INTEGRATED AIR TRAFFIC MANAGEMENT SYSTEMS
TOOLS FOR A MORE EFFICIENT AIRPORT

The Saab integrated ATM and airport systems reflect the well-proven Swedish safety and reliability standards. They are built to suit all environments, from regional to international airports, and can work stand-alone or as an integrated ATM and airport system.

The systems give the customer the flexibility of adding modules when needed for future expansion. The high integration and the ease of sharing information between the modules pave the way for Collaborative Decision Making (CDM) at the airport.

INTEGRATION PHILOSOPHY

Saab’s suite of ATC and Communications modules are based on open interfaces in order to facilitate integration. The benefits provided by this solution meet the need for a streamlined ATC HMI with all necessary functions available.

Our ‘black cockpit’ HMI design displays only the vital functions during normal operations. But when the system raises an alert that needs to attract the ATCO’s attention, the information appears in a previously defined position in bright colours. This makes it easy to differentiate the alert from normal operation.

INTEGRATION PHILOSOPHY

All ATC functions are set up according to a predefined role-based configuration. Setting up is performed by a system supervisor who defines which functions open up for each specific role. This means that each ATC function (digital flight plans, control and monitoring of airport lighting, digital maps, etc.) can be displayed on any screen and combined with the other functions defined in a specific role. In this way the number of systems (displays, keyboards, mice, etc.) at the controller position can be reduced. Since the HMI is the same for all displays at each controller position and each workstation is based on the same hardware and software, the need for spare parts is considerably reduced.
 Systems and their use for the surveillance of the integrated ILS. One common supervisory system is alarms, approach lights, VDF, ILS, RVR and runway lighting, break down position are radar, flight plans, weather, integrated systems for an i-TWR working non-standardised interfaces. Example of developed to be able to communicate reliably with systems that use common digital display and inputs. The idea of the i-TWR (integrated tower) is to gather the displayed information from all kinds of systems at one single ergonomic position equipped with a common digital display and inputs. The i-TWR working position consists of one flat screen equipped with mouse, keyboard and touch screens as input devices. A standard tower interface (STI) has been developed to be able to communicate reliably with systems that use non-standardised interfaces. Examples of integrated systems for an i-TWR working position are radar, flight plans, weather, alarms, runway lighting, break down alarms, approach lights, VDF, ILS, RVR and ILS. One common supervisory system is used for the surveillance of the integrated systems.

**Integrated Tower, i-TWR**

To be able to meet the demands that today’s increasing traffic flows place on air traffic service operations, a large number of systems are installed in the tower. Most often the systems are delivered from different suppliers and equipped with their own displays and input devices, which makes it difficult to work in a safe way.

The idea of the i-TWR (integrated tower) is to gather the displayed information from all kinds of systems at one single ergonomic working position equipped with a common digital display and inputs. The i-TWR working position consists of one flat screen equipped with mouse, keyboard and touch screens as input devices.

A standard tower interface (STI) has been developed to be able to communicate reliably with systems that use non-standardised interfaces. Examples of integrated systems for an i-TWR working position are radar, flight plans, weather, alarms, runway lighting, break down alarms, approach lights, VDF, ILS, RVR and ILS. One common supervisory system is used for the surveillance of the integrated systems.

**Transportable TWR/APP**

New hardware and software technology has opened the possibility of integrating all functions normally found in fixed TWR/APP environments into a transportable TWR/APP. The limited space available in a transportable TWR/APP is well suited for the i-TWR integrated ATC tools.

**Remotely Operated Tower**

With the Remotely Operated Tower, conventional ATC services currently provided from a tower located at the airport are provided from a location which is remote from the airport. This creates benefits for the service providers who can operate from a centralised location (Remote Tower Centre – RTC) rather than from a large number of geographically diverse locations.

The Controller Working Position (CWP) in ROT includes a 360° HD-video presentation. It provides the Air Traffic Controller (ATCO) with situational awareness of all surface movements at the airport and aircraft on final approach or departing together with information on the present weather situation.

The use of the Remotely Operated Tower does not compromise safety or have an impact on service quality. The underlying technical and operational concepts meet the required standards of safety and performance whilst realising the available potential savings.

**Control and Monitoring Systems**

EMS is a user-friendly network detective that constantly monitors your connected operating systems, provides detailed early fault warnings and offers a complete network overview from one workstation. CMS provides a constant overview of your network, its system processes, equipment and individual units. It can save time and money by improving faultfinding and diagnosis and thus reducing downtime and unnecessary maintenance to a minimum. CMS can monitor everything from the operating status of hard disks, the heat generated by processors and network status to individual software processes and system loads.

**Remote Control and Monitoring System, RCMS**

RCMS is a remote control and monitoring system that enables effective management of complex electronic installations, such as MSSR, PSR, VOR, DME, VHF, etc. RCMS can use different types of interfaces to the remote sites, such as leased or dialled-up lines, TCP/IP, SNMP, Web-server, etc. RCMS supplies real-time status from the systems to the maintenance and operating staff. The front-line fault-detection capabilities increase the security and safety of connected facilities and give early warnings of system faults and disturbances.

Besides remote control of the connected equipment, remote maintenance and diagnostic tests can also be carried out. Other RCMS benefits include an HTML window for reading documents, dial-up voice alarm, error and event logging, and handover functions.

RCMS can be integrated with a CMS (Control & Monitoring System) to provide complete control and monitoring capabilities from the individual computer at the airport to the radar station miles away.

**Remote Control and Monitoring System, RCMS**

EMS is an environmental monitoring tool that registers, calculates and processes air traffic noise and emission data at an airport and its surroundings. In combination with the environmental simulation tool the system covers the whole spectrum of environmental activities needed at a modern airport.

EMS is designed to provide highly detailed environmental data, allowing users to actively monitor and calculate several environmental fields, such as emissions (CO2, CO, NOx, and HC), movements, noise recordings, noise calculations and flight path analysis according to user-defined parameters. The automatic flight path analysis consists of tools for simulation and investigation of restriction areas, departure altitudes and route deviations.

EMS presents all data to the operator in a user-friendly interface consisting of flight track presentation in both 2D and 3D and compiles user-defined reports for on-screen presentation and printing.
**FLIGHT INFORMATION DISPLAY SYSTEM, FIDS**

In A2 (Airport Administration) there are functions for FIDS and Gate Information, but these functions can also be used as stand-alone functions. The FIDS/Gate system has interfaces for connection to external systems such as flight plan systems, web servers, etc., to receive and send flight information. The system can be configured in a simple way in order to select information relating to check-in, gates, baggage, customs, etc., that eases and reduces the workload at peak periods. In FPC, FDP is connected to several external systems for the collection and distribution of briefing information to FPC’s customers.

**FLIGHT PLANNING CENTRE SYSTEM, FDP**

FDP (Flight Data Processing) is also available in an adapted version for national Flight Planning Centres, FPC, for the planning and realisation of air travel both nationally and internationally. The FDP system is specially developed to handle a large quantity of flight plans, from several clients and servers with high redundancy and availability. Great importance has also been placed on the design of the user interface in order to achieve a secure and user-friendly interface that eases and reduces the workload at peak periods.

In the expanded version a central server cluster is used and connected via a separate network to the message-switch server. The ATS receives acknowledgements and possible error messages for all ATS messages that are sent and also receives the status of the airports that are connected to the network. This expanded version also includes a central database that contains a national aircraft register as well as handling the storage and distribution of ATS messages. The ATS collects and manages a large amount of information about all flights, including flight plan systems, web servers, etc., to receive and send flight information. The FIDS/Gate system has interfaces for connection to external systems such as flight plan systems, web servers, etc., to receive and send flight information.

**ADMINISTRATION AND BILLING, A2**

A2 is a valuable airport administration tool that offers increased control of many vital airport functions, including aircraft landing, parking statistics, and handling fees as well as flight information display systems. A2 can streamline the administration at your airport by bundling vital applications into one cost-effective administration package. The system facilitates efficient airport management by offering central administration of digital airport handbooks, gate and flight information display systems (FIDS) and invoicing for landing, parking and handling services. FIDS information can be distributed to a Web server, providing up-to-date flight information on the Internet. The staff can access information regarding incoming aircraft, such as aircraft requirements and the location of water and fuel connections, making ground handling more efficient.

**AFTN MESSAGE SWITCHING**

FDP is available in different versions so that it can operate as a normal AFTN centre or with expanded customised functionality. In the expanded version a central server cluster is used and connected via a separate network to the message-switch server. The ATS receives acknowledgements and possible error messages for all ATS messages that are sent and also receives the status of the airports that are connected to the network. This expanded version also includes a central database that contains a national aircraft register as well as handling the storage and distribution of ATS messages. The ATS collects and manages a large amount of information about all flights, including flight plan systems, web servers, etc., to receive and send flight information. The FIDS/Gate system has interfaces for connection to external systems such as flight plan systems, web servers, etc., to receive and send flight information.

**FLIGHT DATA PROCESSING, FDP**

FDP is a flight planning tool that generates, receives, updates, processes and distributes flight plans and ATS and flight plan-related messages in real time. FDP can handle several functions in one work-station, including automatic flight plan retrieval and updating, format checking of ATS-related messages and adjacent weather data provision, thereby improving improved control of the flight plan dispatch. Information is also communicated to local and external networks, such as AFTN, CFMU, IFPS, radar processing, etc. FDP’s format checking of incoming and out-going ATS-related messages speeds up communications and reduces the risk of human error. Automatic flight plan updating means the latest information is instantly available to all connected systems. FDP is a role-based system. It includes strips in a TWR/APP environment. The e-strip can be integrated with the flight plan systems, web servers, etc., to receive and send flight information. The FIDS/Gate system has interfaces for connection to external systems such as flight plan systems, web servers, etc., to receive and send flight information. The system can be configured in a simple way in order to select information relating to check-in, gates, baggage, customs, etc., that eases and reduces the workload at peak periods. In FPC, FDP is connected to several external systems for the collection and distribution of briefing information to FPC’s customers.
SURVEILLANCE

ADVANCED SURFACE MOVEMENT GUIDANCE & CONTROL SYSTEM, A-SMGCS
The Advanced Surface Movement Guidance & Control System provides routing, guidance, surveillance, and control of all aircraft and affected vehicles within the airport vicinity. The A-SMGCS is built around several of the i-acs modules and is interfaced to external systems such as AMAN, DSMAN, CDM NET, Gate System, Airport Lighting, Radar, IR Sensors, ADS, etc.

The different data sources are processed in real time and fused into a general view or displayed in user-defined information layers containing preferred data for routing, guidance, surveillance and control.

The processed data can be distributed to Airport and ATM stakeholders via a network or data link to provide better situational awareness and support a high safety level. The external cooperative surveillance technologies such as Radar, GNSS and Multilateration are combined in a Data Fusion process and tracked in the Multi Sensor Tracker.

The tracks are correlated with flight plan data and displayed as definable symbols with connected dynamic labels over map layers. All targets are checked in the safety-net database process for any alert situation such as runway incursion, probability of collision, proximity to restricted areas, etc.

The extractor can be used within aviation surveillance systems and surface movement radars, marine radar stations, costal surveillance systems, etc. These are a few examples of methods that have been used to develop a very reliable STCA, with proven performance in operational use at international airports.

INFORMATION SYSTEMS FOR ATS
INTEGRATED REAL-TIME INFORMATION SYSTEM
IRIS introduces an open-source and vendor-independent system for efficient information support for TWR/APP/ATCC personnel. Both dynamic and static information are stored, handled and presented.

With the role-based user interfaces, the information can be adapted for every operational need. The system combines numerous important functions for the controllers into one display instead of requiring several separate systems for weather information, status monitoring, remote control, AFTN terminal, flight information, document handling, mail system, briefing, shift and telephone lists, video surveillance, etc.

The system offers an individual workflow with a customer-changeable user interface.

IRIS is a scalable real-time information system with an open architecture. This makes it possible to choose either free-licensing COTS software or supported commercial COTS software. The installations can be stand-alone, or can form part of a nationwide network with a central installation where backup and administration of all sites can be handled, including distribution of information, documents, maps, etc., to all sites.
WEATHER SYSTEMS

Automated Weather Observation System, AWOS & ATIS

AWOS is a real-time weather observation system specially designed to detect, report and disseminate weather conditions at airports.

AWOS can itself produce high-quality reports like METAR and SPECI, MET REPORT and SPECIAL and can also provide ATIS or DATIS with MET information. All weather data and changes will be distributed according to ICAO and WMO rules and recommendations.

AWOS is designed to produce information to different needs and demands. Selected packages of information can be transmitted to other ATC systems, to the Internet or to any other customer. The AWOS system can reduce the workload for the ATC staff and improve the quality of the reports and save money at the same time.

AWOS is available in different versions for the municipal airport up to the international airport. AWOS supports almost every type and brand of weather sensors. It can also be integrated with our systems for ATIS, Thunder Storm Warning and MET Display for ATC.

WEATHER BRIEFING

Instant Briefing is a complete network-based weather briefing tool that will keep airports, pilots, briefing officers and ATC staff up-to-date on weather conditions at all times and in a flexible way.

The system presents customized weather reports using animations, audio and text. Reports are compiled and regularly updated by a meteorologist using maps, pictures (satellite, radar, and forecast graphics), text and voice recordings that are fed into the system. The information can be accessed at any time across the ATC and local networks. In the case of unexpected weather changes, updates to reports can rapidly be made by the meteorologist and dispatched through the system.

Instant Briefing also includes an electronic conferencing facility that allows the user to hold real-time conferences over the network with the meteorologist when necessary.

Remote-controlled web cameras can be connected for remote surveillance and recording of cloud formations at surrounding airports.

WEATHER SYSTEMS

TRAINING AND SIMULATOR SYSTEMS

Radar Approach Simulator

The approach simulator guarantees good operational training and ensures that the air traffic controllers can maintain their qualifications and skills with regard to radar control, methods, procedures, etc., as well as training in new functions before they are introduced to the ATC systems for operational use.

The approach simulator uses the same HMIs (Human/Machine Interfaces) that are used in the operational systems. Recorded and/or simulated flight plan and radar data is used to give as realistic training as possible.

WEATHER SYSTEMS

TRAINING AND SIMULATOR SYSTEMS

Automatic Dependent Surveillance, ADS

The ADS-B Display and Processing System

A flexible, high-performance, low-cost ATC system, specially designed for presentation of ADS-B data. The system is based on the operational ATC system, RDP.

The ADS-B data can be received by subscribing to data within user-defined volumes. It is also possible to subscribe to single objects independent of the subscribed volumes. ADS-B display contains an integrated graphical tool for managing the subscriptions.

The ADS-B system can also offer processed ADS-B data to external systems and clients.

WEATHER SYSTEMS

TRAINING AND SIMULATOR SYSTEMS

Automatic Dependent Surveillance, ADS

The CNS Ground Network

It provides distribution of air- and ground-based processed CNS data to a configurable area with coverage from nationwide distribution down to contract data to a single transponder. CNS information such as ground-processed weather data, traffic information, etc. is distributed to the specified areas as Automatic Dependent Surveillance Broadcast (ADS-B) data through connected ground stations.

The ADS-B Service offers an external interface to subscribe to definable aircraft/vehicle transponder IDs and/or all IDs in definable volumes in the covered area. Sharing of identical position and information provides high situational awareness.

WEATHER SYSTEMS

TRAINING AND SIMULATOR SYSTEMS

Automatic Dependent Surveillance, ADS

The CNS Ground Network

Services

Saab offer a wide range of professional services in our technical areas, including:

• Project management
• Procurement assistance
• System design, software development, and system integration
• System safety analysis
• Installation and commissioning
• System testing and performance verification
• Airspace information and basic data
• Ergonomic and custom-designed consoles
• Information security at airports to secure IT systems against attacks and infiltration
• ATC TWR and APP design
• Flight inspection
• Radio communication
• Airfield lighting
• Navigation aids
• Data and telecommunications
• Electromagnetic technology
• Maintenance planning and services
• Training and documentation

Our scope of involvement includes turnkey projects, systems integration, technical assistance and maintenance services.