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Regional trends and issues

The regional aircraft industry has seen a bit of a growth spurt post 9/11. John Holding, Executive Vice President, Engineering and Product Development for **Bombardier Aerospace** (Booth 1002) and Executive Chair for the 2003 Aerospace Congress & Exhibition (ACE), has witnessed the shift in market since 9/11. "There's been a tendency for airlines to migrate to smaller, more efficient aircraft—to transfer routes to their regional subsidiaries," he said. "We've seen a significant decline in the traffic, and the regionals seem to be maintaining—if not increasing—their revenue on passenger volumes since 9/11."



John Holding, Executive Vice President, Engineering and Product Development for Bombardier Aerospace, is the Executive Chair for ACE 2003.

Most major carriers in the U.S. have restructured their operations to better match aircraft capacity with new passenger dynamics, and regional airlines naturally factor into these changes prominently. Restructuring has allowed airlines to renegotiate their contracts, allowing them to operate more regional aircraft. Many of the wide-bodied jets are being parked because of the current state of affairs with the airline industry.

"This is where the regional aircraft really come into the forefront," Holding said. "They can operate very economically. [Regional aircraft are] definitely the aircraft that are appealing to the airlines at the moment." And the U.S. isn't alone. Europe is experiencing similar trends, particularly eastern Europe.

With an expanding regional market, Holding sees a trend developing in the size of the fleet in terms of the number of seats. "We've gone from 50 seats to the 70- to 90-seat aircraft with the need for bigger-sized regional aircraft," he said.

Like the larger commercial-aircraft industry, the regional-aircraft industry faces financial woes. Another challenge—again not unique to regionals but nonetheless a challenge—is reliability.

"We have to realize reliability is very, very important to regional aircraft," he said. "These aircraft have very heavy cycles. They average an hour's flight. You do 3000 hours, you're doing 3000 cycles. So these aircraft are used seven days a week, six to seven flights a day. The availability and reliability [of regional aircraft] is very critical."

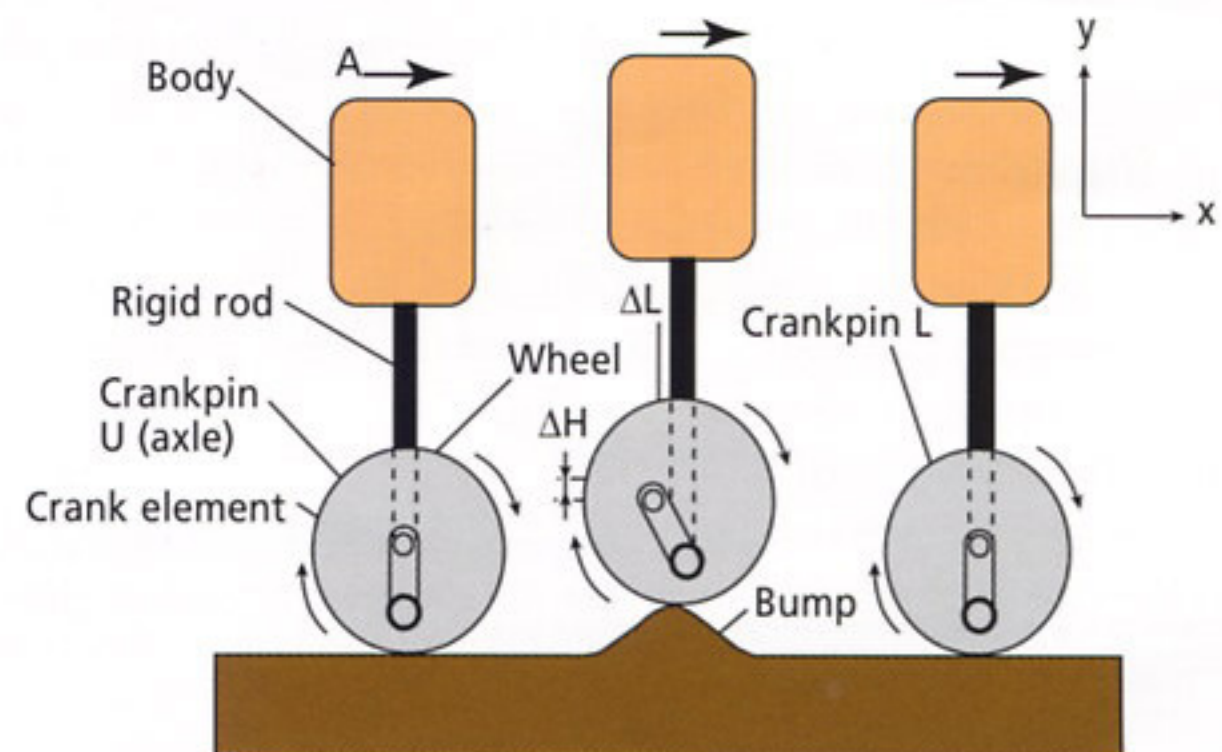
Jennifer Newton

Undercarriage research

To better satisfy the demands of society in such areas as energy conservation, environmental protection, and safety, ascertaining the limits of current technology and breaking through those limits are considered essential.

The moment at which a wheel of a landing aircraft touches the ground, the circumferential speed of the

wheel vertical stroke of 300 to 400 mm. However, longitudinal stroke on the nose gear is almost zero, while the main landing gear has about 10% of the vertical stroke due to the angle of inclined attachment. The trailing-link type undercarriage does give improved longitudinal stroke, but this type does not provide an adequate solution



The new suspension model from researchers at SUS21 and Kyoto Institute of Technology included the aircraft body being supported by a crank element set between it and the wheel. The crankpin U functions as an axle. Crankpin L, supported by ball-bearings or roller-bearings, swings like a pendulum, and is normally held at the lowest point by the force of gravity. By this model, the wheel can undergo rotary motion and circular motion simultaneously.

wheel begins to accelerate rapidly until it equals the horizontal velocity of the aircraft. At the moment of contact, the wheel meets great resistance to forward motion. As the undercarriage absorbs almost none of this longitudinal impact, the tire begins to smoke, while the oleo strut undergoes spin-up and spring-back.

For the wheel to absorb forward impact, it must be given longitudinal stroke. In conventional aircraft undercarriages, use of the oleo strut gives the

because it restricts the maximum vertical stroke. The displacement component ratio of vertical and longitudinal strokes is predetermined in the trailing-link type; it usually differs from the actual input component ratio.

Tomorrow at the World Aviation Congress & Exposition during the Acoustics, Dynamics, and Vibration technical session at 3:30 pm in Room 511F researchers from **SUS21 Co.** and **Kyoto Institute of Technology** will present its work on a new type of undercarriage containing

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