ALIAS
PROGRAM RESULTS

AIRCREW LABOR
IN-COCKPIT
AUTOMATION SYSTEM

ADVANCED AUTOMATION TO ENABLE REDUCED CREW OPERATIONS

Aurora
FLIGHT SCIENCES
ALIAS is an in-cockpit automation system that acts as a pilot’s assistant, capable of operating an aircraft from takeoff to landing, including contingencies. Its modular design enables extensibility to almost any aircraft type, fixed- or rotary-wing. The level of automation is adjustable to suit pilot preference. Ultimately, ALIAS will enable reduced crew operations.

The ALIAS program was funded by the Defense Advanced Research Projects Agency (DARPA). Aurora has successfully developed, extended, and flight-tested ALIAS across three different aircraft (commercial and military) in less than 24 months.

**ALIAS Components**

**In-Cockpit User Interface**

- Easy to use in-cockpit tablet provides primary interface between the pilot and the automation, including:
  - Checklist monitor
  - Moving maps
  - Speech recognition & synthesis
  - System & aircraft status
  - Distribution of tasks between pilot and automation system

**Perception**

- Machine-vision cameras trained on instrument panel non-invasively perceive aircraft state
- Custom-developed software includes a reconfigurable set of plug-ins for the wide variety of instruments and effectors that are found in cockpits: switches, lights, knobs, levers, gauges, etc.
- Plug-ins can be rapidly tailored to the specific layout, number, and type of instruments and effectors in a new cockpit

**ALIAS Autonomy Core**

- Software backbone of ALIAS, providing open interfaces to subsystems as well as third party applications
- Includes flight control system (based on an existing aircraft model, or a custom aerodynamic model developed using Aurora’s system identification methods), and mission software to support a variety of applications

**Actuation**

- Non-invasive actuation suite is composed of a custom-designed versatile manipulation system for primary flight controls (yoke/stick, rudder pedals) and commercial off-the-shelf (COTS) robotic arm for secondary flight controls (throttle, levers, switches)
- Alternatively, a toolbox architecture allows ALIAS to use a variety of actuation solutions, developed under ALIAS and other programs, with varying levels of invasiveness and capabilities (see opposite page)
- Design is fully driven by customer requirements and tailorable to the specific aircraft and/or applications
ALIAS Extensibility and Adaptability

- Rapidly adaptable to new aircraft types
- Open interface core architecture to easily incorporate third party applications
- Toolbox-based approach for subsystem development, including actuation (left graphic), provides customizable configuration, invasiveness, and capabilities depending on the customer’s requirements

Adjustable Automation Supports Human-Machine Teaming

ALIAS facilitates optimal pilot performance, by allowing the pilot to perform tasks best suited to a human (e.g. complex cognition/mission planning) and ALIAS to perform tasks best suited to automation (e.g. monitoring instruments). In very high workload situations, ALIAS can bear much of the burden, allowing the pilot to operate at near-optimal performance.

The role of ALIAS is determined by the pilot for any flight or any flight segment

- ALIAS can operate as a flight monitor by monitoring the state of the aircraft and comparing it with known flight phases, as well as retrieve procedures and record flight data
- If desired by the pilot or necessary due to a high workload situation, ALIAS can fly the airplane including simple and complex maneuvers, retrieve and execute procedures including secondary flight control, and maintain planned mission path
Aurora Flight Sciences is a leader in the development and manufacturing of advanced unmanned systems, autonomy technologies, and aerospace vehicles.

We are headquartered in Manassas, Virginia and operate production plants in Bridgeport, West Virginia and Columbus, Mississippi. Aurora has Research and Development Centers in Cambridge, Massachusetts, Dayton, Ohio and Mountain View, California, and a European office, Aurora Swiss Aerospace, located in Lucerne, Switzerland.