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# Taking AIXM 5 into the cockpit

➤ THE ADVANCED MISSION DISPLAY SYSTEM (AMDS) AND COMSOFT'S AERONAUTICAL DATA ACCESS SYSTEM - AERONAUTICAL INFORMATION MANAGEMENT DATABASE (CADAS-AIM<sub>DB</sub>) FORM THE NEXT GENERATION COCKPIT EQUIPMENT COMBINED WITH A GROUND BASED AIXM 5 DATA STORE.



The AMDS provides substantial reductions to the amount of aeronautical data and information required in hard copy by pilots.

COMSOFT, the German ATC supplier, and Flight Focus Pte Ltd, a Singapore-based company, provide the world's first digital AIM solution that covers the full path from data originator to data user, as well as the full data set from static to dynamic aeronautical data.

Pilots normally carry a substantial amount of aeronautical data and information around with them in the form of paper documents in their carry-on crew baggage. The AMDS provides substantial reductions to the amount of aeronautical data and information required in hard copy by providing all of the required information electronically; route manuals, maps and charts, airline documents such as standard operating procedures (SOP), aircraft manuals and the like. Data flows within the AMDS are such that these documents are able to be updated electronically without the need for back-office intervention.

The AMDS integrates and displays data and information of various types.

Flight Focus, has developed the AMDS, the next-generation electronic flight bag (EFB). The core values of the Flight Focus solution lie in the way that it is integrated into the business processes of an airline, the way the AMDS integrates and displays data and information of various types, and, importantly, a truly global communications capability via satellite.

The AMDS has the functionality to construct operational flight plans (OFP) and a comprehensive flight crew briefing package, including NOTAM and weather information onboard the aircraft using up-to-date information derived from state and other authorised sources. Use of the innovative AIXM 5 standard is a crucial precondition to fulfil the stringent demands for data consistency made by this process. In contrast to previous versions of AIXM or other (proprietary) static data formats, AIXM 5

Aeronautical data and information is a substantial component of the AMDS data flow, enabling the system to provide sustainable benefits, efficiencies and safety enhancements for the airline industry.



combines the dynamic and static aspects of aeronautical information with unambiguous references between the various parts of the data set. At the conclusion of the OFP construction stage, the AMDS distributes the air traffic services (ATS) copy of the flight plan (FPL) to the required terminal and en route agencies requiring the information.

The AMDS takes the presentation of the proposed route of the flight, aeronautical data and information and weather information into a new dimension through its ability to show this as layers of information in a user-selectable display, over the proposed route of the flight.

The benefits of this type of display are numerous, not the least of which are the inherent safety benefits of being able to see where areas of significant weather, such as severe thunderstorms, or areas of volcanic ash are in relation to the track of the aircraft.

The AMDS is a data-driven system, meaning that Flight Focus has moved away from the more usual static maps, charts and information being presented in pdf or other similar raster format.

Only data from authorised state sources is permitted for use in the AMDS, and is protected whilst in storage and transit in accordance with international standards. Data loads can be uploaded to the system via direct connectivity using a USB device, while updates are provided via satellite communications or Bluetooth. Data flows to the AMDS are through the data centre where all aeronautical data and information is traceable back to the point of origin.

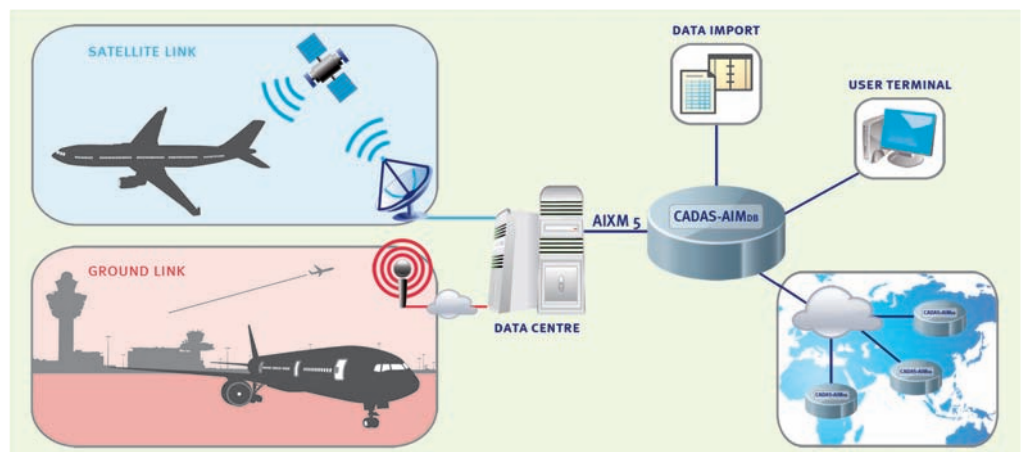
Use of data, as the underlying foundation, as opposed to the use of raster images, means that aeronautical maps and charts are kept up-to-date and updated dynamically as and when changes occur to show the effect of the change, rather than an amendment to the AIP or through a separate list of NOTAMs.

The dynamically drawn charts include an overlay of the aircraft's position derived from the GPS system. Dynamic charts are used within the system as another strand in the overall safety net to assist in the prevention of runway incursions or entry onto unserviceable areas. The use of dynamically updated and drawn charts increases safety by applying the digital NOTAM concept through the ground-based database system and

flight-following application to show the position of the aircraft relative to the active runway, and to mark the position of the unserviceable portions of taxiways or runways, thus helping the flight crew to avoid areas of the movement area that pose a risk to safe flight operations.

The AMDS system as a whole incorporates a ground component that intelligently determines the data requirements and updates for individual aircraft, depending on the aircraft type and theatre of operations. This process and methodology is applied to other operational data entering the AMDS, for example NOTAM and weather information. The AMDS system ensures, through the inbuilt flight following application, that the airborne system has current aeronautical and weather data, automatically directed to the aircraft when required.

The AMDS is able to highlight significant operational information for the flight crew in a structured way to enhance safety. The AMDS is coupled to a ground-based component that is able to analyse incoming data and information to determine the relevance of this data and information in relation to the aircraft known to the system. This functionality is delivered through a dynamic flight-following application that distributes data and information entering the system, against parameter settings for the theatre of operations of particular aircraft, the actual or planned location of the aircraft, and



CADAS-AIM000 provides the link to the data originators.

the relevance of the data or information to a particular flight. Safety of operations is enhanced with the use of the AMDS by applying only those updates that are of relevance to the flight.

The AMDS provides an environment within which all data and information entering and stored in the system is protected during storage and transit in keeping with international standards, and is encrypted to prevent loss of confidential airline data and information. The AMDS uses

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an SHA-1 secure hash algorithm (SHA), which generates a 160-bit (20-byte) checksum code. Use of the SHA-1 algorithm provides protection far superior to the current international standards which call for the use of 32-bit CRC for the protection of aeronautical data classified as critical, and a 24-bit CRC for aeronautical data classified as essential.

In addition to the mainstream aeronautical side of the system, the AMDS generates other business efficiencies for the airlines by providing data to the airline's operations control, commercial, and engineering and maintenance departments in near real time through the satellite communications channels.

The main interface to the data stream is the AMDS data centre, this is where the various aeronautical data and information comes together.

The required data feeds for the AMDS data centre have to come from the states' AISs.

into a completely new situation and allowing them to move from subsidised departments to real profit centres.

EUROCONTROL, the European agency for the safety of air navigation, has gained worldwide momentum by working out the respective data standards and concepts that have culminated in the AIMX 5 data exchange format. It bridges the gap between data originators and data users and fits to the well-established consensus that has been reached within the single European sky ATM research (SESAR). Enabling the ATM community to carry out their operations and business more efficiently is one of the primary goals.

While the AMDS data centre guarantees a quality assured selective data provision for the ground/air link, CADAS-AIMDB provides the link to the data originators. The scalability of the database makes it ideal for use as part of a country-wide AIM solution or even, like the EAD, as a central database for an aggregation of states. The database has been designed from ground up to serve as aeronautical database and contains all functions that are needed for consistent aeronautical information management.

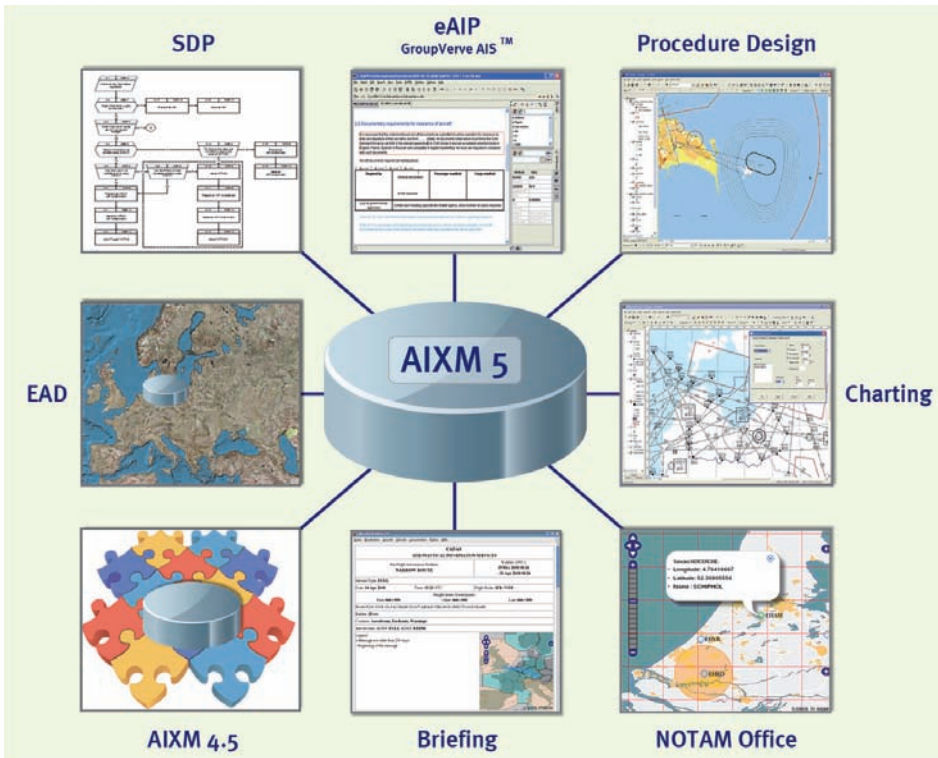
**CADAS-AIMDB highlights**

- Complete AIMX 5 data model
- Support for extensions and non-AIMX data
- Administrative and maintenance functions
- EUROCONTROL-compliant static data procedures
- Access control
- Charging and monitoring
- Import from and export to AIMX 4.5
- EAD interface for data user and data provider
- Sound data validation suite
- Report engine
- Audit trail for tracking changes

Following its AIS-AIM study group, ICAO is planning to adopt AIMX 5 as the aeronautical information exchange model for the provision of aeronautical information in digital

format. This will manifest in amendment 36 to annex 15 to the convention on international civil aviation. The use of the new AIMX 5 standard as native exchange format of CADAS-AIMDB therefore not only guarantees compatibility to other AIMX 5 based databases and to the AMDS data centre but also guarantees a high investment saving for the involved states.

AIMX 5 – unlike its predecessor AIMX 4.5 – has a holistic approach, which is to include all existing



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Consequently, it puts the latter in the role of data service providers rather than publishers of paper-based products.

The data is handled digitally throughout the supply chain from data originator to the data user which is crucial for timely, relevant, accurate and quality-assured information. Moreover, this paves the way for new cost-effective revenue models where data is paid for on a per-use base, hence putting the AIS offices

aeronautical data from static data like airport runways up to dynamic data like NOTAMs.

A basic concept of AIXM 5 is its extensibility. Further data like weather information is currently being defined in order to be included into AIXM 5.

The extremely advanced capabilities of AIXM 5 compared to its previous versions required a substantial amount of knowledge in database design and aeronautical data. The endeavour resulted in elaborate solutions for demands that go far beyond those of simple relational database models for static data only.

In order to cover all aspects of an AIS office and to contain up-to-date information for all phases of a flight CADAS-AIM<sub>DB</sub> can be complemented by a number of aeronautical products, most notably for the creation and management of NOTAM, electronic AIP, charting, and procedure design. These tools are provided by market-leading vendors which are in line with COMSOFT's AIM concept.

Moreover, the CADAS-AIM<sub>DB</sub> is able to convert from and to AIXM 4.5 and can connect to the EAD through the EAD system interface (ESI). Both modes of operation are supported allowing CADAS-AIM<sub>DB</sub> to act as data user as well as data provider for static and dynamic data.

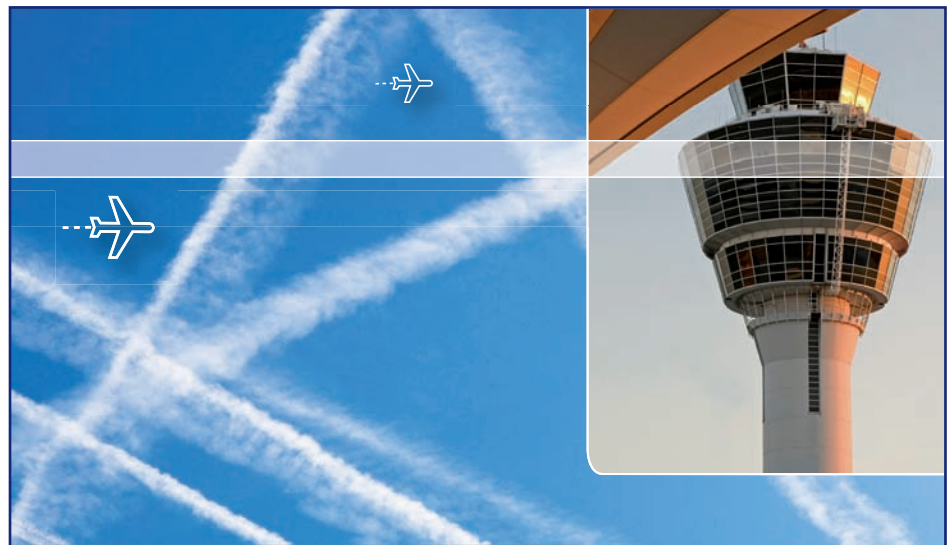
Through the combination of two unique products, namely the next generation's EFB AMDS and CADAS-AIM<sub>DB</sub>, a continuous data path of quality-assured data from data originators to data users has been made feasible.

This ambitious project shows that pioneer spirit of companies who have understood the users' demands, coupled with solid expertise in aeronautical engineering, leads to innovative solutions which considerably contribute to flight safety due to improved situation awareness and reduced operating costs through new business models.

### Company profile

COMSOFT is a German company with more than 20 years of profound experience in the ATC market. The company's product portfolio covers manifold solutions for the field of surveillance and ground-to-ground communication, visualisation, whole ATM centre solutions, ASTERIX tools and many more. Lately the German key player has been persistently successful with its aeronautical messaging solutions and information services. Over the past few years COMSOFT has evolved into a market leader in this sector backed by an unmatched number of installations worldwide. Together with its Asian partner the German expert is about to revolutionise the way of providing AIM information to its target group. ○

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- aftn/cidin/amhs systems
- aeronautical information systems
- surveillance communication
- surveillance display & processing
- integrated radar/voice recording
- atm systems & safety nets
- asterix tools & systems
- artas installations & services
- ads-b & multilateration sensors

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