



Embraer Phenom 100 Very Light Jet is best-in-class with Eaton's help

Location:

São José dos Campos, São Paulo

Segment:

Business Aviation

Problem:

Embraer required systems and components that offered higher performance, lower weight, lower noise, lower heat generation and higher reliability ... all at an affordable cost.

Solution:

Eaton designed an innovative hydraulic power generation system that utilizes simple, rugged components all integrated into a compact reliable and lighter weight package.

Results:

This concept is especially suited to small business jets, and results in reduced cabin noise, power consumption and heat generation.

To address an emerging market demand for more personal service with a new line of business jets, Embraer developed their version of the Very Light Jet, the Phenom 100.

Background

To meet its unique design and performance objectives, Embraer required systems and components that offered higher performance, lower weight, lower noise, lower heat generation and higher reliability ... all at an affordable cost.

Challenges

In response to the requirement and the technology challenge, Eaton engineering designed an innovative hydraulic power generation system that utilizes simple, rugged components all integrated into a compact reliable and lighter weight package.

Solution

The assembly includes a permanent magnet DC motor, fixed displacement vane pump, filters, sensors, ground service access ports and a rolling diaphragm reservoir, and is mounted in the nose of the aircraft. A stand-alone accumulator rounds out the hydraulic power generation system, which supplies fluid power to activate the versatile new aircraft's landing gear and the anti-skid brakes.

During normal operation, the electric motor drives the pump when system pressure is below a preset low limit and charges the accumulator to the preset high limit. At this point the motor stops, and the accumulator continues to silently supply hydraulic power to the system. This concept is especially suited to the unique requirements of small business jets, and results in reduced cabin noise, power consumption and heat generation compared to traditional continuously running variable displacement

piston pump systems. This also ultimately saves fuel and operating cost for the owner.

Results

The components that make up the power pack are designed specifically for light jet applications.

The electric motor is a highly efficient and reliable permanent magnet design that will operate for years without maintenance. The vane pump, compact enough to fit in the palm of one's hand, is adapted from Eaton's proven line of rugged fuel pumps that are used in numerous turbine engines. The unique rolling diaphragm reservoir provides frictionless piston movement energized by a light spring, and does not require any bleed air or a heavy barrel housing and bootstrap cylinder. The pressure and return filters, sensors, ground service quick-disconnects and pump rotating elements are neatly packaged into a slim manifold located



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between the electric motor and the reservoir.

The system's simplicity, low cost, low weight and high reliability combine to provide unmatched value to the prospective owner as well as the airframe manufacturer.

Technological Milestone

In addition to the unique Phenom 100 hydraulic power generation package, Eaton also achieved a technological milestone with the design of the first electronically synchronized flap actuator system specifically designed for very light jet aircraft application.

The Phenom 100 flap actuation system utilizes a brushless DC motor integrated directly within each actuator assembly. System synchronization is accomplished electronically, replacing the traditional flex shafts with lightweight electrical wires. Eaton developed this new technology to advance flap system application as it applies to very light jets to offer reduced weight, increased reliability and improved overall performance.

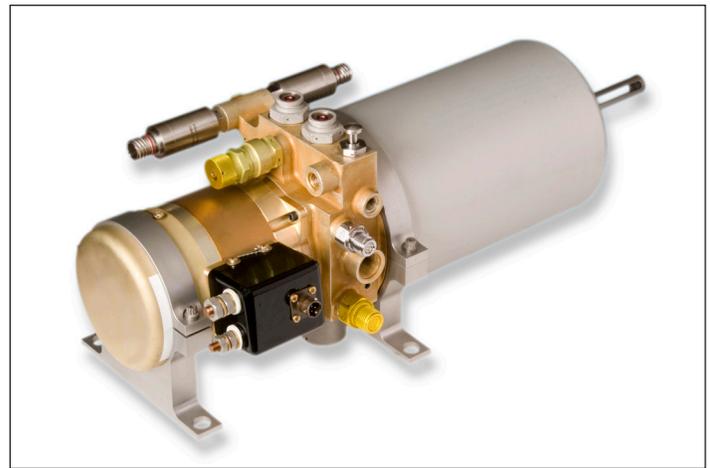
Phenom 100 Very Light Jet

The Phenom 100 Very Light Jet (VLJ) is the best-in-class. Premium comfort, outstanding performance and low operating costs are key design drivers. It will offer pilots and passengers the comfort and style unseen in

their categories. The relaxing ambience is enhanced by the size of the generous windows and the most ample cabin in its class. Onboard conveniences include a wardrobe or refreshment center, an aft cabin private lavatory with toiletry cabinet, and satellite communications.

The Phenom 100 will comfortably accommodate four passengers in a typical club seat configuration, and be powered by Pratt & Whitney Canada's PW617F engine, with 1,615 pounds of thrust. Its range will be 1,160 nautical miles (NBAA IFR reserves [35 min], with 100 nm alternate), or 1,320nm (VFR reserves [45 minutes]) with four people onboard, and it will have a maximum operating speed of Mach 0.7. The airplane is designed for short field takeoff performance and is capable of flying at 41,000 feet.

The Phenom 100 successfully took its first flight on July 26, 2007.



Phenom 100 Hydraulic Power Package

Eaton
Aerospace Group
9650 Jeronimo Road
Irvine, California 92618
Phone: (949) 452 9500
Fax: (949) 452 9555
www.eaton.com/aerospace

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