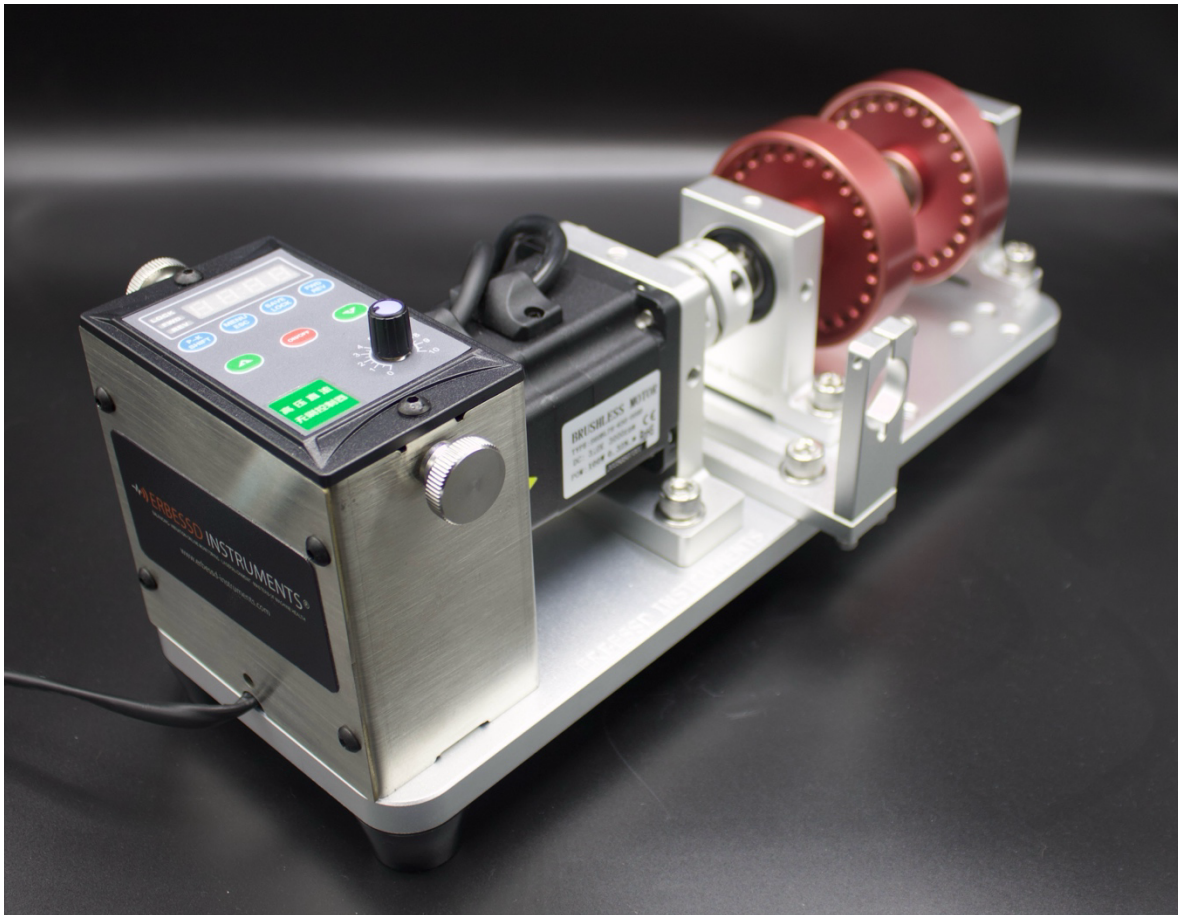
ERBESSD INSTRUMENTS®

BALANCING - VIBRATION - ONLINE MONITORING - LASER ALIGNMENT - MASTERS OF MACHINE HEALTH

EI-TSIM3

Erbessd Solution Simulator - LITE



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Safety Precautions

Consistently following safety precautions helps prevent accidents and avoid potential hazards.

- Before connecting to the power supply, check if the power cable is damaged. After connecting to the power supply, check if there is smoke or a short circuit. If any of the above occurs, immediately replace the cable.
- Do not operate any switch knobs with wet hands to prevent electric shock
- Keep all body parts away from rotating components while the device is operating. To prevent injury, long hair should be securely tied back or covered with a cap to avoid entanglement in the equipment.
- Before changing any equipment accessories, ensure the machine has come to a complete stop. Only then should you open or access any related components.
- Only authorized personnel are permitted to open the control cabinet. Unauthorized access is strictly prohibited.
- If an accident occurs during operation, immediately shut off the machine.

1. Operating Procedures for Vibration Testing Bench

1.1. Before Startup

1. Check the control panel to ensure that the speed control knob switch button is turned counterclockwise to the off position.
2. Manually rotate the equipment to check for any signs of jamming or restricted movement If any issues are detected, inspect each component individually to identify and resolve the cause.
3. Inspect all screws on the equipment's components to ensure they are securely tightened.

1.2 Test the Machine

1. Slowly turn the adjustment knob to operate the equipment at low speed. Observe for any unusual vibrations or abnormal noises during operation.

2. Let the equipment run continuously for about one minute and observe any unusual vibrations or abnormal noises during operation.
3. If any abnormal vibrations or noise occur during jogging or short-term operation, stop the machine immediately. Inspect each component individually to identify and resolve the issue before resuming operation.
4. If no abnormal vibrations or noises are detected during testing, the equipment can be operated normally, and the related experiments can proceed.

1.3 Shutdown Procedures

1. Confirm that all components are returned to their original positions and store the faulty parts and related tools.
2. Turn off the power, unplug the equipment, and store it properly.

2. Operating Procedures for Vibration Testing Bench

2.1 Function Description

This experimental platform can simulate the fault states of shafts, bearings, rotors and their bases. 80% of the equipment is made of high-strength aluminum alloy, which greatly reduces the weight of the equipment while ensuring its strength, making it easy to transport. The surface has been treated physically and chemically to enhance the machine's appearance. This equipment is widely used in scientific research, teaching, product development, personnel training, and participating in exhibitions in universities, industrial and mining industries, and research institutions.

1. Can simulate fault characteristics of shafts, bearings, and other components at various speeds, with an adjustable range from 0 to 3000 RPM.
2. The shaft assembly can simulate shaft angle misalignment, mass imbalance, loose mounting base, and bearing failure.

The bearing faults that can be simulated include cracks in the inner ring, damage to the outer ring, defects in the bearing balls, combined bearing faults, and fractures in the retainer.

2.2 Composition and Main Component Parameters

Composition

The EI-TSIM3 vibration testing platform consists of a driving motor, front and rear bearing seats, rotor, sensor bracket, base, and motor controller.

Main Component Parameters

i) Drive Motor
   a) Motor type: DC brushless motor
   b) Motor power: 100w
   c) Maximum Speed: 3000rpm
   d) Speed Control: DC controller

ii) Front and rear bearing seats
   a) Bearing seat material: High quality aluminum alloy
   b) Surface treatment: Anodizing after sandblasting
   c) Sensor installation holes: M6 x 1 threaded, located in both vertical and horizontal directions
   d) The rear seat position is adjustable, allowing installation of a double-rotor cantilever
   e) A matching gasket is placed under the bearing seat when tightening the screw to intentionally introduce a misalignment fault.
   f) It can simulate bearing faults such as outer ring damage, inner ring damage, rolling element cracks, comprehensive faults, and cage fractures.
   g) Bearing model: 6202-2RZ (SKF)

Types	Specifications	Outer diameter	Inner diameter	Thick ness	Ball Diameter	Pitch Diameter	Number of Balls	Contact Angle
Deep Groove Ball Bearing	6202	35mm	15mm	11mm	6mm	25.26mm	8	0°

iii) Rotor
   a) Material: Aluminum alloy
   b) Surface treatment: Anodizing
   c) Installation and fastening method: Spring tube clamp with adjustable position that can be loosened.
   d) Indexing threaded holes M5 quantity: 24, evenly distributed
   e) Size: Φ 80mm x 20mm
   f) Equipped with eccentric rotor, eccentric nominal size: 0.5mm

iv) Sensor Bracket
   a) Material: Steel, aluminum alloy
   b) Surface treatment: Anodizing
   c) Installation thread specifications and methods:
      M6* 1, installed vertically at the motor, installed horizontally, vertically, and 45° at the rotor,
      M20* 1.5 installed horizontally at the rotor

v) Base
   a) Material: Aluminum alloy
   b) Surface treatment: Anodizing
   c) Size: 356mm x 130mm x 14mm

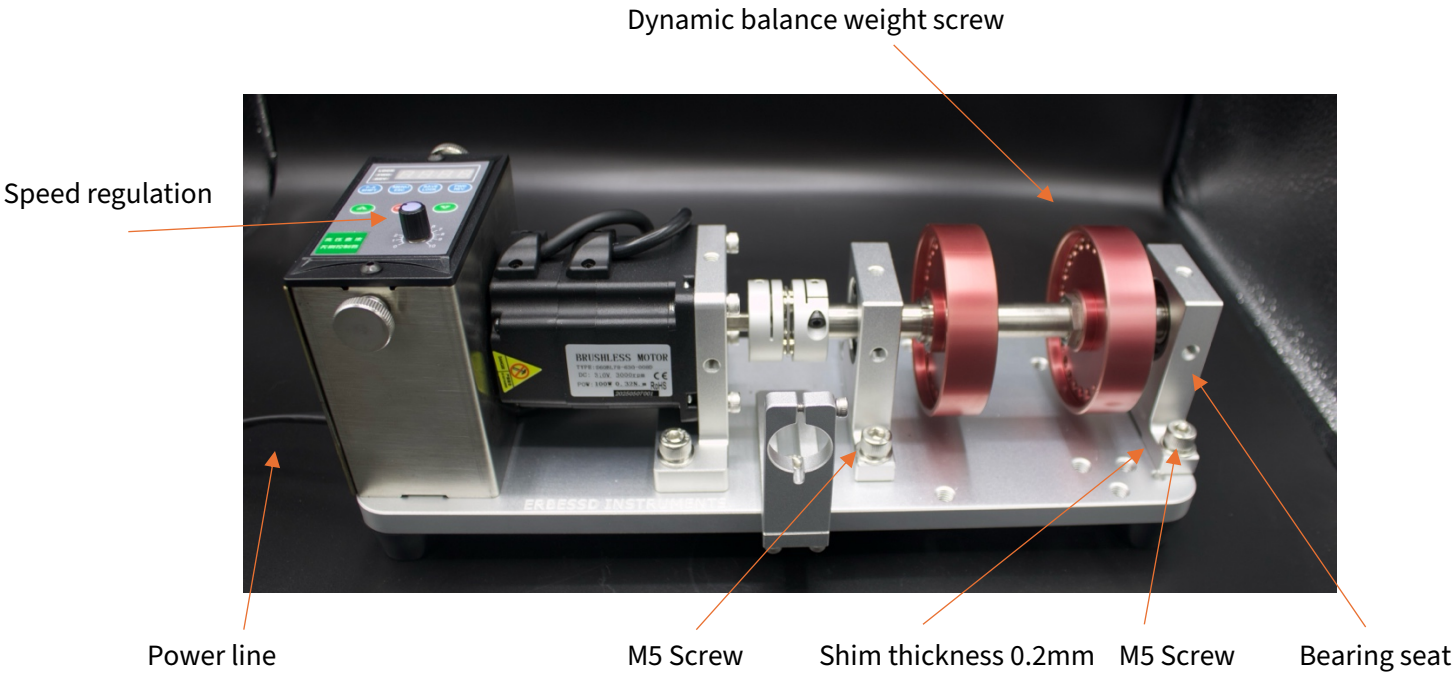
vi) Controller
   a) Adjusting speed with a knob
   b) Adjustable motor forward and reverse rotation
   c) Power supply: single-phase 110-220V, 50-60Hz

3. Simulating Fault States

Attention: The following steps must be performed while the device is TURNED OFF!

3.1 Angle Misalignment Fault Setting

1. Use a matching hex wrench to turn the M5 fixing screw on the bearing seat counterclockwise and loosen it.
2. Select the appropriate gasket from the misaligned gasket storage box, making sure the groove faces the screw, and place it between the bearing seat and the base plate. For angular misalignment, insert a gasket under one bearing seat. For parallel misalignment, place gaskets under both bearing seats, ensuring the thickness is the same. Each gasket is marked with its thickness.
3. Turn the M5 fastening screw clockwise and tighten it on the bearing seat to proceed with the experiment.
4. After the experiment, remove the misaligned gaskets and reset the shaft system to its original state.



3.2 Angle Misalignment Fault Setting

- The faulty bearing is installed inside the bearing seat, with the fault type marked on the surface of the bearing seat

(1) Use a matching hex wrench to turn the two M5 fixing screws on the rear bearing seat counterclockwise, loosen and remove them, then store them properly.

(2) Pull the rear bearing seat away from the shaft.

(3) Remove the faulty bearing seat you want to test, align it with the shaft end, push it into the correct fixed position, then insert and tighten two M5 screws to secure the bearing seat to the base for the experiment.

3.3 Unbalanced Settings

(1) Take the required number of M5 internal hex screws and washers from the quality screw storage box.

(2) Fix the screws and washers to any threaded holes on the rotor and tighten them. The spring pad is placed between the flat pad and the screw, which can prevent loosening to a certain extent.

(3) After the experiment, promptly remove the mass block and return it to the storage box.

3.4 Tightening, Moving, and Dismantling of Rotors

- The rotor is secured to the shaft using a spring collet and collet nut. To disassemble, loosen the nut with a special wrench.

(1) Use a specialized barrel clamp nut wrench to turn the nut counterclockwise. After loosening it for several turns, the rotor can be moved or removed from the shaft.

(2) After positioning the rotor where desired, tighten the nut by turning it clockwise with a wrench.

3.5 Setting of Cantilever Axis

(1) Follow the steps in section 3.2 to remove the rear bearing set
(2) Follow the steps in section 3.4 to loosen the cylinder clamp nut and remove the rotor.
(3) Align the rear bearing seat with the shaft end, push it into the cantilever shaft's installation position, and then tighten the bearing seat using the removed screws.
(4) Align the removed rotor with the shaft end and slide it into its position on the shaft, then tighten the barrel clamp nut.

3.6 Replacement of Eccentric Rotor (Red Rotor Disc)

(1) Follow the steps in section 3.2 to remove the bearing seat
(2) Follow the steps in section 3.4 to loosen the cylinder clamp nut and remove the rotor. At the same time, remove the tension clamp sleeve from inside the standard rotor.
(3) Remove the red eccentric rotor, install the tensioning sleeve into the inner hole of the rotor disc, place it onto the corresponding position on the shaft, and tighten the cylinder clamp nut.

4. Motor Control

4.1 LED Indicator Lights

(1) LOCK: Multi-functional indicator light
(2) FWD: Forward running/stopping indicator light.
(3) REV: Reverse operation/stop indicator light.

4.2 Button Introduction

(1) SHIFT/SAVE: Long press the SHIFT/SAVE button for 3 seconds. When the device is powered on, pressing the SHIFT button will cycle through the display of temperature, current, voltage, and speed.
(2) FWD/REV: Motor forward/motor reverse button
(3) MENU: Long press the button for 3 seconds to enter the menu settings.
(4) ▲: Data plus buttons.
(5) ▼: Data reduction button.
(6) RUN/STOP: Start/stop button.

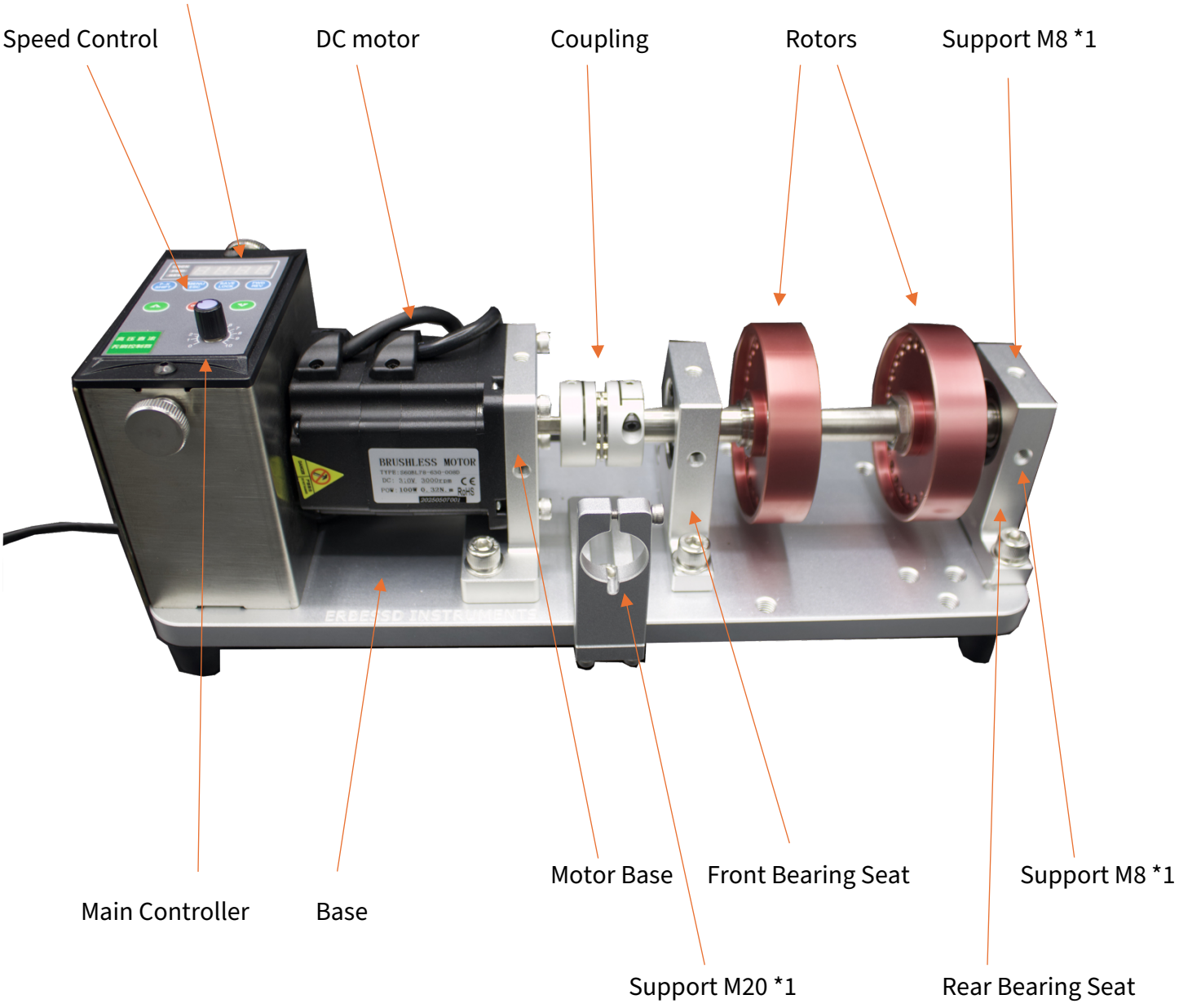
4.3 Knob Switch

(1)Rotate clockwise to manually increase speed.

(2)Rotate counterclockwise to manually decrease speed.

5. Appendix

5.1 Overall Diagram of the Vibration Testing Platform



5.2 Overhaul Manual

Serial Number	Project Content	Maintenance cycle	Measure
1	Normal operation of the motor	At the beginning of the experiment	Repair or replace if not operating
2	Installation of each module	At the beginning of the experiment	Ensure all screws are tightened
3	Experimental platform	At the end of the experiment	Perform cleaning and dust-proofing

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Mechanical Fault Simulation System

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