aircraft and performance, economic, and environmental metrics were selected to evaluate the design.

Even with the infusion of five advanced technologies, the aircraft failed to meet the sought metrics. The main constraint violated was the sonic boom overpressure. Shaping plays an important role in reducing the sonic boom, thus more configurations need to be analyzed to find a feasible and viable design. The ICE created provides such exploratory capability.

Jean L. Broge

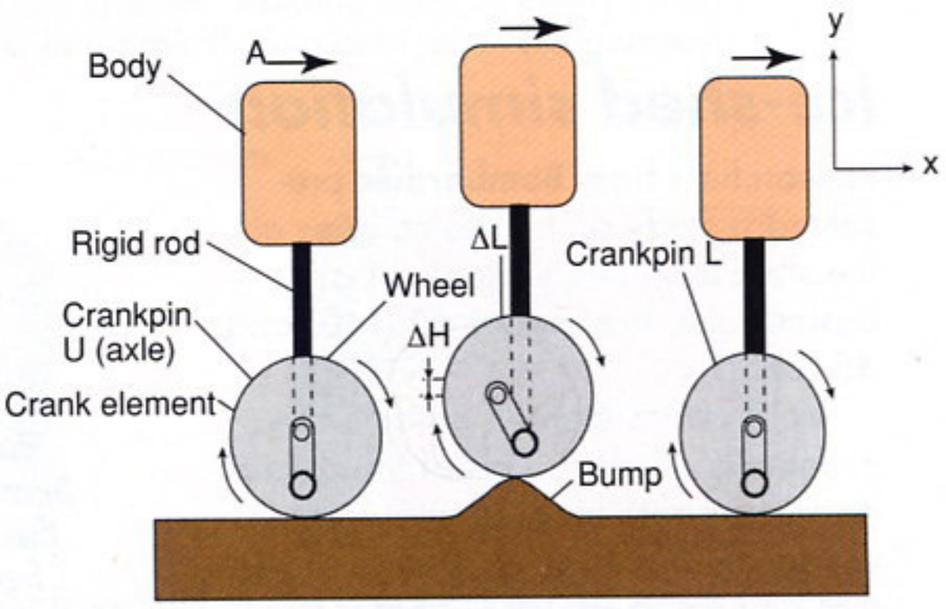
Undercarriage research

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 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 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 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.

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.



Researchers from **SUS21** Co. and **Kyoto Institute of Technology** presented its work on a new type of undercarriage containing a crank element that provides adequate longitudinal stroke. Dynamic analysis, assuming constant impact load operating upon the wheel, confirmed that the maximum temperature rise of the tire was lowered.

Computer simulation was conducted on the wheel contacting the ground from a state of free fall starting at 0.56 m from the bottom of the wheel to the runway, after the aircraft nose had been pulled up. Accordingly, a wheel operating with a crank element underwent acceleration in two stages, giving a significant reduction of approximately 47.4% in maximum sliding work of the tire, compared with a wheel operating without a crank element.

Jean L. Broge

A funny thing happened on the way to strategic planning

"When will the industry return to profitability? When will people start flying again? What's the meaning of life? And why do we bother with non-chocolate desserts?"

In a lighthearted but insight-filled keynote address, Adam Pilarski of **Avitas** had as many questions as he did answers about where the commercial airline industry is heading—or should be heading. Pilarski identified himself as an economist with some knowledge of engineering, but one may suspect he is a comedian at heart.

The topic of his presentation was airline strategic planning, and in as serious a tone as he could manage Pilarski emphasized that there is a difference between strategy and tactics.

Responding to acts of terrorism and challenges such as the SARS epidemic requires tactical responses to get through them short term. They also require strategic responses because although such events cannot be predicted, "their consequences can be," Pilarski said.

Strategic planning should be rather easy in the commercial airline industry,

Adam Pilarski used humor to drive home important points during his keynote presentation Tuesday morning.