

**RotMach s.r.o.**

Podvinný Mlýn 1418/2, 190 00 Praha 9

+420 602 573 975

info@rotmach.com

linkedin.com/company/rotmach

**VIBROSTANDS FOR TRAINING,  
MACHINE LEARNING AND R&D**



[www.rotmach.com](http://www.rotmach.com)



Many organizations such as rotating machinery service companies, end users and machinery manufactures need a deep understanding of rotating machinery vibrodiagnostics. Various machine failures can occur in service and vibrodiagnostics is well established tool to identify these. RotMach Vibrostand helps to understand vibration patterns and fault specific symptoms of rotating machinery.

## ROTATING MACHINERY TRAINING

RotMach vibrostands offer an excellent, cost effective and safe tool to gain a hands-on experience with rotating machinery vibrations. Vibrodiagnostics and machinery personnel can be trained in rotor balancing and vibrations patterns associated to various component failures. And it all takes place in home workshop, without pressure of maintenance or production time schedule and a risk of compromising the expensive machinery.

## MACHINE LEARNING APPLICATIONS

To learn effectively for machine learning algorithms like neural networks there has to be a large amounts of input data. Vibrostand can be used to generate real world data that authentically represent the faults of large rotating machinery. Various kinds of machinery faults can be simulated and its vibration pattern generated on a compact size machine in a controlled laboratory environment.

## VIBROSTAND DESIGN

Special attention has been focused on user-friendly design. Roller bearings are mounted on a shaft via tapered adapter sleeve and locking nut. Change of roller bearing or adjustment of bearing span is a matter of minutes. Rotor speed is controlled by variable speed drive with LCD display. Upon request, customer specific motor driver can be installed.

Our vibrostands consist to a large extent of standard market available, CE approved components. Spare parts are readily and widely available. Tailor made components are manufactured under strict quality control, based in RotMach's long term experience in rotating machinery manufacturing.

## SENSORS AND DIAGNOSTICS

Our vibrostands can be equipped by range of third-party sensors from temperature and absolute vibration sensors up to eddy current probes monitoring the relative shaft positions. Probe mounting locations are compatible with mainstream market sensors. Upon request, we can deliver vibrostands with pre-installed sensors based on customer specification.



# SIMULATED ROTATING MACHINERY PHENOMENA

Various vibrostands configurations enable users to generate and study various rotating machinery phenomena, damages and associated vibration patterns. Sensitivity of many effects on unbalance, rotor mass, bearing span, bearing preload, oil pressure etc. can be observed.

## Rotor unbalance

Disc on rotors allow for single or multiple planes unbalance introduction. Unbalance is added by a set of added weight (M5 screws) to provisions on discs. Effect of unbalance on 1x response can be observed.

## Roller bearing faults

Set of damaged bearings can be supplied: damaged outer race, inner race and rolling element. Bearings faults can be simulated and vibration patterns observed.

## Bearing load

Load bearing pedestal allows for mechanical induced radial bearing loading. Load is created by tightening the preload bolt. Bearing load is optionally available for both radial and hydrodynamic bearings.

## Critical speeds

On high-speed shaft with hydrodynamic bearings critical speeds can be passed. The frequency and amplitude response of critical speeds can be altered by bearing span and using different weights. Effect of disc location and unbalance can be studied.

## „Loose feet“

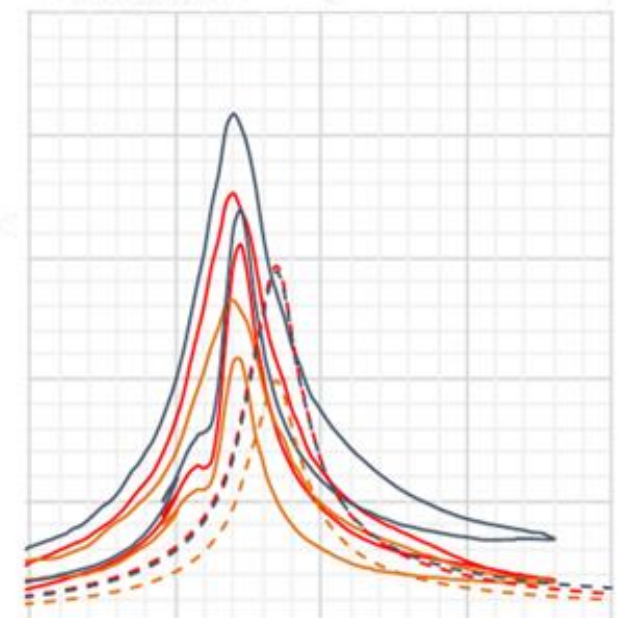
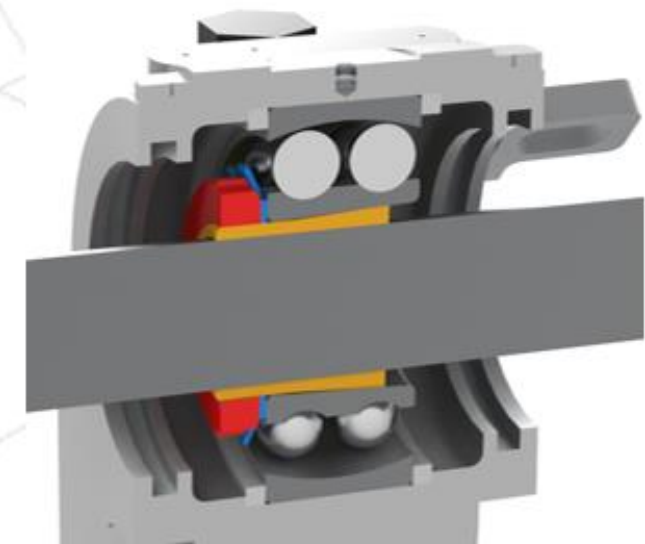
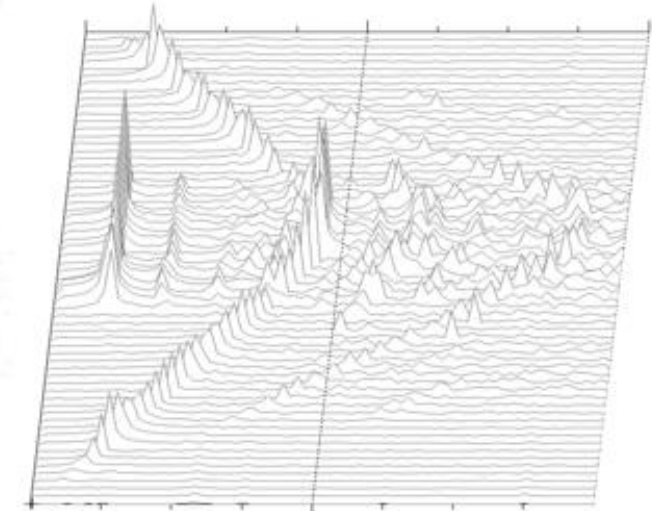
By loosening a connection bolt between frame and bearing pedestal a „loose feet“ can be simulated.

## Belt misalignment

By adjusting shaft/ pulley position a misaligned belt drive can be simulated.

## Gearbox tooth damage

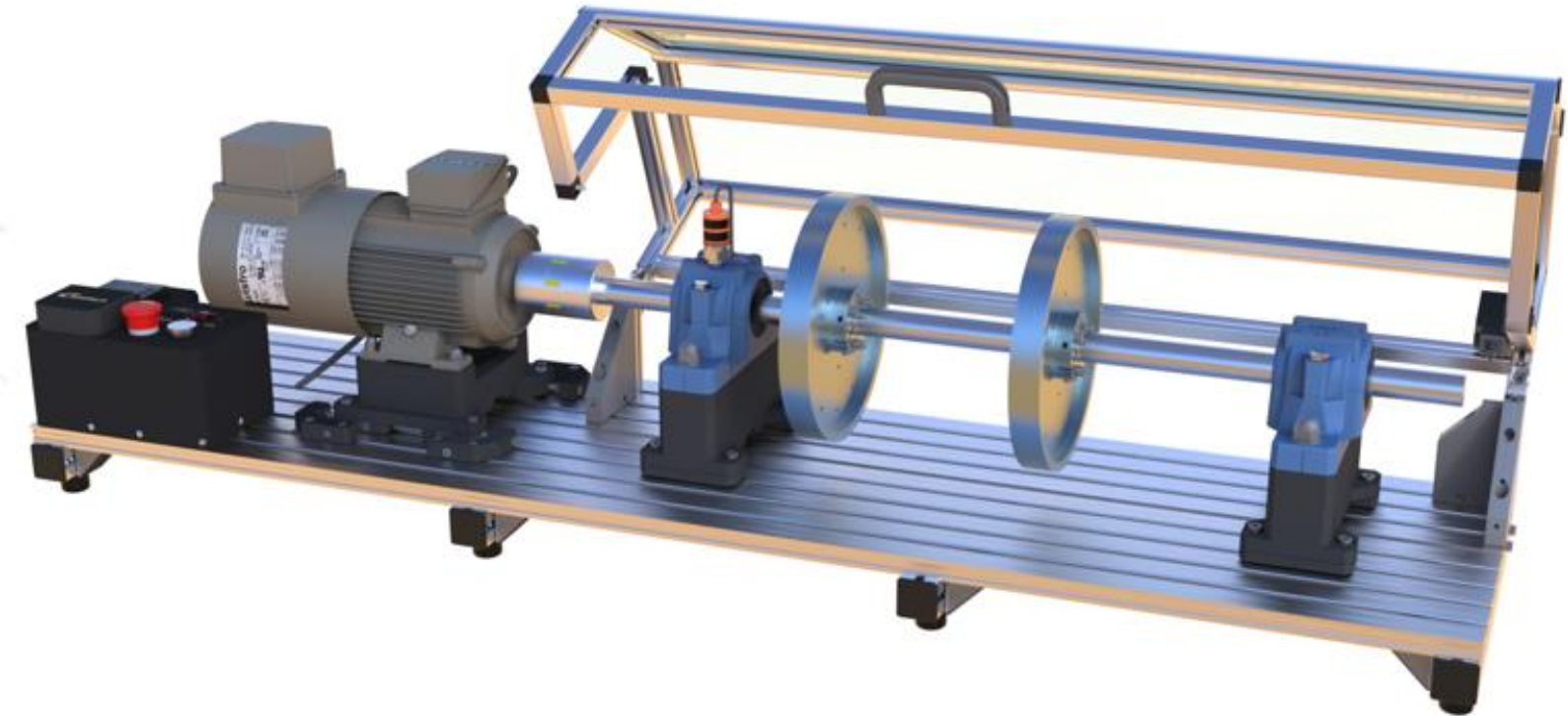
Set optionally include spare gearbox with missing tooth. Vibration spectra of fault gearbox can be investigated.



# VIBROSTAND TYPICAL MODELS

## Easy

For training rigid rotors balancing



### DESCRIPTION

- Basic model with one shaft supported on roller bearings
- AC electric motor with variable speed drive
- Adjustable bearing span
- Designed for practicing unbalance in one or multiple planes and roller bearing's damages

### MAIN COMPONENTS

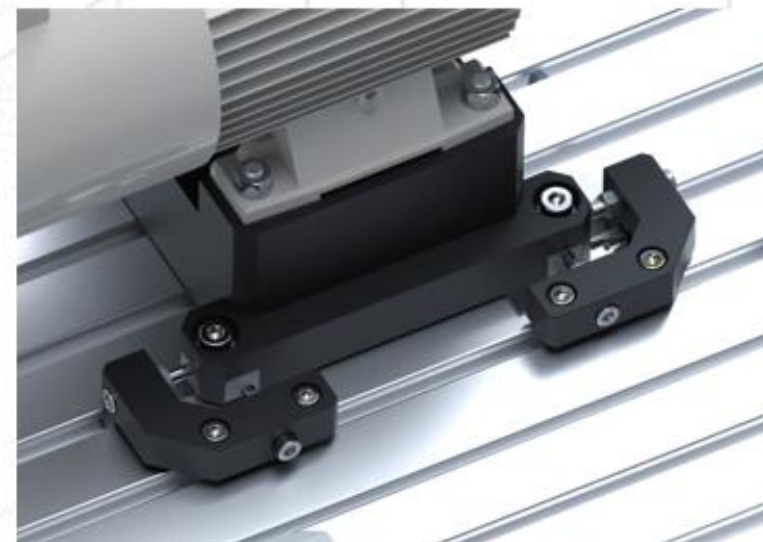
- Aluminum base frame
- Motor, variable speed drive with LCD display
- Shaft speed 50~ 5 000 RPM
- Industrial flexible coupling
- Stainless steel shaft supported on 2 pedestals with rolling element bearings
- Removable and position adjustable zinc coated steel discs with balancing provisions

### SENSOR PROVISIONS

- Provisions on both bearing pedestals for absolute vibration sensors (2 surfaces in radial directions on each pedestal)
- 1x bracket for phase sensor

### SAFETY FEATURES

- tilting cover with end stop switch, main kill switch,
- **circuit with bearing pedestal vibration level monitoring with automatic machine shutdown**



Industrial style motor alignment option  
with jacking bolts and shims.



SKF Industrial bearing, tapered  
sleeve and housing set



## Medium

Advanced model with belt drive, gearbox and 3<sup>rd</sup> bearing preload

### DESCRIPTION

- stationary type for training rooms, universities (unbalance, misalignment, bearing damage , bearing loading)
- also suitable for technical research (algorithms for automated vibrodiagnostics)
- Advanced model adding 3<sup>rd</sup> bearing pedestal and gearbox driven by a belt drive
- A gear mesh and belt errors can be simulated
- 3<sup>rd</sup> bearing pedestal for mechanical preload of the bearing in radial direction

### MAIN COMPONENTS

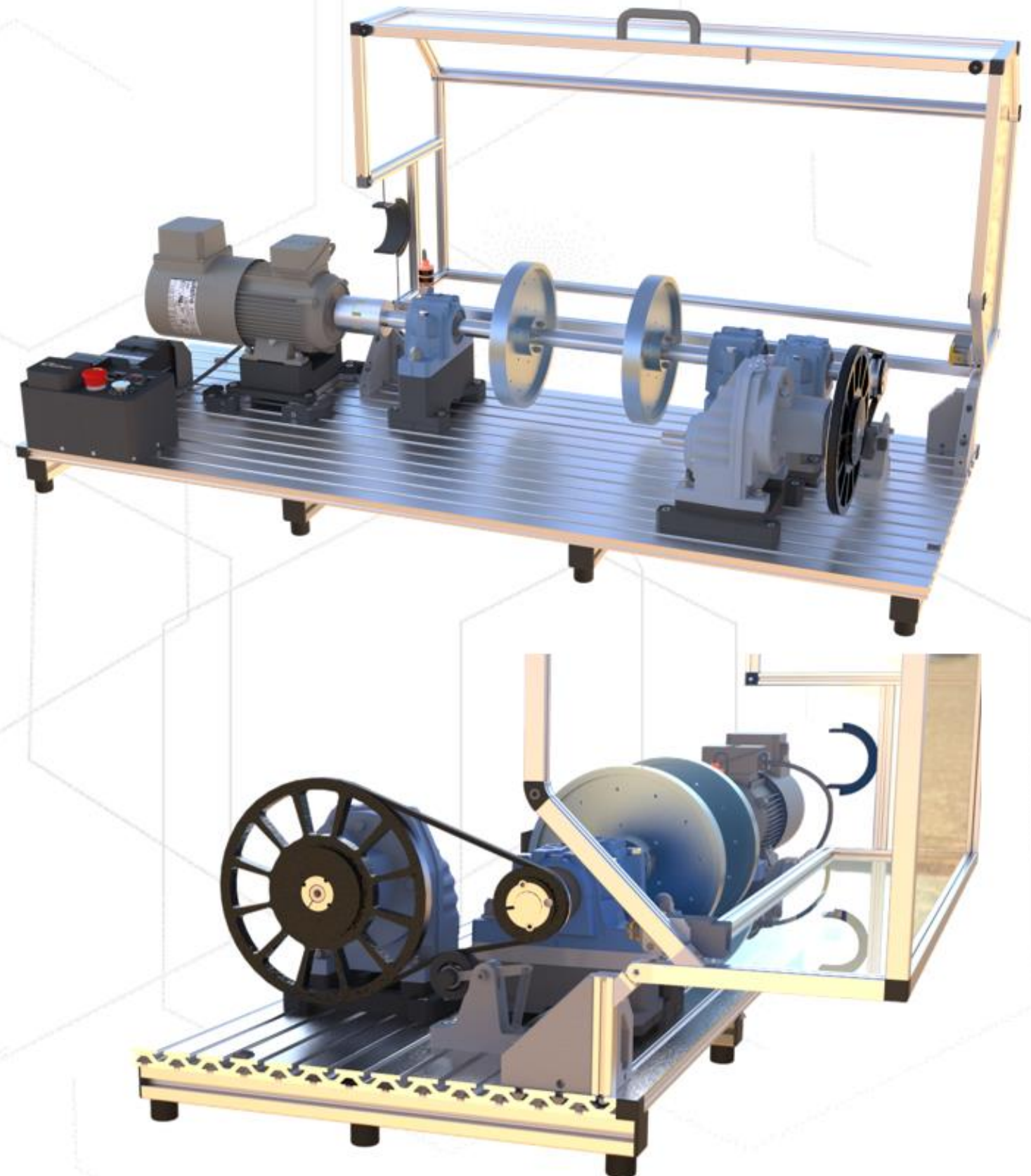
- As model Easy, plus additionally:
- 3<sup>rd</sup> radial bearing pedestal with bearing preload system
- Belt drive 1:3 with automatic tensioner
- 2x spur gearbox, optionally with missing gear tooth

### SENSOR PROVISIONS

- As model Easy, plus additionally:
- Provision for loaded bearing temperature sensor

### SAFETY FEATURES

- tilting cover with end stop switch, main kill switch
- **circuit with bearing pedestal vibration level monitoring with automatic machine shutdown**



Gearbox, belt drive with automatic tensioner , bearing pedestal with mechanical preload.



## Max

High end model for training high speed rotor dynamics with sleeve bearings

### DESCRIPTION

- High end model adding an extra high-speed shaft equipped with hydrodynamic bearings
- Critical speeds and effect of bearing span, unbalance can be studied on a high-speed shaft

### MAIN COMPONENTS

- As model Medium, plus additionally:
- Second, high speed shaft driven by belt
- max speed ~7 000 RPM
- Hydrodynamic bearing pedestals with sleeve bearings
- Lube-oil unit with electric pump, tank, filter and pressure control valve

### SENSOR PROVISIONS

- As model Medium, plus additionally:
- Provisions for relative vibration sensors, 2 on each of the high-speed bearing pedestals
- Provisions for hydrodynamic bearing temperature sensors

### SAFETY FEATURES

- tilting cover with end stop switch, main kill switch
- hydrodynamic bearing temperature switch with automatic machine shutdown
- **circuit with bearing pedestal vibration level monitoring with automatic machine shutdown**



# TECHNICAL SPECIFICATIONS

Listed technical specifications are for typical configurations. Cusomter individual request configurations can be specified or custom designed.



Model	Easy	Medium	Max
			
Power - driver	0.75kW		
Voltage	230V, 50Hz		
Total mass (approx.)	~80 kg	~115 kg	~185 kg
Outer dimensions (approx.)	1 500 x 350 x 400mm	1 500 x 600 x 450mm	1 500 x 600 x 450mm
Shaft speed	approx. 50 - 5 000 RPM, Variable Speed Drive		~7 000 RPM, VSD
Number of shafts	1	1	2
Shaft diameter	30mm	30mm	2x 30mm
Number of discs	2	2	4
Roller bearings	2x	3x	3x
Roller bearing preload		1x	1x
Hydrodynamic bearings			3x
Gearbox		yes	yes
Belt drive		1x	2x
Pressure oil lub unit			yes



# CUSTOMIZATION & INDIVIDUAL SOLUTIONS



High level of various customizations is possible. On customer request a specific configuration of fully custom test stand can be designed.

Photo on the right presents ultra low speed modification of Vibrostand medium with dual belt and single gearbox ratio. This setup allows to achieve stable run with 3 RPM on main shaft.



Based on years of hands-on experience with rotating machinery, RotMach is ready to extend the vibrostands with components like compressors, pumps etc. upon a customer request.

Image on the right shows individual ultra high speed (47 000 RPM) test bed for testing tilting pad hydrodynamic bearings and integrally geared Compressors rotordynamics.

