



दूरभाष :
TELEPHONE: 022-2559 0069

फेक्स संख्या :
FAX NUMBER +91-22-2550 5150/51/52

Email: vgumma@barc.gov.in

भारत सरकार
GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केंद्र
BHABHA ATOMIC RESEARCH CENTRE
Centre for Design and Manufacture
Design of Beamline Equipment Section

ट्रॉम्बे,
मुंबई-४०० ०८५.
TROMBAY,
MUMBAI -400 085

Ref: CDM/DBLES/GVR/17/

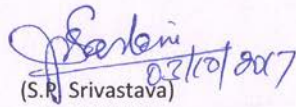
October 03, 2017

Sub: Fabrication & Supply of Control systems for Chopper as per Annexure-I


Dear Sir/Madam;

1. Quotation is invited for the minor fabrication job as per Annexure-I.
2. Bidder shall quote for fabrication of these items with material. Taxes shall be quoted separately.
3. The quotation must reach **Head, CDM** by **30/10/2017** and must be sent in a **sealed envelope by Registered Post/ Speed Post super scribed with the above reference no. and due date .**
4. The address on the envelope should read: **HEAD, CENTRE FOR DESIGN AND MANUFACTURE (Attn: Shri G. Venkateswara Rao), BHABHA ATOMIC RESEARCH CENTRE, TROMBAY, MUMBAI-400085.**
5. Control systems as per Annexure-I are to be fabricated as per the specification given in Annexure-I. Fabrication work shall be subjected to inspection by our engineer at bidders works.
6. The bidder shall deliver the approved items **within 10 weeks** from the date the firm purchase order is issued to the bidder. The finished items shall be delivered by the bidder at **Store Officer, Centre for Design and Manufacture Zonal Store, B.A.R.C, Trombay, Mumbai-85.**

Encl: Annexure-I


(S.P. Srivastava)
Head, CDM

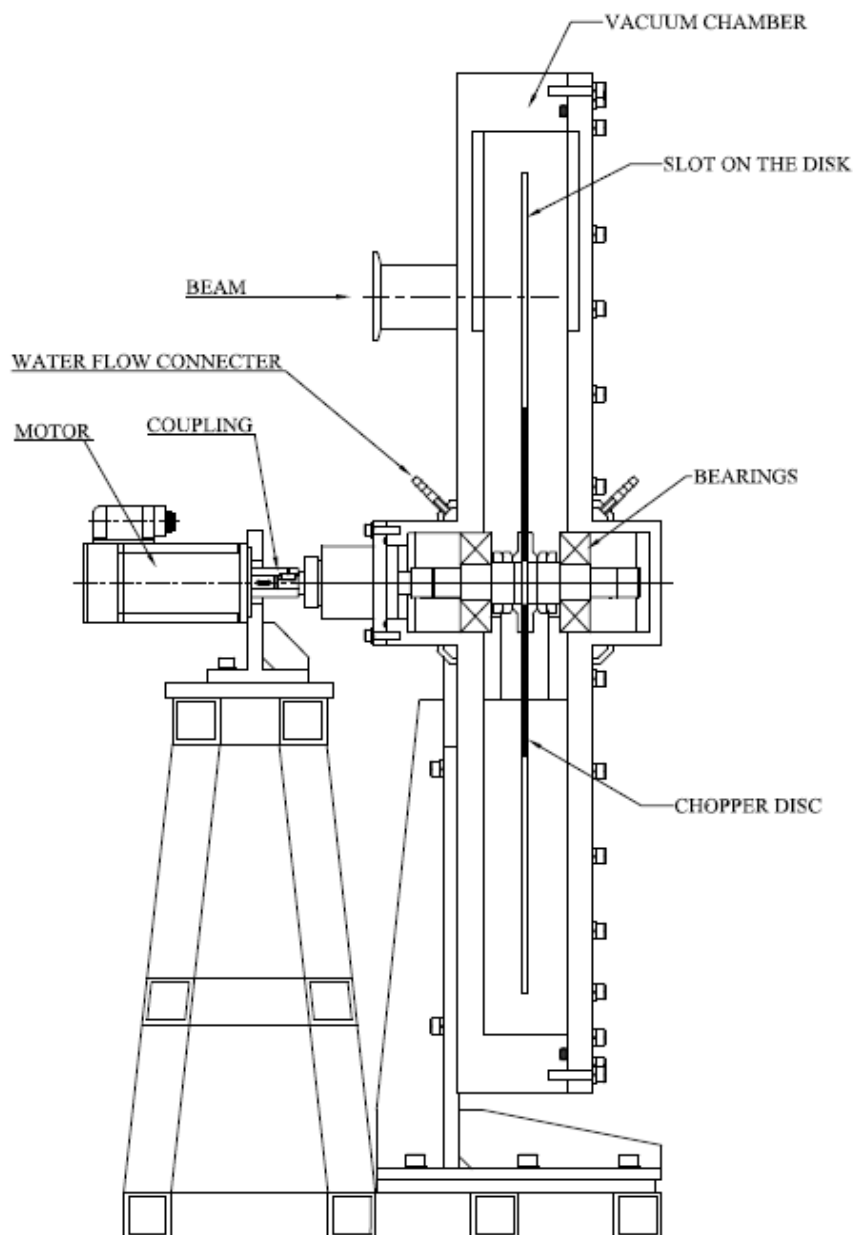
एस. पी. श्रीवास्तव / S. P. Srivastava
अध्यक्ष, अभिकल्पन एवं विनिर्माण केंद्र
Head, Centre for Design and Manufacture
भारत सरकार / Government of India
भाभा परमाणु अनुसंधान केंद्र / Bhabha Atomic Research Centre
ट्रॉम्बे, मुंबई - ४०० ०८५ / Trombay, Mumbai - 400 085.


(G. Venkateswara Rao)
SO/D, DBLES

ANNEXURE – I

CONTROL SYSTEM FOR OPERATING CHOPPER ASSEMBLY

- 1 Brief description:** A control system is required to control the RPM of a servo motor and thus the rotating disk of a chopper assembly. The disk is having six slits on its periphery 60° apart. Beam will pass through the slits whenever any of the slit of a rotating disk comes in line with the beam. For homing or for the starting position of the disk any of the slit angular position to be taken as home position. The variation in RPM during ramp-up shall be within ± 1 RPM and shall also vary within ± 1 RPM after attaining the set RPM.



LAYOUT OF CHOPPER ASSEMBLY

2 Scope of work:

- The motion of disk is required to be motorized for chopper assembly.
- The supplier will have to purchase and integrate all the necessary electrical as well as electronic hardware e.g. servo motor, servo drive, controller and various cables to develop the control system.
- Supplier has to develop a Graphical user Interface (GUI) for the above control system.
- The scope of work also include pre dispatch inspection, functional as well as operational testing, installation, commissioning and training of various system as per the specifications.
- Supplier shall ensure that RPM variation during ramp-up shall be within ± 1 RPM and shall also vary within ± 1 RPM after attaining the set RPM.

3 Requirements: Brief descriptions of minimum requirements for control system are given below:

3.1 Servo Motor:

- Motor Type: Permanent magnet synchronous motor/ Brushless DC motor
- Minimum continuous torque: 1 Nm at 10,000 rpm
- Feedback device: Absolute magnetic encoder/resolver
- Holding Brake: No
- Protection Class: IP64

3.2 Servo drive: It should be compatible with motor.

- Type: Variable frequency drive
- Number of axis: 02 Nos.
- Number of digital and Analog I/O: As per design requirement
- Interface: CANopen/PROFINET/EtherCAT

3.3 Controller: Controller should be used to control speed of motor. It should be compatible with servo drive.

- Number of axis: 02 Nos.
- Control scheme: Close loop speed control (vector control/servo control)
- Speed control range: 1 to 10,000 rpm
- Allowable maximum speed error: ± 1 rpm
- Field bus interface: CANopen/PROFINET/EtherCAT
- Communication interface: Ethernet
- Motion Control features: PID control, Electronic cams, Speed control, positioning control

3.4 Laptop: The entire system should be controlled by a laptop.

- Processor: Intel® Core™ i5-7200U (7th Gen)
- RAM: 8 GB DDR4
- HDD Capacity: 1TB
- Screen size: 15.6" inch
- Screen resolution: 1366 x 768
- Interface : 3 x USB 3.0, 1 x RJ45
- Dedicated Graphic card: 2 GB

- Operating System: Windows 10 Home (64 bit)

3.5 Thermocouple & Controller: The supplier has to provide two numbers of K-type thermocouples with required mountings, temperature controller and digital display unit. The length of thermocouple wire should be 8 metres. The specifications of temperature controller are:

- Supply voltage: 220 VAC
- Type of input: 2 x Thermocouple
- Type of output: Relay, voltage, current (4-20mA), alarm
- Control: ON-OFF/ PID

3.6 Control Panel:

- Control panel should be interfaced by laptop using open Ethernet network.
- A Graphical User Interface (GUI) has to be developed for laptop using LabVIEW and source code should also be provided.
- Supplier has to provide a BNC female connector interface on control panel which give TTL signal in terms of speed (RPM) of rotating disk.
- The supplier will have to install servo drive, controller, knobs/push-buttons, SMPS, MCB, line filters, emergency switch, relays, lamps etc. inside 19” inch rack only. Maximum height of the control cabinet should be 27U.

3.7 Other auxiliary items:

- Cable length from power supply to control panel should be 4 meters and from control panel to servo motor should be 8 meters.
- The cables inside control panel should be properly routed as per standard practices.
- Line filter should be used to suppress EMI on AC power line as per design requirements.
- Protection devices e.g. MCB/MPCB/contactors should be used to prevent overcurrent or a short circuit in control system components e.g. motors.
- The supplier should have to suggest any other components required to complete this project(not mentioned in this technical specification).

4 Acceptance Criteria

- Supplier has to demonstrate the functionality and capability of the control system and other hardware, i.e. Motor, drive, controller, temperature controller etc. as per specifications through laptop during Pre-Dispatch Inspection.
- Supplier has to install, integrate and commission the control system with mechanical assembly of chopper.
- Supplier has to demonstrate that RPM variation during ramp-up is within ± 1 RPM and also varies within ± 1 RPM after attaining the set RPM.

5 General Terms & Conditions

- Supplier has to integrate the control system with the mechanical system at purchaser’s site i.e. CDM, BARC, Mumbai.
- Actual requirements for GUI screen features can be modified at any point of time till final installation at purchaser’s site.

- **Manuals (in English):** The supplier shall have to provide complete electrical diagrams, installation manual, operation and maintenance manual, application/software note manual, motor and servo drive/controller datasheets/specification sheets, firmware and hardware information manual in hard as well as soft copy.
- **Software:** The supplier shall have to provide all necessary software/GUI applications/driver(s) in DVD(s). License of the software(s) should be valid for lifelong.
- **Training:** Operational, maintenance and technical training should be provided by supplier. Training should also cover design and development of graphical user interface programming at purchaser's site.
- **Guarantee/Warranty:** Control system shall be guaranteed for trouble free operation for a period of 12 months from the date of commissioning and final acceptance. Supplier shall also quote for extended warranty of 36 months after expiry of standard warranty period.
- **In case of any dilemma/ doubt, the purchaser or his authorized representative should be consulted.**

6 Bidder's Qualification Criteria

- Bidders must submit their quotation with detail product catalogue with all specified parameters and features/requirements.
- The manufacturer shall confirm his capability to support the spares, maintenance and after sales service of the complete system after commissioning, during and after the warranty period.
- Police Verification Certificate: Supplier's personnel coming for installation and commissioning need to have Police Verification Certificate (PVC) and without this document it will not be possible to allow them to enter the purchaser's premises. The supplier will have to submit the PVC of the persons coming for installation and commissioning, in advance, to the purchaser. The supplier will have to arrange this document himself, in the event of receiving the purchase order, so that installation and commissioning work at purchaser's site is completed in time.

7 Inspection and Testing at Supplier's Works: Following pre-dispatch inspection and testing shall be carried out at supplier's premises:

- Inspection of individual items for make and technical specification.
- Demonstration of actual operation of motor, switches, encoder etc. as per specification through laptop.
- Inspection of GUI prepared by supplier.
- General inspection of control panel for operation of switches, connectors, cables, etc.
- Post supply inspection in respect of supplies made is not permitted. Any offer containing the condition of post supply inspection will be out-rightly rejected.