Gearbox Dynamics Simulator (GDS)

An optimum device for research and development in gearbox diagnostics and dynamics studies.

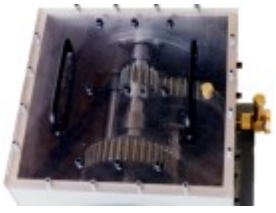
SpectraQuest's Gearbox Dynamics Simulator (GDS) has been specifically designed to simulate industrial gearboxes for experimental and educational purposes. It is robust to provide appropriate stiffness and sufficiently spacious for ease of gear placement, setup, and installation of monitoring devices. This model simulates a standard single stage, parallel shaft, helical gear reducer or increaser depending upon configuration.

Set of Helical Gears in Oil

Features

- Gears can slide along the shafts to alter system stiffness and make room for additional devices.
- Adaptable to different gear styles.
- Bearing assemblies may be set up for either sleeve or rolling element simulation.
- Backlash can be altered by replacing bearing mounting plates to provide the desired clearance.
- Increasing the amount of backlash is without major consequence (other than increased noise and rotational play).
- Reducing it can result in binding and/or excessive operating temperatures.
- With sleeve bearings, the axial movement of the shafts is determined by the thickness of the thrust spacers located between the shaft and sleeve bearing at each end of both shafts.
- Intentionally damaged or worn gearing can be fitted to study the effects on vibration signature.
- Lids: metal lid with 1/4-28 proximity probe holes, and clear LEXAN® lid for viewing moving parts inside gearbox.
- The output shaft is connected directly to a magnetic brake to provide constant system loading.
- Additional devices may be mounted to the brake or in its place.

Magnetic Brake/Clutch



Gearbox with LEXAN® cover

Design of Gearbox Dynamic Simulator (GDS)

The **SpectraQuest, Inc.** Gearbox Dynamic Simulator (GDS) has been specifically designed to simulate industrial gearboxes for experimental and educational purposes. It is robust to provide appropriate stiffness and sufficiently spacious for ease of gear placement, setup, and installation of monitoring devices. Double and single reduction, parallel shaft reducer/increasers are available.

1. The gearbox is driven by a 3 hp. induction motor with inverter speed control for an input speed range of 0 to 4,000 rpm. The inverter can be programmed for higher speeds, but care must be exercised to assure proper lubrication and temperature control. The inverter is initially programmed to permit simple start/stop and scrolling to different speeds measured in hertz (revolutions per second); however, it may also be set up to permit PLC control.

2. The gearbox is fitted with 1/4-28 threaded holes for proximity probe placement at 90 degrees to the input and output shafts. Surface mount transducers can be installed on the casing by applying Loctite 401 adhesive to threaded mounting disks to affix them to the desired locations. The disks can be removed by tapping the side of the disks with a hammer.

3. Input, output, and intermediate shafts can be provided with continuous key slots or none per customer requirements.

4. The gearcase is fitted with numerous ports for lubricant level adjustment, internal monitoring devices, cooling coils, pressure lubrication, etc. Under normal circumstances, the case is filled to approximately 1/3 of the height of the lowest gear with 90-weight SAE gear lubricant.

5. The bearings assemblies can be set up for either rolling element or sleeve simulation depending on the customer's requirements.

6. The output shaft is connected directly to a magnetic brake to provide constant system loading. As a rule, increased load produces greater vibration amplitude, thereby making any gear defects easier to discern.

Bearing Mount
Backlash can be altered by replacing the bearing mounting plates with ones precisely machined to provide the desired clearance. With sleeve bearings, the axial movement of the shafts is determined by the thickness of the thrust spacers located between the shaft and the sleeve bearing at each end of both shafts.

View of three Gears
Either a metal lid with 1/4-28 proximity probe holes or a clear Lucite lid can be fitted to the top of the gearcase.

View of Lubrication
The gears can be slid along the length of the shafts to alter the system stiffness and to make room for any additional devices. Different gear styles, such as spur, can also be fitted. Intentionally damaged or worn gearing can also be fitted to study the effects on vibration signature.

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