

Reduced Gravity Simulation Load Cell

Industry: Aerospace

Summary

Customer Challenge

Develop a system to provide a full range of natural motion for a realistic simulation of reduced gravity environments. The system can simulate future missions to the moon, mars, asteroids, or any other celestial destination. The simulated weightlessness can train crew how to handle a wide range of microgravity activities, including walking, running, and jumping. The system can also be used for surface operation studies, suit and vehicle development, robotic development, and mass handling studies.

Interface Solution

The 1100 series load cell is installed in-line with a steel support cable to actively measure the vertical load on the system. A control system, (which includes the 9870 High-Speed High Performance TEDS Ready Indicator), monitors the load cell output and continuously offloads a portion of a human or robotic payload weight during all dynamic motions.

Results

Using the precise feedback from the load cell, the control system is able to command a motor to raise or lower the subject to maintain a constant offload force. During the simulation, the system actively compensates for the movement of the subject to accurately reproduce a microgravity environment.

Materials

- 1100 Ultra Precision Load Cell
- CLV-101 Heat Treated Steel Clevis
- 9870 High-Speed High Performance TEDS Ready Indicator

How It Works

1. The 1100 series load cell is installed in the vertical axis steel cable.
2. The subject and simulation exercise are loaded into to system.
3. The load cell naturally reacts to the continually changing loads on the cable.
4. The control system (which includes the 9870 High-Speed High Performance TEDS Ready Indicator), monitors the output of the load cell.
5. The motors are commanded to raise or lower the subject as it runs the simulation.
6. The subject experiences the sensation of microgravity.

