A vionics technology is ac-
celerating, and while man-
ufacturers have made im-
pressive advances during the past decade, the march of micropro-
cessor speed, electronic storage growth and high-speed communications net-
works means that engineers can increas-
ingly do much more with less equipment, imaging spanning new capabilities to the cockpits of tomorrow.

Rockwell Collins

Cockpit avionics are on the brink of a huge leap forward, according to the company.

The head-up display (HUD) and synthetic vision are key develop-
ments in Rockwell Collins’s cockpit, especially when it comes to merging aircraft


Die Unternehmen arbeiten daran, die Cockpit-Technologien zu verbessern, um den Flugbetrieb zu optimieren und den Piloten dabei zu unterstützen, die Anforderungen moderner Flugzeuge zu erfüllen. Die Technologien sollen dazu beitragen, die Sicherheit des Flugs zu erhöhen und den Einsatz der Flugzeuge zu optimieren.

Insgesamt stellen die Unternehmen mit dem Projekt "The Cockpit of the Future" eine wichtige Schritt in die Zukunft der Cockpit-Technologien dar. Die neuen Technologien werden nicht nur die Funktionalität der Cockpit-Systeme verbessern, sondern auch die Effizienz des Flugbetriebes erhöhen.
Universal Avionics

Universal Avionics also sees a huge benefit in high-speed satcom data connections, especially to satisfy the needs of upcoming Future Air Navigation System (Fans) communications and ADS-B surveillance in modern air traffic management systems.

“Three, combined with high-speed Internet capabilities, will open up a revolution in cockpit capabilities, enabling data to be streamed to the ground or information to be streamed to the flight deck,” explained Paul DeHerrara, Universal’s COO.

Universal’s UL-800/801 UniLink system begins deliveries this month, offering Fans capability to meet European and North Atlantic Track requirements as well as Acars VDL Mode 2 compatibility. This enables high-speed and high-capacity digital communications at speeds up to 20 times faster than current voice communications, according to Universal.

The overwhelming amount of information flowing into cockpits could become a problem, according to DeHerrara, and Universal is working on a concept it calls “condition awareness,” replacing the traditional navigational awareness.”

“Pilots are facing exponential growth in the amount of data they have to assimilate,” he told AIN. “New technologies will help them with this increasing burden, enabling them to make better decisions in the cockpit, decisions that will save energy and at the same time improve the safety and reliability in all flight regimes.”

Universal, which invented the FMS, is continuing research into how the system fits into future cockpits. “The FMS has always been the central hub of information for the pilot,” DeHerrara explained. “We envision EFBs and wireless navigation into the future will work more synergistically with the pilot, presenting data more graphically and in a sequence consistent with the needs of the pilot. Streaming weather, topographical data, electronic charts and airport information jointly offers opportunities to provide the pilot with better information and guidance for all profiles of flight.

“We believe more integration of capabilities into our display technologies is a future game changer,” he continued. “About 10 years ago we integrated synthetic vision into our display technology, which started a revolution of capabilities being added to the displays, such as graphical representation of runways and traffic. This trend will continue with better graphical representation of the flight plan, better visual cues for the pilot and better ways for the pilot to interact seamlessly with the information presented.”

Continued from preceding page

Universal’s UL-800/801 UniLink system provides high-speed, high-capacity digital communications.

Esterline CMC

“Universal’s major drive for the future is exploiting the technology we acquired with SmartDeck,” said Patrick Champagne, Esterline CMC vice president of cockpits and system integration.

CMC acquired an exclusive license for SmartDeck technology from L-3 Communications Aerospace in December 2010. CMC plans to add more features to the SmartDeck integrated cockpit and, as part of a CMC technology demonstration project to make avionics ready for NextGen and Sesar air traffic management and capable of NextGen integration. SmartDeck components like synthetic vision, chart display and others and offer these as products to other avionics manufacturers or for other CMC avionics products.

“This is a program that we’re doing in partnership with the Quebec government under a green aircraft framework as a substantial investment by CMC and the government to develop and mature technology,” Champagne said.

CMC’s CMA 5024 offers one path toward satisfying the needs of the three-year Green Aviation Project, a stand-alone in-aircraft GPS that provides precision approach capability without ground-based nav aids.

“We’re seeing a convergence of requirements from NextGen,” said Champagne. “[The CMA 5024] can be added to the existing cockpit without having to replace a lot of avionics, supporting a lot of NextGen features at the same time.” The 5024 is Russian Glonass-compatible and will be compatible with Europe’s Galileo when that becomes available.

CMC’s recently announced Tandem system is bringing new functionality to the traditional electronic flight bag (EFB), marrying the attributes of portable devices, such as iPads and cockpit-mounted EFBs. “What we’re seeing is this enables a future evolution of an EFB,” said Jean-Marie Begis, director of EFBs and wireless navigation. “We see this growing from being purely a replacement of paper to also supporting what we call advanced applications.”

These could include advanced moving maps with real-time weather overlays and terrain databases running on the EFB. “We think the EFB will become more a crew information management display, a system that not only holds applications, but also [is] the gateway for communications, such as connecting the rest of the aircraft systems that are typically certified to the outside for data load or flight plan inputs,” Begis said.

He anticipates that an EFB combined with tablet devices will offer a quicker way to move useful applications into the cockpit, without the lengthy certification process needed for avionics updates.

“Eventually, those applications may become part of the cockpit applications,” he said, “so it plays the role not of a stop gap but more of an intermediate implementation step.”

“This is why we believe the flight bag has a significant future between a uncontrolled commercial consumer device, like an iPad,” Champagne added, “which performs a useful function, but has no configuration control, and installed avionics where adoption of new technology is often difficult and takes a long time. We believe the flight bag as CMC has envisioned it as installed avionics, but with the flexibility of the product we have, it will continue to have a place in the cockpit. That’s why we’re investing our efforts and making the EFB platform more capable and providing applications to it, because it has its place in the cockpit of the future, not just now until the iPad gets better, but forever.”

CMC is focusing on the Part 23 avionics on the civil side in the medium term, “in niches where we bring competitive value,” said Champagne. Other areas of focus are the military, air transport and business aviation markets. “We’re looking at expanding the number of platforms that we can address,” he said. “We don’t want to compete everywhere with the sole objective of competing; our objective is to provide value.”

“Now as you look at a science fiction future,” he concluded, “you will have a very large round display around the pilots with multiple data entry devices, from voice to touchscreen to keypads to all kinds of cursor-control devices, and a slew of software applications of different certification levels and multiple processors everywhere.”

Garmin

When Garmin unveiled the GTN series navigators last year, featuring touchscreen control of all functions, the company signaled that it sees touch control of avionics as a core feature of the product. Of course, touch is not new for Garmin, and it is baked into the G3000 and G5000 controller, which sits closer to the pilot than the instrument panel displays.

“When the GNS [400 and 500 series navigators] came out,” said Ben Kowalski, Garmin director of OEM sales and marketing, “our goal was to release products that are user-friendly, solid and work every time. The user interface at the time was a solid step forward in usability of GPS units. Touchscreen has the ability to take that further. Folks can access information they want faster than before.”

Another advantage of touchscreens is the ease of making changes to the system and the user interface, without having to add new buttons to the unit. “We’re pretty excited about touchscreen technology and what it can do,” Kowalski said. “The faster you can get information to the pilot, we believe, the better decision [he can make].”

Weather information in the cockpit is another area where Garmin is delivering more capability. Pilots are used to flying with XM WX, which works only in the U.S., noted Jim Alpiser, director of aviation aftermarket sales. “The rest of the world has not been as fortunate to see convective activity or lightning and rainshowers (and so forth).”

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Garmin currently offers weather data via Iridium using the GSR 56 transceiver (which also includes voice calling) in Europe and Australia and parts of the U.S. like Alaska where there is no XM coverage. “We’re looking to expand our footprint of radar coverage,” he said, “but we also have worldwide Metars and winds aloft data. We’re trying to provide as many tools as we possibly can to those folks who are flying globally.”

Garmin’s G3000 and G5000 programs remain on track, with the G3000 slated to enter service on the HondaJet in the second half of next year and the G5000 slated to appear in Cessna’s Citation Ten in 2013 and Latitude in 2015. Garmin’s new Telligence Voice Command technology now appears in Cessna’s Citation Ten in 2013 and Latitude in 2015. According to IS&S, “Integration of connected Panel work is Aspen’s open architecture, which allows other companies to develop products that work on that platform.”

“People are really realizing the benefits of [Connected Panel],” Hayden said. “Those partnerships are another thing we can do to add a lot of functionality and make systems more affordable.”

The key to making systems like Connected Panel work is Aspen’s open architecture, which allows other companies to develop products that work on that platform.

“Our products are known to be interoperable with other manufacturers’ retrofit avionics,” he said. “It didn’t take a huge leap to go from that to the concept of Connected Panel. As we develop these new products like the DFC90, KSN 770 and other products coming from our Connected Panel partners, we’re going to see some exciting functionality bubble up.”

AVIDYNE

Avidyne is working closely with companies like Aspen Avionics, including as a partner in the Connected Panel program.

“Cockpit integration will continue to be enhanced through a higher level of connectivity with portable devices using wireless technologies,” explained Tom Harper, Avidyne director of marketing. “Ease of use is still the biggest obstacle that most avionics manufacturers will need to address to stay competitive.”

Avidyne is preparing for the 2020 mandate to install ADS-B out equipment, but another key effort is a bus design that will lead to future products. According to Harper, “Avidyne has invested heavily in the development of a dual databus avionics architecture, which provides significant redundancy and reliability benefits and that will be the backbone of a wide range of integrated systems and point-solution products over the coming decade.”