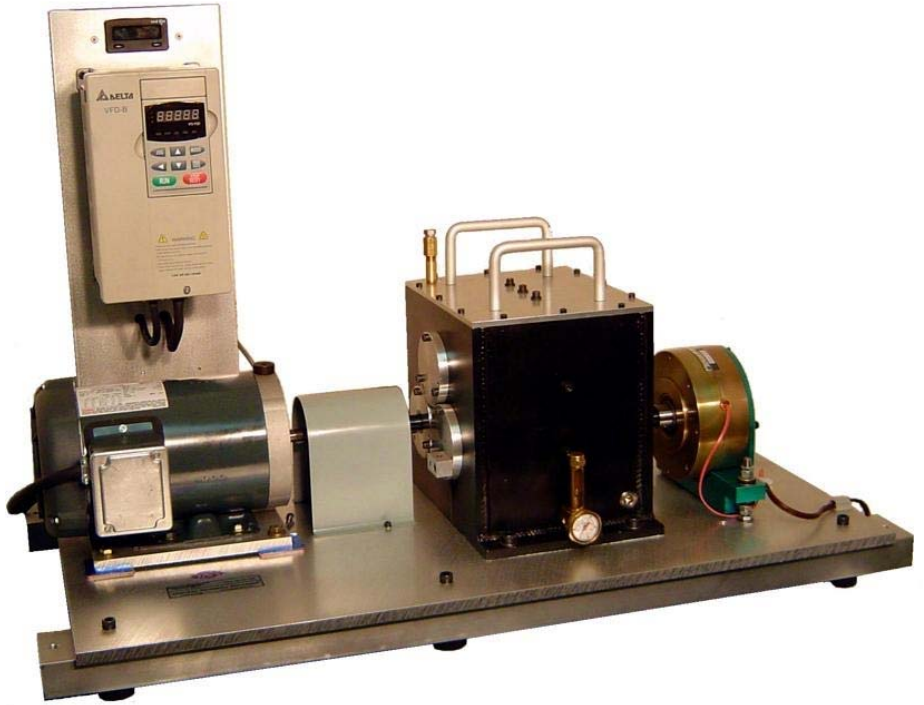
Gearbox Diagnostics Simulator

The Perfect Tool for Gearbox Dynamics Studies



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Gearbox Diagnostics Simulator

- Specifically designed to simulate industrial gearbox for experimental and educational purposes.
- 2 stage parallel shaft gearbox with rolling bearings and a magnetic brake.
- All elements of the GDS have been designed to investigate gearbox dynamics and acoustic behavior, health monitoring, vibration based diagnostic techniques, lubricant conditioning or wear particle analysis.
- It is robust enough to handle heady loads and spacious enough for easy gear placement, setup, and installation of monitoring devices.
- The two-stage parallel shaft gearbox can be configured as to reduce or increase the gear ratio.
- The effect faults like surface wear, crack tooth, chipped tooth and missing tooth can be demonstrated on either spur gears or helical gears.
- Rolling element bearing faults like inner race, outer race, ball damage can also be incorporated.
- Adjustable clearance to study backlash is possible

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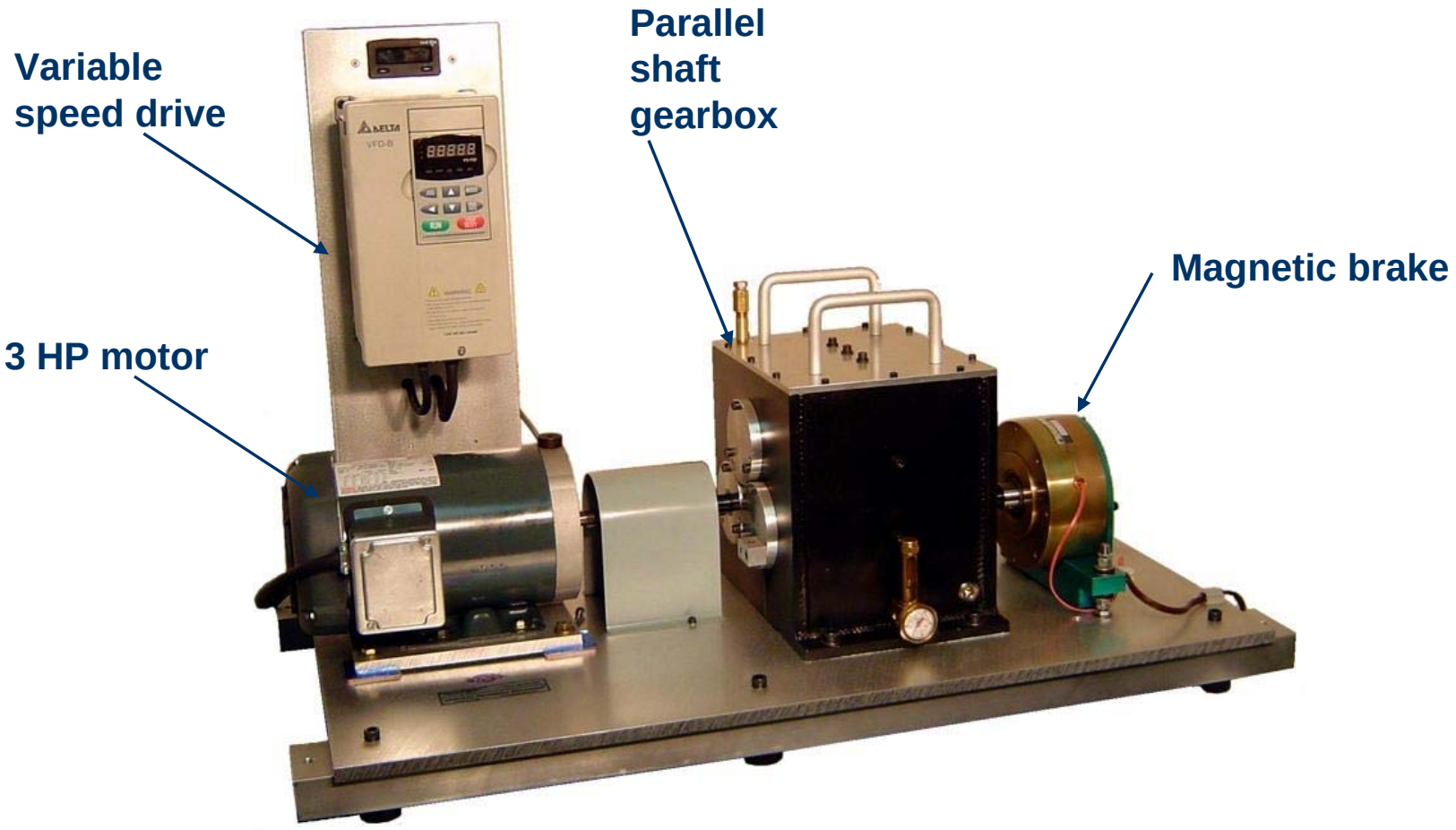
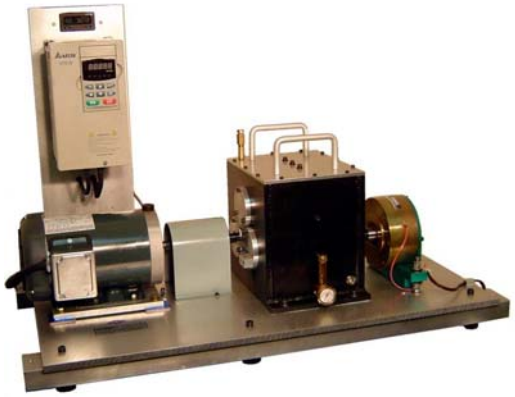


GDS Features

- Gears can slide along the shafts to alter system stiffness and make room for additional devices.
- Adaptable to spur or helical gears.
- Intentionally damaged or worn gearing can be fitted to study the effects on vibration signature.
- Alterable backlash by replacing bearing mounting hubs to provide the desired clearance.
- Modular design makes the introduction of faulted bearing and/or faulted gears an easy task.
- Multiple mounting locations provided for installation of various transducers.
- Develop diagnosis techniques and advanced signal processing methods.
- Torsional variable speed loading.
- Additional devices may be mounted instead of the brake.

Basic GDS

- 3 HP variable frequency AC drive with multi-featured front panel programmable controller
- 3 Phase 3 HP motor, pre-wired self-aligning mounting system for easy installation/removal
- Built-in Tachometer with LCD Display and analog output for DAQ purposes
- Three in-line parallel shafts configurable as single or two stage reducer/increaser
- Four spur gears to obtain two gear mesh frequencies
- Six rolling element bearings
- Magnetic break for gearbox loading
- Precision machined bearing housings at both ends of the gearbox with mountings for direct measurements of bearing vibrations
- Gearbox oil level gauge
- Vibration isolators mounts and base stiffener



Option Kits

- SpectraQuest offers a complete array of option kits enabling detailed investigations of particular and more advance vibration phenomena or machinery faults.

Bearing fault kit	G-BFK-1
Defective spur gears	G-SDG
Helical gears set	G-HG
Defective helical gears	G-HDG
Eccentric Spur Gear	G-ESG
PC motor control kit	G-PCK
Shaft encoder	G-ENC

Parallel Gearbox Bearing Fault Kit (G-BFK-1)

- Learn waveform and spectra of classic bearing defects.
- Learn about signal processing issues such as averaging techniques, leakage, and spectral resolution on determining bearing faults.
- Perform experiments with increasing severity of defects.
- Determine why an ultra-high resolution spectrum is needed to diagnose a bearing fault when fault frequencies are located close to multiples rotational speed.
- Learn how a large signal can mask adjoining low amplitude signal due to spectra leakage.
- The kit consists of one inner race defect, one outer race defect, one with ball defect, and one combination of defects.

Defective Spur Gears (G-SDG)

- Study the effect of damaged tooth in gearboxes.
- Apply phase demodulation signal analysis to detect gear damage.
- Investigate backlash between mating gears.
- The kit consists of one missing tooth gear, one chipped tooth gear, one root

Eccentric Spur Gear (G-ESG)

- Study the effects of eccentric spur gear.
- Measure the vibration signature of eccentric gears.
- The kit consists of one eccentric spur gear.

Helical Gears Set (G-HG)

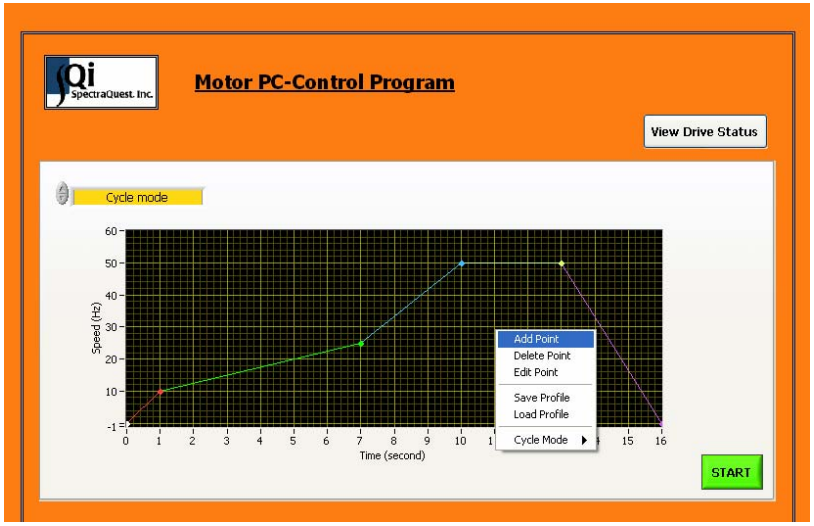
- Study the helical gears parallel shaft gearbox.
- Compare vibration signature between spur and helical gears.
- The kit consists of four helical gears to replace standard spur gears in gearbox

Defective Helical Gears (G-HDG)

- Study the effect of damaged helical gears.
- Apply phase demodulation signal analysis to detect gear damage.
- The kit consists of one gear with chipped tooth and one gear with missing tooth

PC Motor Control Kit (G-PCK)

- Operate DDS from remote location.
- Pre-program speed acceleration, deceleration, and length of run to meet exact requirements.
- The kit consists of PC software, one interface module to motor drive and cables.



Shaft Encoder (G-ENC)

- Measure transmission error in the gearbox by comparing input and output rotation.
- The kit consists of one 360 pulse per revolution encoder and once per revolution index

Specifications

Electrical	
Motor	3 Phase, 3 HP motor, pre-wired self-aligning mounting system for easy installation/removal
Drive	3 HP variable frequency AC drive with multi-featured front panel programmable controller
RPM range	0 to 5000 rpm variable speed
Tachometer	Built-in tachometer with LCD display and one pulse per revolution analog TTL output for DAQ purposes
Voltage	230 VAC, Single phase, 60/50 Hz
Mechanical	
Shaft Diameter	1” diameter; Turned, Ground, & Polished (TGP) steel
Parallel Shaft Gearbox	2 stage, 2.5 maximum ratio per stage, spur or helical gears
Bearing	Deep groove ball bearing
Magnetic Brake	4-220 lb.in capacity magnetic particle brake
Foundation	1/2” (12.7 mm) die cast aluminum base, base stiffener and eight rubber isolators
Physical	
Weight	Approximately 200 lb
Dimensions	L=39” (100cm), W=20” (50cm), H=24” (60cm)