



Real-Time Balancing Solutions for the Aerospace & Defense Industry

LORD
AskUsHow™

LORD balancing systems are designed to correct imbalance in all conditions without manual balancing. Unlike traditional “off-line” balancing techniques which require the equipment to be stopped and often disassembled while corrections are made, LORD balancers monitor and correct imbalance in real-time.



Our systems are comprised of sensors, a controller and a fail-safe balancer. The balancer is installed permanently onto the rotating shaft while the sensors continuously monitor vibration levels. When an increase in vibration is detected above a pre-determined level, the controller instructs the balancer to make an automatic balance correction.

Balance adjustments can be made during start-up, normal operation and/or shutdown, depending on the needs of the application. Often times, balance conditions can change in real-time depending on the environment. For example, a propeller sees different balance conditions on the ground versus during flight maneuvers; therefore, on-ground balancing never fully corrects for flight conditions.

In addition, the system can provide diagnostic information to predict system health and optimize service outages. This data can be tied into other health-usage monitoring systems (HUMS) or can be stored on the controller for use in preventative maintenance.

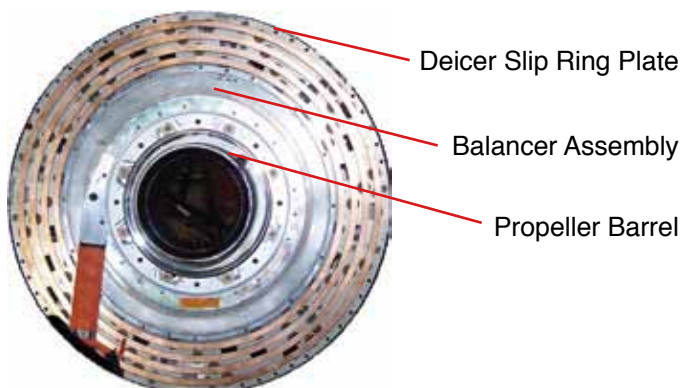
System Benefits:

Lower Maintenance Costs: Eliminates the labor, material and fuel costs associated with manual balancing. Unlike manual balancing, the system minimizes vibration throughout the aircraft or system in all operating conditions, which in turn reduces on-board equipment fatigue.

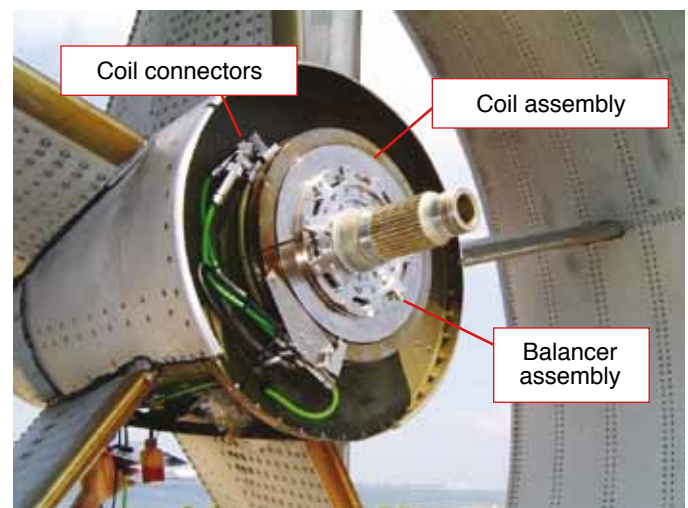
Efficient: Decreases vibration up to 10-20 times with negligible power consumption; makes corrections in seconds.

Reliable and Fail-Safe: Proven reliability in hundreds of high-speed applications in harsh environments; a power interruption or controller shutdown leaves the balance correction at its latest optimal value.

Enables Advanced Diagnostics: The LORD balancing system can be used to provide prognostic health management (PHM) and diagnostic information to maintenance crews.



LORD In-flight Propeller Balancing System (IPBS)

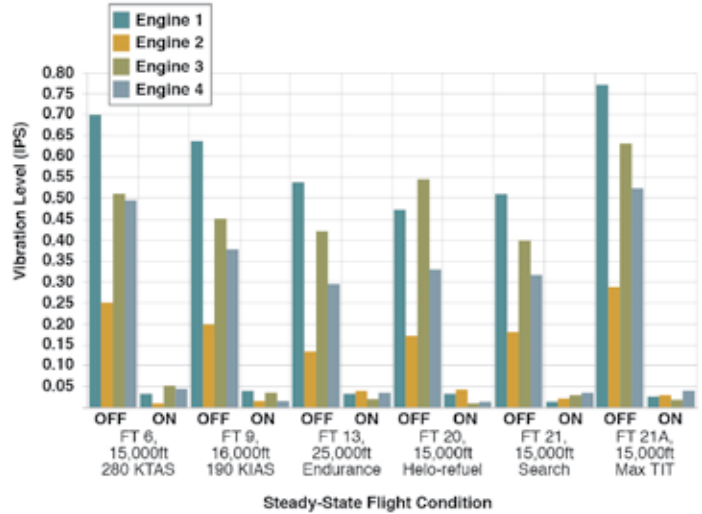


LORD balancing system on a Navy LCAC

Application: C130 In-flight Propeller Balancing

The LORD In-flight Propeller Balancing System (IPBS) has been successfully demonstrated on all engines of a C130. The accompanying chart shows the summary test results across multiple flight maneuvers. The IPBS kept the propeller vibration at minimal levels, which will lead to less fatigue and will save significant amounts in labor cost and fuel associated with manual balancing.

C130 Flight Test
Kirtland AFB, 15-16 July 2009
Selected Steady-State 1P Gearbox Vibration Levels



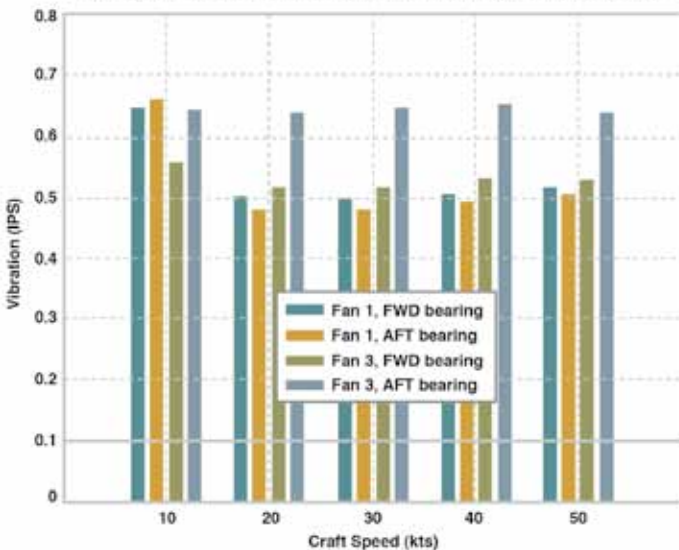
On-Line Balancing Performance Parameters	
Revolution Speed	1020 RPM
Correction Capacity	0.05 oz-in to 220 oz-in
Balancing Time	1 to 10 seconds

Application: Landing Craft Air Cushion Fan Balancing

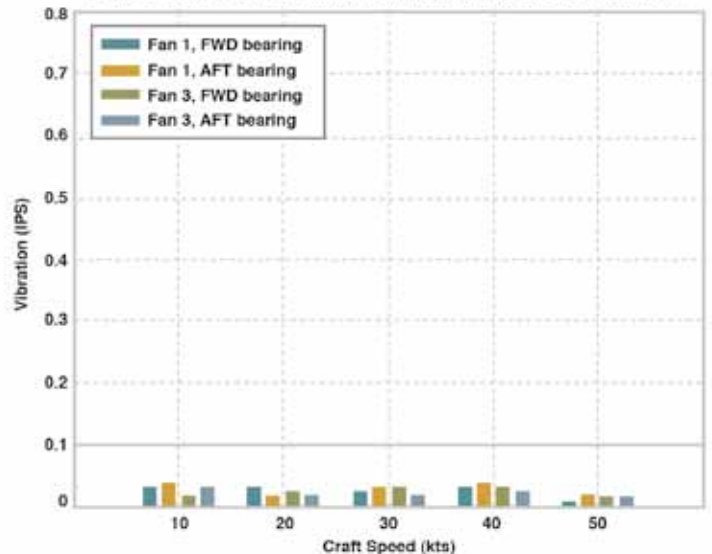
LORD has demonstrated real-time balancing on lift fans and propellers of a Navy Landing Craft Air Cushion (LCAC) vessel. This Navy vessel has six separate fans for lift and propulsion, which means that balanced fans are critical for operation.

Results of the testing show that the LORD balancing system can successfully reduce propeller and lift fan vibration to levels which cannot be accomplished through manual balancing. In addition, only a real-time balancing system can account for interaction between the lift and propulsion fans as conditions change.

LCAC Starboard Fan Vibration: All Balancers Neutralized



LCAC Starboard Fan Vibration: All Balancers Neutralized



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LORD provides valuable expertise in adhesives and coatings, vibration and motion control, and magnetically responsive technologies. Our people work in collaboration with our customers to help them increase the value of their products. Innovative and responsive in an ever-changing marketplace, we are focused on providing solutions for our customers worldwide ... Ask Us How.

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