

## CRANE OFFERS AIRCRAFT WEIGHT AND BALANCE SYSTEM

DAVID HUGHES/WASHINGTON

**C**rane Aerospace & Electronics is developing a system that can measure the weight of C-130s or regional jets automatically, and perform weight and balance calculations to meet dispatch requirements.

Overloading and poor balance have been key safety concerns for every class of aircraft for years (the 2002 crash of a U.S. Air Force MC-130H was attributed to inaccurate weight information) and engineers have sought solutions for decades. But the main problem has been reliably measuring weight.

"AirWeighs" offers an onboard weight and balance system that can meet the requirements of military transports as well as smaller civilian transports.

The system turns landing gear shock struts into scales. A control unit with a computer then performs the weight and balance calculations. The recurring difficulty in all the attempts has been to obtain a reliable, low-maintenance weight measurement.

Chad Thorne, director of new ventures at Crane Aerospace, says his company found that Trinity Airways of Arlington, Tex., had patented a concept for a system in 1994. Global Helicopter Technology Inc., also of Arlington, aided in the development of test hardware and software for a DC-9 and a Fairchild Metro 3. USAF showed early interest as did Saab. Crane bought the technology in 2001 and redesigned the system using a redundant architecture.

The difficulty in measuring the weight of an aircraft on each strut has always been that the assemblies are primarily shock absorbers. The basic type of strut contains nitrogen gas over oil and a metering pin to slow the rate of compression. The AirWeighs system injects additional fluid into the servicing port and withdraws it while monitoring pressure. Using algorithms, the effects of friction in the strut seal are removed from the equation to produce a direct weight measurement, Thorne says.

The computer then performs a

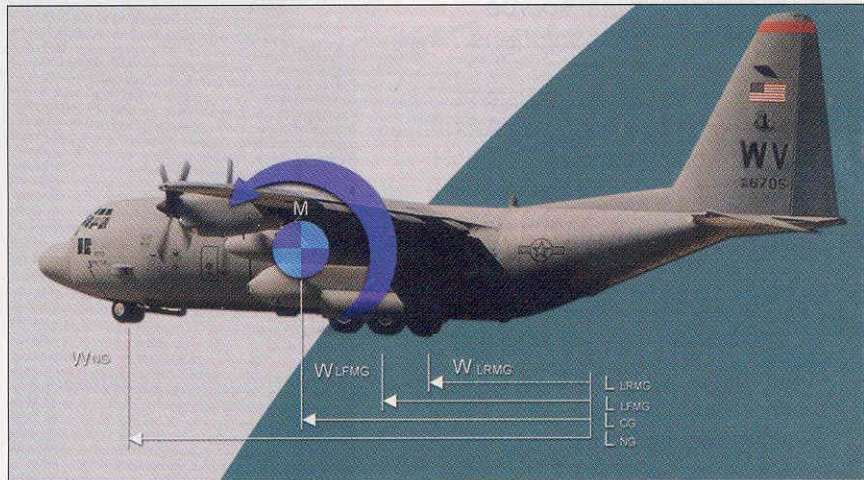
weight/balance calculation and displays the aircraft's weight and center of gravity (CG). The entire process takes 10 sec., and information can be shown on a dedicated display or one shared with other aircraft system functions.

A manifold or housing for each landing gear strut contains pressure sensors and, in some cases, temperature gauges and actuators for each gear.

Crane is entering the third phase of a Cooperative Research and Development Agreement with USAF's Air Mobility

ing an AirWeighs system tailored for the evolving field of lighter general aviation aircraft known as microjets. Prospective air taxi operators are concerned that the FAA might require them to use higher average weights for passengers than the 190 lb. now used by Part 121 airlines. This is because microjets will seat 4-6 people, and the sample size is so small that higher average

**AIRWEIGHS SYSTEM MEASURES weight on wheels to calculate load and balance.**



Battle Lab at Ft. Dix, N.J., according to Thorne. In the first two phases, Crane analyzed the C-130 airframe to determine the size of components needed and then performed a ground demonstration at Davis Monthan AFB, Ariz.

Phase 3 involves development of flightworthy hardware and a flight-test demonstration in 2006 at Warner Robins AFB, Ga. A National Guard C-130 may be involved, but an aircraft has not been confirmed. USAF has made no commitment, but the aim is to develop a mission-ready system and upgrade kit that can be installed on C-130s rapidly.

Thorne says Crane also is working with a regional airline operator and regional jet airframe manufacturer.

In addition, some airframe manufacturers are exploring the idea of us-

weight might be needed to be conservative on estimates.

An AirWeighs system, in comparison, could give pilots the exact weight of the aircraft and CG including passengers and luggage, reducing guesswork between actual and allowable weights.

As an added maintenance benefit, a tail tip alarm sounds when the aft center of gravity reaches its limit.

Crane is supporting the FAA's aviation rulemaking committee's loading system working group that is recommending operational and certification guidance for onboard weight and balance systems. Crane Aerospace & Electronics, 16700 13th Ave., West Lynnwood, Wash. 98046.

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