spares

The tenderers shall indicate the availability and required lead times for the spares considered to be critical for the successful operation of the equipment.

The successful tenderer shall supply Transnet Engineering with three sets blown out diagrams and schematics of the complete machine as well as detailed copies of the list of critical spares for equipment including original equipment manufacturer ( OEM ) numbers.

The successful tenderer shall provide TE with acceptable proof that spares can be easily and speedily procured for the equipment within 7 working days through agents locally.

➤ Completion / handover

A testing period of 1 month (744 hours for 24/7 shifts and 248 hours for 8 hour shifts).

No equipment will be accepted by TE without the satisfaction of the conditions above.

➤ Warranty

The warranty shall be 24 months.

The contractor shall undertake to repair all faults due to bad workmanship and/or faulty materials during a period of 24 months, calculated from the date that the completed plant installation is accepted by TE.

Any latent defects that become apparent during the warranty period shall be rectified to the satisfaction of TE at the cost of the supplier.

The supplier shall agree to replace at his/her cost any defective items discovered within the guaranteed period.

➤ Maintenance

The maintenance plan shall be for 5 years. The tenderers shall include the maintenance plan.

The quote for maintenance plan shall be added on the Schedule of prices.

**Note:** All work to be completed in each respect by suitably qualified person.

## 9. OTHER INFORMATION RELATED TO THE SCOPE

- 9.1 This specification states the minimum requirements relating to the work and in no way absolves the contractor from responsibility for sound engineering practice. Any omissions or sub-standard requirements of this specification must be brought to the attention of Transnet Engineering at tender stage and optional prices for addressing such omissions must be provided.
- 9.2 Any matter relating to this work, which requires a decision from Transnet Engineering shall be presented to the Project Manager in charge.
- 9.3 All offers shall be completed in every respect with this specification. Only completed tenders shall be considered
- 9.4 The Technical Officer reserves the right to have the proposal checked independently by a third party.
- 9.5 Tenders must allow for monthly progress and clarification meetings on site initially and after commissioning for defect meetings when required. A meeting will be held after issuing of the tender to establish the exact scope and magnitude of the contract. No tender will be considered unless it has this Certificate signed by the Engineer or his representative.

## 10. HEALTH AND SAFETY REQUIREMENTS

- 10.1 All equipment whether detailed in this specification or not shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993 as amended and all other applicable legislation including specific set of regulations and local authority bylaws where applicable.
- 10.2 All the necessary safety equipment such as guards over rotating equipment shall be supplied and the equipment shall comply fully with all the requirements of the South African Occupational Health and Safety Act, Act 85 of 1993 and all other applicable legislation including specific set of regulations and local authority bylaws where applicable.

## 11. SPECIALIST SUB-CONTRACTORS

- 11.1 Only specialist sub-contractors who have previously successfully completed work of the type and extent specified in this document should be engaged.

The tenderer shall provide the technical officer with sufficient proof of having suitable experience regarding the design and manufacturing of similar equipment. To this end, complete and detailed reference list shall be submitted with the tender. Reference list shall include addresses as well as contact person who may be visited for inspection of the equipment during the adjudication period.

- 11.2 The tender shall submit a complete list of proposed sub-contractors and suppliers of major components with his tender.
- 11.3 The tenderer shall be prepared to commit themselves in writing to the technical officer with an adequate, experienced and stable project team for the duration of the contract.
- 11.4 Transnet Engineering will not consider any Tenderer's offer that, in the sole opinion of Transnet Engineering, does not have adequate experience in the design and manufacture of such equipment.
- 11.5 Contractors shall do the installation simultaneously with other contractors on-site busy with other work and shall plan work that it integrates with other work performed.

## 12. EQUIPMENT

- 12.1 The required items shall be complete in all respects.
- 12.2 Tenderers shall supply a list of all materials proposed as well as the addresses of the local support companies.

## 13. GENERAL REQUIREMENTS

Operation will be in the following conditions:

Altitude	Sea level
Ambient temperature	0°C to 45°C
Relative humidity	50% to 100%
Atmosphere	Heavy saline

## 14. DEFINITIONS AND ABBREVIATIONS

**CLIENT** Transnet Engineering Durban

**TECHNICAL OFFICER:** Project Manager

**CONTRACTOR** Contractor appointed under this specification document

## **15. GENERAL**

- 15.1 The successful tenderer will be subjected to a workshop inspection by Transnet Engineering, to ensure that the facilities are to the satisfaction of the Transnet Engineering in terms of the quality control and equipment capabilities for manufacturing such type of equipment.
- 15.2 The tenderers shall guarantee that the rating and size etc. of the equipment offered, will be adequate to perform the duties required.

## **16. SITE ESTABLISHMENT**

- 16.1 The contractor shall be solely responsible for safety of his staff and for providing security to safeguard his works and material on site, until such a time.
- 16.2 The contractor shall be required to attend site meetings when convened by the Project Leader controlling the contract.
- 16.3 The contractor will be responsible for any damages caused by his staff to the existing buildings, electrical installations, water pipes and all plumbing infrastructure, civil work infrastructure, CCTV camera infrastructure, perimeter fences, vehicles (locomotives, wagons, coaches, trucks, cherry pickers, and golf carts), trolleys, and all property on site.

## **17. PENALTY CLAUSES**

- 17.1 Due to the criticality of this project, penalties will be levied for late deliveries.