Background
In 2004, the Boeing Co. selected Hamilton Sundstrand to supply multiple systems on the company’s new 787 Dreamliner.

The airplane
The Boeing 787 Dreamliner is being developed as an international team of top aerospace companies led by Boeing at its Everett facility near Seattle, Wash.

The Boeing board of directors granted authority to offer the airplane for sale in late 2004. Program launch occurred in April 2004 with a record order from All-Nippon Airways. As of June, 98 customers from five continents have placed orders for nearly 900 airplanes, making this the most successful launch of a new commercial airplane in Boeing’s history.

The 787 program opened its final assembly plant in Everett in 2007. First flight is expected by the end of 2009 with certification, delivery and entry into service occurring by the end of 2010.

The 787-6 Dreamliner will carry 210-250 passengers on routes of 7,650 to 8,200 nautical miles (14,200 to 15,200 kilometers), while the 787-9 Dreamliner will carry 250-290 passengers on routes of 8,000 to 8,500 nautical miles (14,800 to 15,750 kilometers). A third 787 family member, the 787-3 Dreamliner, will accommodate 290-330 passengers on routes of 8,000 to 8,500 nautical miles (14,800 to 15,750 kilometers).

Technology investment
Hamilton Sundstrand is investing heavily in the 787’s development. The company’s new Airplane Power System Integration Facility in Rowland, N.C., USA, is playing a pivotal role in developing and testing multiple systems for the 787.

Through high-speed data links with Boeing and with other Hamilton Sundstrand facilities in Connecticut and California, the facility operates as a virtual workspace. Boeing engineers and analysts in many locations can have the ability to test and verify systems in real-time, without actually being there. This is helping to simplify the aircraft development and certification process.

APSIF brings together all the actual hardware from Hamilton Sundstrand as well as from other 787 partners. Hamilton Sundstrand has completed nearly 20,000 hours of integration testing in the APSIF.

Program value
The 787 program is expected to generate more than $15 billion in revenue for Hamilton Sundstrand over the life of the program.

9 systems for the 787

1. Environmental Control System: The ECS provides complete airplane thermal management — including cabin temperature management and control, fresh air, pressure control, heating and cooling, galley chилling, and cargo and crew rest compartment temperature control. The system also includes liquid cooling for the Power Electronics Cooling (PEC) system, which is required for safety and to meet 815V/400Hz, 150V/400Hz, 150V/1,500Hz, and 24VDC bus voltages. The ECS provides on-board cooling to cool more than 25 typical New England homes.

2. Nitrogen Generation System: The 787 is the first passenger aircraft designed with an integrated on-board NGS. The nitrogen generation system produces nitrogen-rich airfoce to the fuel tanks to increase fuel tank safety.

3. Auxiliary Power System: The APS comprises the auxiliary power unit (APU) and main engine start capability, and the motor controllers are multiplexed to drive the cabin air compressors and electric motor pumps. The EPGSS comprises four main engine-mounted variable frequency starter generators and two APU-mounted auxiliary starter generators. It also includes eight common motor starter controllers, six generator control units and two bus power control units. The system will produce 1,450kW of electrical power — five times the power generation capacity of the 767 and enough to power 400 homes. This will be the first time a commercial airplane will have a variable frequency drive system, and the EPGSS provides key technologies that enable the 787 to be the first “more electric” airplane.

4. Electrical Power Generating and Start System: The EPGSS generates and controls the electrical power on the airplane. The system also provides the APU and main engine start capability, and the motor controllers are multiplexed to drive the cabin air compressors and electric motor pumps. The EPGSS comprises four main engine-mounted variable frequency starter generator systems and two APU-mounted auxiliary starter generators. It also includes eight common motor starter controllers, six generator control units and two bus power control units. The system will produce 1,450kW of electrical power — five times the power generation capacity of the 767 and enough to power 400 homes. This will be the first time a large turboshaft engine has been started electronically, and the EPGSS provides key technologies that enable the 787 to be the first “more electric” airplane.

5. Remote Power Distribution System: The RPDS is a network of distributed power controllers that connect all the lower power loads in the airplane to one set of multi-functional power buses. They provide on-off as well as protection for the bus. Hamilton Sundstrand is responsible for controlling over digital communications buses, eliminating the conventional circuit breaker interfaces overhead. There are 17 individual buses located throughout the airplane.

6. Primary Power Distribution System: Hamilton Sundstrand has the lead role in providing the PPDs, and is teamed with ECE (a Zodiac Company), and Nabtesco (formerly Terje Seki). ECE will provide five AC power panels, and control and manage the 213VAC, 115VAC, and 26VDC buses on the airplane. Nabtesco will provide two +/-27VDC power panels, and the motor control racks they are part of. The combined rack and panel houses the eight large motor controllers, the power conversion equipment, and provides cooling manifolds from the PEC5 system.

7. Ram Air Turbine: The RAT provides emergency power in the unlikely event of a dual engine failure. The RAT comprises a propeller that is deployed into the air stream from the wing fairing and provides a hydraulic pump to pressurize the center hydraulic channel, and a generator to power the essential electrical bus.

8. Electric Motor Pump: The EMP comprises four electric motor pumps that drive hydraulic pumps on a demand basis. The pumps are provided by Boeing sourced from Parker however Hamilton Sundstrand is responsible for assembly and integration of the pump, motor and the motor controller (part of the EPGSS package).

9. Fire Detection and Suppression System: Hamilton Sundstrand’s K骄傲e Aerospace & Defense unit provides the cargo and engine fire detection and suppression systems. The systems comprise smoke and fire detection, fire extinguishing systems, bottles and associated controls.

787 Program
Hamilton Sundstrand is a subsidiary of United Technologies Corp. (NYSE: UTX). Based in Hartford, Conn., UTC is a diversified company providing a broad range of aerospace, building technology products and support services to the aerospace and building systems industries.

Source: Hamilton Sundstrand