EFFICIENT AND SAFE

A Head Up Display (HUD) plays a crucial role in the ability of Enhanced Flight Vision Systems (EFVS) to use more effective flight and approach paths without jeopardising safety. We believe that next-generation advanced approaches will be easier to fly, more precise and require less training, thanks to HUDs.

Using our thinking edge Saab has developed AviGuide, an advanced, multi-function HUD that can be interfaced with a range of other flight systems. It intuitively provides information at the right time; providing crews with superior control, whatever the situation.

TAKE OFF/DISPATCH

A HUD helps pilots maintain situational awareness, thus minimising risks such as tail strikes and stalling during initial climb. It also enhances the precision of any flight operation. The Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) have opened the door for certifications that will allow for more effective flight planning in adverse visual conditions, including at the destination. This makes way for the possibility to dispatch flights with the intent to use alternative approach methods that are not available for less equipped aircraft.

APPROACH, ILS, LPV, LANDING

HUD/EFVS systems are an established solution in Part 91 operations for achieving landing credit and expanding an aircraft’s operational capability. The HUD and an infrared camera enable pilots to see through weather. They also enhance their ability to maintain awareness and a stable approach using symbology including a flight path vector, approach angle reference cue and synthetic vision fused with the camera image. The success of EFVS in Part 91 has resulted in expansion to commercial operators.

GO-AROUND

Autoland coupled approaches and other sophisticated systems are important for increased efficiency and safety. These systems may or may not need a HUD. But when the approach is aborted, AviGuide drastically reduces the risks associated, such as the loss of spatial awareness, by presenting Flight Path Vector (FPV) with an artificial horizon and boresight symbol.
ENROUTE
A HUD is the most intuitive and effective tool for a pilot to monitor aircraft systems that are activated during enroute Instrument Flight Rules (IFR) without losing spatial awareness. A sensor that identifies clouds at night instead of seeing through them may help an experienced pilot to avoid unnecessary turbulence, icing, etc. In addition, the AviGuide system can be adapted to include future technologies such as Air Traffic Management (ATM) and Automatic Dependent Surveillance Broadcast (ADSB) information.

TAXI
A HUD provides crucial information and situational awareness on the ground, when an aircraft is closest to other objects. Whilst even a simple Enhanced Vision System (EVS) sensor picks up other objects on the runway or taxiway, AviGuide features a Picture-In-Picture (PIP) function that drastically enhances the pilot’s situational awareness on the ground and helps the aircraft reach the correct taxiway and stall.

PREPARED FOR GROWTH
The AviGuide HUD System Processor can support multiple additional capabilities as a general avionics management computer or as a tactical mission computer. Saab has an extensive roadmap for the development and/or integration of:
- Mission-specific symbology
- EVS processing and display
- Synthetic Vision System (SVS) and Combined Vision System (CVS)
- Advanced digital map function with high resolution data
- Ground collision avoidance function
- Audio and video mission recording function
ADVANCED TECHNOLOGY

A number of breakthroughs will enable operators to overcome the limitations of today’s avionic equipment by leveraging innovations including:

- Advanced imaging and detection sensor technologies
- Cutting-edge image processing techniques
- Next-generation collision avoidance capabilities
- Deterministic artificial intelligence algorithms

These techniques and technologies combine to provide a family of innovative vision and awareness solutions that will be available as civil-certified software applications, dedicated systems, and integrated into our existing and future HUD and avionics platforms.

FUTURE MERITS

Regulatory agencies are defining the next step in HUD landing known as Equivalent Visual Operations as an economical replacement for the expensive ground and airborne equipment required for legacy autoland systems. HUDs have proven themselves a high value tool for expanding operational capability in inclement weather, and are becoming an integral part of tomorrow’s All Weather Operations solution.

A HUD is necessary for EFVS and EFVS2 certification, which is now recognised as a key element in the FAA’s NextGen effort. It is also a core part of Saab’s Avionics Systems efforts, with integrated avionics solutions and Avionics Management Systems (AMS).
HISTORY OF HUD

AviGuide is the result of Saab’s long and successful history developing HUD systems. The initial breakthrough came during the development of the supersonic fighter aircraft Saab 37 Viggen in the early 1960s. Its design was unique and at the forefront of modern fighters at the time, featuring canard wings, an on-board computer for navigational purposes and a HUD system.

SAAB 2000
Saab has experience in all aspects of integration, installation and certification of HUDs in commercial aircraft. The Saab 2000 HUD installation was certified as a primary flight reference, and as a landing system for CAT III weather minimums. The Saab 2000 HUD was approved for landing at 200m Runway Visual Range (RVR), including OEI landings.

HELITOW
The HeliTOW airborne weapons system combines direct view optics with various sensors and cameras for long-range weapons engagements from different helicopter platforms. The vast experience gained on how to integrate different sensors and how they work in a 24/7 airborne, low-level environment across all parts of the globe has given Saab Avionics Systems a unique knowledge base that is used in the advancement of EFVS.

FIGHTER HUDS
Saab has been developing cutting-edge HUDs for fighter aircraft for decades, including the first wide angle, holographic HUDs that revolutionised airborne tactical combat in the 1980s. Over the decades the fighters have also transitioned to civilian certification standards, resulting in ever-increasing harmonisation of HUD technologies between the military and civil industries. Now Saab is bringing this vast experience to the civilian market.
HEAD UP EYES OUT

With or without an All Weather Solution and in any phase of flight, a HUD plays an invaluable role in drastically reducing the risks associated with the loss of situational awareness. The conformal flight path vector and attitude symbology, combined with velocity and height information provide the pilot with an at-a-glance means for intuitively assessing the state of the aircraft. Additionally, conformal traffic, terrain and navigation data displayed on the HUD bring new levels of situational awareness.

CAPABILITIES

EFFECTIVE FLIGHTS
- Conformal Flight Path Vector (FPV) improves energy management
- HUD makes IFR/VFR transition more effective
- HUD increases precision during take-off approach and landing
- EVFS certifiable, bringing regulatory merits

SAFETY FIRST
- Flight data presented to enable head up flight and navigation
- Intuitive presentation for faster decisions
- Conformal data for situational awareness
- Enhanced/synthetic vision

EFFECTIVE INTEGRATION
- Compatible with most flight decks
- Integrates with both electro-optical and radar based sensors
- Compact and low weight for easier integration
- Modular approach for effective adaption to new platforms
- Prepared to benefit from future vision and awareness subsystems

MISSION COMPATIBLE
- Flexible and adaptable display modes
- Enhanced and synthetic vision
- Integrated flight mission data

TECHNICAL LAYOUT
The top image shows AviGuide with standard graphics, whilst the image below shows AviGuide with enhanced vision.