
SPECIFICATIONS FOR POLISHING MACHINE FOR TURBOMACHINERY COMPONENTS

1. Objective:
To polish the turbo-machinery components shown in Table-1 by vibratory and drag polishing methods.
2. Scope:
Design, fabricate and supply a polishing machine as per functional requirements mentioned below.
3. The polishing machine shall be similar to the concept shown in Figure-1.

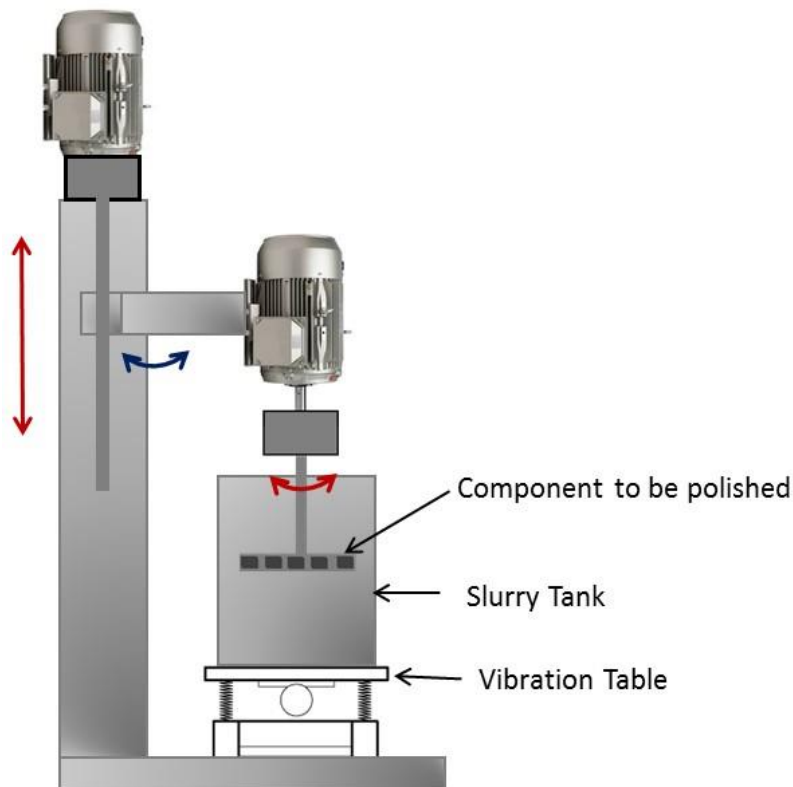


Figure 1: Concept of polishing machine

4. The polishing machine shall be able to
 - a. Independently rotate the component to be polished (impeller) at continuously variable speeds from 0 to 1500 rpm with maximum variation of $\pm 2\%$.
 - b. Independently move the part up and down with stroke of 500 mm at continuously variable speeds from 0 to 5000 mm/min with maximum variation of $\pm 2\%$.
 - c. Rotate the part while moving up/down in cyclic manner. Cycle will consist of clockwise (CW) rotational movement combined with downward movement (up to full travel stroke of 500 mm) and counterclockwise (CCW) rotational movement combined with upward movement (up to full travel stroke of 500 mm) or vice-versa.
 - d. Independently vibrate the whole slurry tank including the slurry in the tank.

5. The polishing machine shall have ability for rotating and moving the components as shown in Table-1.
6. The polishing machine shall have a common holding arrangement for loading impellers of various diameters as shown in Table-1. The holding arrangement shall be such that the component to be polished can be suspended in the slurry tank for rotation & up/down movement without touching the tank body. The holding arrangement shall not cover the openings i.e. vanes of impeller.

Table 1: Details of components to be polished

No	Part		Dimensions (approximate)		Material
			MIN	MAX	
1	2D Closed Impeller		200 mm Dia X 45 mm Height ID: 80 mm Wt: 20 Kgs	1000 mm Dia X 70 mm Height ID: 200 mm Wt: 400 Kgs	Alloy Steel X20 Cr13 (SS304)
2	3D Closed Impeller		300 mm Dia X 200 mm Height ID: 80 mm Wt: 50 Kgs	1000 mm Dia X 350 mm Height ID: 200 mm Wt: 400 Kgs	Alloy Steel X20 Cr13 (SS304)
3	Stationary Bladed Rings		600 mm Dia X 200 mm Height ID: 400 mm Wt: 50 Kgs	1100 mm Dia X 250 mm Height ID: 600 mm Wt: 400 Kgs	Alloy Steel X20 Cr13 (SS304)

NOTE: THIS INFORMATION IS EXCLUSIVELY FOR THE QUOTE PURPOSE AND SHOULD NOT BE DISCLOSED TO ANYONE WITHOUT PERMISSION OF BHEL R&D, HYDERABAD.

7. The polishing machine shall have facility for loading the impellers manually.
8. Slurry tank shall be circular with internal diameter of 1200 mm and height of 1000 mm. It should be fabricated out of MS (mild steel) or FRP (fibre glass reinforced plastic) and painted. It shall have a rugged transparent cover such that the slurry does not overflow due to slurry splashing while component is rotated. The slurry tank shall have the provision to drain the slurry.
9. The slurry tank with slurry should be able to vibrate independently. The slurry (supplied by BHEL) shall have ratio of 40 to 60 of water and abrasive powder (silicon carbide). The slurry shall be filled to maximum height of 750 mm from bottom of tank. Maximum weight of slurry is estimated to be 2000 Kgs.
10. The vibratory system shall be based on mass-spring system and have suitable motor power taking into consideration weights of the tank, tank covers, slurry and other accessories. The amplitude of vibrations shall be minimum +/- 2 mm in X and Y directions using 1500/1440 rpm motor.



BHARAT HEAVY ELECTRICAL LTD.

COPROPRATE R&D, VIKASNAGAR
HYDERABAD 500093

SPECIFICATION NUMBER: BHEL RD/QE2016-827-RD39-E01

11. The polishing machine shall:

- a. Have a central control panel shall house required control components i.e. Programmable Logic Controller (PLC), any other controller or programmable controller, Local Human Machine Interface (HMI), electrical motors control switches, relays, contractors etc. For control cables, it is preferred to have interface between machine and control panel by using quick disconnects. All motors shall have short circuit, temperature and overload protection which can be reset.
- b. Operate on power supply of 415VAC $\pm$ 10%, 3 phase, 50 Hz.
- c. Have a provision for setting or programming the following parameters:
 - i. Rotational speed
 - ii. Up and down speed
 - iii. Type of cycle i.e. (a) CW/DOWN & CCW/UP (b) CCW/DOWN & CW/UP
 - iv. Number of cycles (When the set/programmed number of cycles are completed, the machine shall automatically stop).
 - v. Mode of operation – (a) Single cycle mode and (b) Continuous cycle mode

12. Vendor shall submit the concept and final drawings for approval by BHEL before manufacturing the machine.

13. Vendor shall quote the erection commissioning charge separately.

14. Deliverables shall include the following:

- a. Complete polishing machine as per specifications. Part delivery will not be accepted.
- b. As built mechanical component drawings – hard copy and soft copy.
- c. As built electrical power and control drawings – hard copy and soft copy
- d. As built source code of PLC and HMI for machine control/logic program – soft copy

15. Acceptance criteria:

- a. Successful trials at vendors works
- b. All deliverables at BHEL, Corporate R&D, Vikasnagar, Hyderabad
- c. Erection and commissioning at BHEL, Hyderabad

16. General:

- a. The supplier shall be special purpose machinery (SPM) manufacturer and shall submit the document showing minimum five years' experience in manufacturing SPM.
- b. Supplier shall submit the list of SPM supplied during last five years, mentioning name of machine and customer with contact details. BHEL may independently verify the information with the customer.
- c. The design of the polishing machine shall be property of BHEL and shall not be disclosed or shared with third party without written consent of BHEL.
- d. All Intellectual Property Rights (IPR) i.e. patents, copyrights and design rights etc. related to this order shall be property of BHEL and supplier shall not apply or claim for any IPR, related to this order, arising during or after development of this order.