SKF

Energy Efficiency Solutions

Increasing the energy efficiency of new commercial aircraft

SKF innovation helped designers of the Airbus A380 reduce weight and fuel consumption.

The energy challenge

For commercial aircraft designers, the route to greater energy efficiency is obvious: cut the weight, and you'll cut fuel consumption. For the new Airbus A380 design team, every 10 kilograms trimmed would save 3 liters of fuel per flight hour.

The SKF solution

Drawing on SKF competencies in mechatronics, bearing design, and metallurgy, SKF engineers helped designers of the 555-seat Airbus A380 reduce the weight of a several systems and subsystems, resulting in increased fuel economy. Along with burning less fuel, SKF-assisted weight reductions contribute to greater payload, longer flying range, and lower overall operational costs. All without compromising safety and performance.

Solution No. 1:
Electromechanical actuators

Most of today's commercial aircraft use a combination of both hydraulic and electric command for primary and secondary controls. Electric command is used more for secondary controls, while hydraulic command is predominant in primary controls, such as those used to steer the aircraft. There is a trend toward more use of electric controls due to their potential for weight savings and "cleaner" operation.

On the A380, SKF worked with Airbus designers to implement its electromechanical (fly-by-wire) actuators to control ailerons, rudders, elevators, and spoilers.

Along with the environmental benefits of reducing hydraulic fluid consumption and lessening the risk of hydraulic leaks, the lighter fly-by-wire system provided substantial fuel savings:

SKF electromechanical actuators enabled a weight reduction of 1 600 kg per plane, equal to a savings of 76.3 liters/hour of flight.

See other side for more SKF energy efficiency solutions for Airbus A380.

Solution No. 2:
Titanium bearings

Conventional steel bearings are used in many locations in commercial aircraft. For the A380, SKF supplied lightweight titanium bearings to replace steel bearings in the landing gear, engine support frame, and aileron flaps.

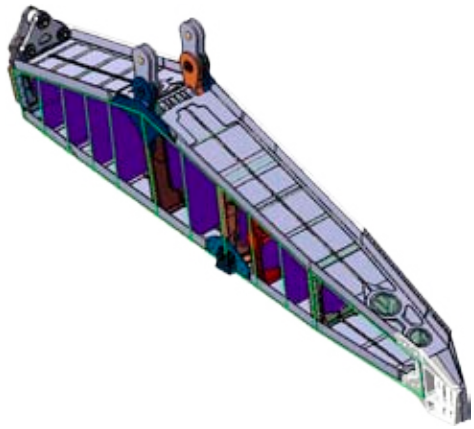
Using titanium in place of steel is inherently eco-friendly, as the manufacturing process uses less of the hazardous elements bronze and chromium. However the primary benefit of using the SKF titanium bearings – weight reduction – was considerable:

In the landing gear alone, SKF titanium bearings reduced weight by 40% for a 110 kg savings per plane. In the engine support frame and aileron flaps, they allowed a weight savings of an additional 90 kg per plane. The combined fuel savings of the titanium bearings for both position flaps and the landing gears represents close to 10 liters/hour of flight.

Solution No. 3:
Composite rods

Most commercial aircraft employ aluminum rods in several positions, including the wings and fuselage. On the A380, SKF supplied lightweight rods constructed of composite materials. The result?

SKF composite rods reduced weight by as much as 40% per rod, allowing a total weight reduction of about 111 kg. This represents a fuel economy of about 5.29 liters/hour of flight.



The bottom line savings?

Total savings for SKF titanium bearing and composite rod solutions amount to 311 kg, resulting in energy savings of 14.8 liters/hour. The contribution of SKF fly-by-wire actuation eliminates another 1 600 kg, bringing the total weight savings close to 1 900 kg, which translates to fuel savings of 100 liters/hour for a long range commercial airplane. Roughly 25% of these savings would be achieved for medium/short range commercial airplanes.

If these SKF solutions were applied to all new long range and short range commercial airplanes, estimated at more than 1 000 per year, the result would be estimated fuel savings of 200 million liters per year. This is equivalent to about 600 000 tons of CO_2 per year. By providing weight-saving solutions to aircraft manufacturers, SKF is helping our customers to be more efficient in terms of fuel consumed per passenger carried.