

Rockwell Collins

Facilitating the convergence of manned, unmanned aviation

After years of fledgling growth, the Unmanned Aerial Vehicle (UAV) market recently boomed as a result of two events: the proliferation of Microelectromechanical Systems (MEMS) sensors and the global war on terror. The availability of MEMS reduced the size and price of sensors used in navigation systems, providing an economical solution for UAVs. The global war on terror drove demand for UAVs in Afghanistan and Iraq and proved their importance and reliability.

ing technologies that improve the reliability and safety of UAVs. Since UAVs provide a low-cost, low-risk platform for testing advanced technologies, capabilities tested and proven on UAVs through concept programs and in combat operations can be brought back to augment reliability and safety in both manned and unmanned aircraft.

Greater automation and situational awareness provide the additional precision and reliability required for UAVs to coexist with manned aircraft from both a technical and a cultural perspective. Fol-

lowing are some examples of the technologies being developed, demonstrated and fielded by Rockwell Collins.

Increasing automation for improved reliability

Flight control and navigation: Rockwell Collins provides Inertial Navigation System/Global Positioning System/Air Data, Attitude, Heading, Reference System (INS/GPS/ADAHRS) and flight control systems in triplex and quad redundant configurations in integrated, miniaturized packages offered with unprecedented affordability. Our

Athena® product line of flight control and navigation systems has been proven on dozens of unmanned platforms, tallying more than 300,000 operational flight hours.

Engine controls: Rockwell Collins engine controls improve reliability in UAVs and manned aircraft engines and have been proven to boost fuel efficiency up to 20 percent in aircraft. In addition to improving aircraft reliability and safety, reduced fuel consumption is critical today as energy prices soar.

Damage/fault tolerance with autonomous landing: Rockwell Collins' adap-

tive controls can enable a manned or unmanned aircraft to regain baseline performance in spite of catastrophic damage. An April 2008 flight showed the automatic recovery and auto-landing of an unmanned subscale F/A-18 air vehicle after ejecting 60 percent of the airplane's wing. (See video: www.rockwellcollins.com/news/video/damage-tolerance.html) Taken to the next level, this solution could enable a "panic button" feature in manned aircraft that allows pilots or passengers to automatically land an airplane in the event of an emergency.

Sense-and-avoid from greater situational awareness

Air traffic management solutions: Rockwell Collins' situational awareness solutions enable highly integrated air traffic management and collision avoidance.

Synthetic Aperture Radar (SAR) and weather radar: Rockwell Collins' mini-SAR and weather radar, offered in miniaturized footprints and at cost-effective price points, can equip aircraft with increased awareness and visibility in all environments.

Required Navigation Performance (RNP) and 4D Nav: RNP and 4D Nav capabilities enable more accurate flight paths, improving safety and efficiency and reducing fuel consumption.

While technology standards and decisions regarding UAVs operating in commercial airspace are carefully being evaluated to ensure the public's overall safety, Rockwell Collins continues to advocate the use of proven automation and sense-and-avoid technologies, as well as the ongoing demonstration of advanced technologies, to responsibly evolve our culture and facilitate the step-by-step movement toward the harmonious coexistence of manned and unmanned aircraft in commercial airspace.

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As the demand for UAVs continues to grow, they are increasingly being integrated with manned aircraft operations in the battlespace. In addition, applications for civilian uses, such as disaster recovery, weather monitoring, police reconnaissance and even cargo delivery are being advocated.

Cultural changes must occur before the general population will fully trust UAVs and before unmanned airplanes can gain access and momentum in commercial airspace for civilian applications. At Rockwell Collins, we believe the way to change this culture is by demonstrat-