**Specification of Laser Shaft Alignment System:**

1. Application: Alignment of shafts of two or more equipments ( e.g., Motor, Gearbox, Compressor, Turbine, Pump, etc.) in a train -- on base-frame, on the test bed or at site.
2. Range of Shaft diameters : Ø20-450 mm.
3. All necessary mounting and clamping accessories, V-fixtures, brackets, chains, magnetic bases/fixtures, etc., suitable for the above shaft diameter range shall be supplied. These accessories shall allow the laser beams to clear off shaft end/coupling flange diameters upto Ø1000 mm.
4. Accessories, brackets, fixtures, chains, magnetic bases, etc., for mounting on shaft ends/coupling flanges of diameters Ø451-1000 mm to be quoted as an option.
5. Laser safety class: Class 2.
6. Laser output power: < 1 mW.
7. Resolution of Measuring Units/Receivers: (a) Linear: 0.001 mm or better, (b) Angular: 10 Micro Radians or better.
8. The laser alignment system shall have no influence from ambient light.
9. The display unit shall have Back-lit LCD display.
10. Storage memory: The system shall be able to save 500 shaft alignment measurements or more in the display unit .
11. RS232 port for printer and PC connection.
12. The equipment shall be operable with Single phase 230 V +10%/-15% and 50 Hz +/- 3 Hz AC power supply.
13. The equipment shall also be operable with Rechargeable battery power supply.

    (a) 1 No. Rechargeable battery, with minimum 8 hours battery backup, shall be supplied.

    (b) 1 No. matching Battery Charger 230V shall be supplied.

14. Weight of the complete system: 15 Kg (maximum).
15. Carrying Case shall be provided.
16. The system shall be capable of Graphical and live (dynamically changing) display of Alignment results:
    i. Centre Offset Value,
    ii. Angular error,
    iii. Shim values & horizontal moves needed for proper alignment.
    iv. Alignment corrections shall be visible live on the display as they are being made.
17. The system shall guide the user step-by-step through the whole measurement procedure.
18. The system shall be capable of printing out customized alignment reports.
19. The system shall be capable of exporting measurement data and pictures to Laptop PC for preparing reports.
20. The system shall be capable of Soft Foot Check and shall show which foot should be corrected (if necessary).
21. The system shall be capable of compensation for thermal growth.
22. Temperature range: 5-45$^0$ C

23. Laptop PC suitable for shop-floor environments shall be supplied: The minimum configuration of the Laptop PC shall be:
    i. Pentium Processor 2.0 GHZ
    ii. 1 GB RAM
    iii. 80 GB Hard Disk
    iv. Screen Display Resolution 1024 x 768 Pixels
    v. Wireless network card
    vi. LAN Port
    vii. USB Ports
    viii. 2 GB Pen Drive (1 No.)
    ix. Windows XP Professional Operating System
    x. Laser Printer

24. Commissioning to be done at BHEL.

25. Training for a period of six days in operation & maintenance.
26. The supplier should have supplied minimum of three Laser Shaft Alignment Systems of the same model in past three years. Performance certificates for satisfactory working over past three years for minimum three Laser Shaft Alignment Systems shall be furnished.
27. If such an equipment has been supplied to any of the units or regions of BHEL, the equipment (s) must be working satisfactorily for past six months. Performance certificate(s) for satisfactory working of these equipment (s) over past six months shall be furnished.
28. Spares and consumables for five years' trouble-free operation shall be quoted.
29. Warranty for two years shall be provided.