



ASTOS

.... your new A-SMGCS

ASTOS improves your Ground Surveillance

ASTOS is a Level 3 A-SMGCS - an essential tool for making airport traffic more efficient and safe. It holds all ICAO, Eurocontrol and EUROCAE defined elements as there are: Surveillance, Guidance, Planning and Control. ASTOS particularly addresses and prevents conflict situations and congestion without disturbing the natural flow of all airport surface movements.



Airports are the bottlenecks of civil aviation. With an annual 5 % increase in ground movements, many airports have the risk of not being able to meet the increasing demand. In many cases, an extension of the airport is not possible because of environmental restrictions. Consequently, the efficiency of

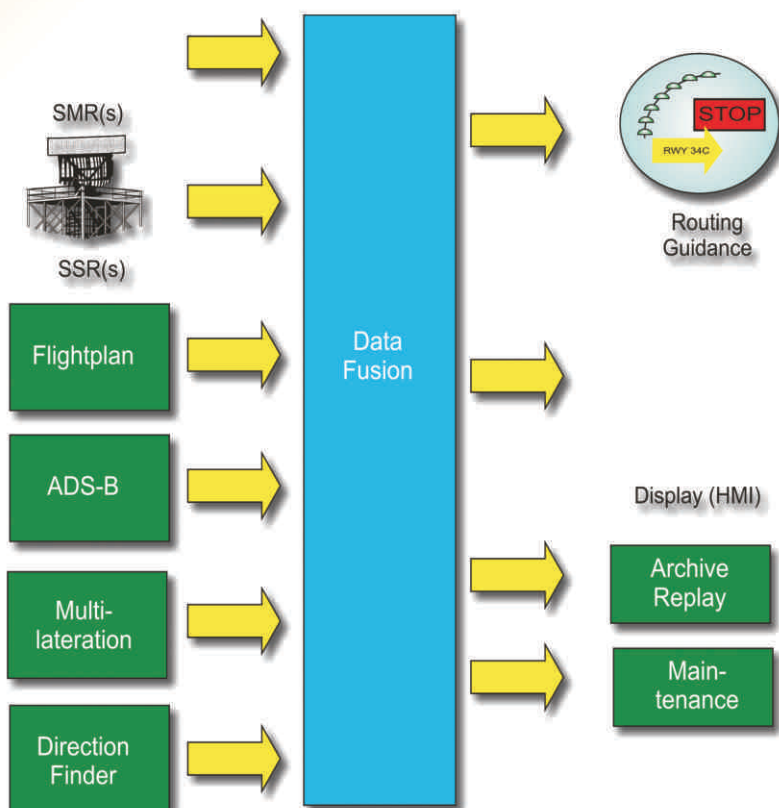
all airport movements supervised by airport managers must be increased.

ASTOS has become an essential tool for more efficient and safer ground traffic movement. ASTOS particularly addresses and prevents conflict situations and congestion without disturbing the natural flow of all airport surface movements.



ASTOS

An Advanced Surface Movement Guidance and Control System



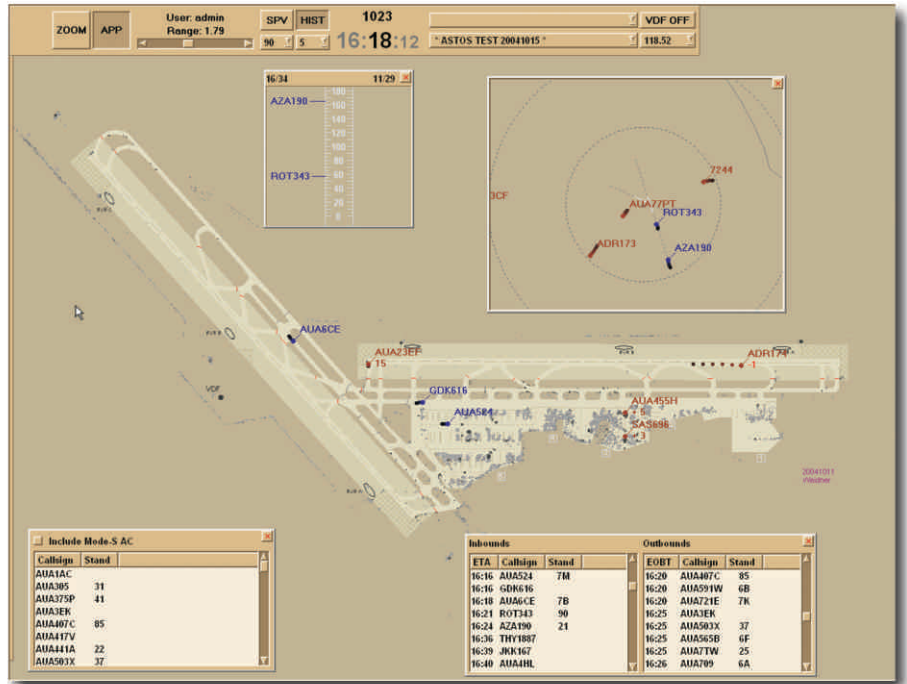
Multi-Sensor Data Fusion (MSDF) is essential for the accurate surveillance of all airport traffic. MSDF combines data from multiple radars and other sensors into a reliable and precise traffic situation presentation. Data from the following sensors can be integrated:

- Primary ground radar data (SMR) is used to identify aircraft and vehicles on the runway and taxiway. All available radar data are incorporated to track all moving targets on the airport.
- SSR data provides approach information for incoming aircraft and initiates ground movement tracking procedures.
- Flight plan data matches SSR codes with call signs, stand and gate information, aircraft type, etc.
- Multilateration Systems can also be integrated into ASTOS to provide data and positions from transponder-based systems.

ASTOS System Layout consisting of Data Sources, Data Fusion, Display, Routing and Guidance, Archiving and Maintenance Unit.

Labeling and Identification

Incoming traffic: Approaching aircraft are tracked to the runway via transmitted SSR data. When the aircraft is detected a few meters above ground by the surface movement radar (SMR), a new ground track is initiated for the landing aircraft. SSR-code, SMR data and flightplan data (call sign, gate and/or parking position, aircraft type, etc.) are matched and assigned to the track that displays the aircraft movement until the designated parking position has been reached. Multilateration data are also used for simultaneous tracking, if available.



Departing traffic: Can be automatically labeled but requires a multilateration system to achieve fully automatic identification. If no multilateration system is present, tracking can be manually initiated by the controller. Labels can be assigned manually using drag-and-drop from a list of flight plans. Since ASTOS is a multi-display

System designed for use with multiple controller working positions, labels entered at any controller working position will appear consistently on all other positions.

Labels of departing aircraft move with each target and disappear a few seconds after the target becomes invisible for the SMR after take-off.

The ASTOS tracking feature uses all available SMR and multilateration data for target detection. If multiple SMRs are available, all of them are integrated into the traffic situation display.

The ASTOS HMI has been defined in close cooperation with the air traffic controllers of Vienna International Airport and is very well accepted by the operational staff.

SMR Video Extraction and Radar Tracking



Surface Movement Radars (SMRs) are one of the main components of the system and are already installed at many airports. The ASTOS system is capable of interfacing with all existing radars by using a highly developed, sophisticated Radar Video Extractor (RVE) hardware module, which offers the following features:

- The RVE can be linked to analog or digital radar interfaces giving the customer maximum flexibility in regard to the choice of the radar.
- RVE generated output can be transmitted on conventional local area networks and requires very little bandwidth compared to conventional video distribution systems.

Safety Logic



Runway Incursion Alert (Simulation)

Especially during high peak traffic hours, the Air Traffic Controllers need assistance to avoid ground traffic conflicts. The ASTOS tracking and labeling features can provide the controller with functionality and ease of operation, thereby avoiding potentially dangerous situations.

In addition to the standard ASTOS package, the following alerting functions can be provided as optional ASTOS deliverables:

- Stop bar crossing alerting
- Runway incursion alerting
- Area infringement alerting
- Aircraft separation alerting
- Taxiway collision alerting
- Taxiway adherence monitoring

All these alerting functions are configured in accordance with local requirements.



ASTOS as installed at Vienna International Airport

General Features

- Open and modular architecture
- Runs on COTS (common off-the-shelf) equipment
- Data acquisition can be physically distributed over multiple machines for high redundancy and easy installation
- Supports multiple display stations (CWPs)
- Extensive HMI (Human Machine Interface) configurable at the CWP on a per-user basis
- Collaborative labeling: Manually assigned labels are immediately visible on all CWPs
- Extensive logging and statistics of all activities
- Statistics functions for evaluation and optimisation purposes
- Data archival and replay
- Automatic label acquisition with and without SSR
- Clear and concise programming interfaces for easy extension

Tracking Features

- Adaptive/selective motion filtering: Temporarily and spatially filters remove static echoes from SMR images. Only moving echoes are retained. Echoes with already assigned labels are excluded from the filter
- Speckle removal: ASTOS removes speckle and other residuals
- Kalman-filtering
- Rule-based tracking: multiple parameters like echo weight, velocity, direction, etc. are combined in several rules
- Parameter limits can be based on geographical properties

Visualization Features

- HMI can be configured to the needs of any airport situation
- Arbitrary user-defined background image maps
- Arbitrary user-defined vector overlays with arbitrary colors and line widths
- User selectable afterglow and trail history dots
- User definable colors

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