Smart Cockpit Technology

The GAJSC has determined that "smart cockpit technology" in the form of automated checklists for normal and emergency operations, predictive aircraft performance, and performance monitoring, might reduce the number of system/component failure general aviation accidents.

ADS-B

A smart cockpit is available right now, and progress will accelerate as more manufacturers and aircraft owners adopt Automatic Dependent Surveillance-Broadcast (ADS-B) technology.

Not only do you have improved aircraft position data, but that data can be used in collision avoidance. ADS-B In comes with a data link for environmental information. That same data link can be used for ATC communications, NOTAMS, and up-to-the-minute TFR information.

By January 1, 2020, you must be equipped with ADS-B Out to fly in most controlled airspace. If you haven't already equipped with ADS-B, do so soon to avoid the last minute rush.

Electronic Ignition & Engine Control

If your car has a start button, you've got some form of electronic engine control (EEC). From basic electronic ignition to full authority digital engine control, EECs are more reliable, more efficient, and less costly to purchase and maintain than analog systems. Evaluating input from engine and environmental sensors hundreds of times per minute, the EEC keeps your engine running at peak efficiency for your operational environment. Those same sensors can provide valuable input as to the health of your powerplant. If problems are detected you'll see an indication on your panel.

Interconnected Devices

Interconnected devices and sensors make more information available in the cockpit than ever before. Air/Ground data links can provide ATC clearances and instructions as well as weather depiction and field condition reports and NOTAMS.

Transfer from your mobile device to your aircraft is simple, speedy, and safe. There's no chance of fumble fingering a route entry if it's transferred directly from your flight plan to the aircraft.

FAAST
Federal Aviation Administration
SAFETY TEAM

Flight Information Stream Flow

Drawing on information from internal and external sources, a comprehensive picture of aircraft state and component health can be formed, updated, and presented to pilots in text and graphical form. Pilots are accustomed to seeing graphical navigation information in the cockpit — in installed avionics, hand-held devices, or both. Weather and airspace is already integrated with many navigational displays. NOTAMS and TFRs are available as well. In the future, ATC communications and aircraft configuration will be integrated, and smart checklists for normal and emergency operations will appear as needed. With all that information available, the aircraft will be able to predict performance in takeoff, cruise, approach, and landing operations. Imagine knowing exactly how much runway you'll need for every takeoff and landing.

Below is a high level diagram of a cross country flight shown in blue boxes. Most pilots currently do their flight planning before they get to the aircraft. Once the flight planning is complete and filed, they manually upload the route information into the navigation system, secure the appropriate clearances, and then they are ready to taxi. Here is how this process or flow of information will look with smart cockpit technology.

The green boxes represent internal and external information sources that are available in the aircraft. Flight plan information is transferred to the aircraft shortly after it is powered up. Aircraft position, system status, and takeoff and climb calculations are based on information such as field conditions, elevation, temperature, and dew point.

After run-up, pilots conduct the flight while internal systems keep track of performance and position presenting the appropriate checklists when needed. Now, see what happens when an abnormal condition is encountered as indicated in the pink box.

In this case, an unsafe gear indication was reported shortly after the gear was selected down. Using internal systems data, the aircraft attempts to discover the condition cause. In this case, emergency gear extension is called for and the emergency gear extension checklist is presented. With "3 in the green," the aircraft lands normally.