e-TWR
ENAV ATM TOWER SUITE
Effective situational awareness for Airport Traffic Control

ENAV ATM TOWER SUITE

» MISSION

e-TWR Suite is an ATC solution based on strictly integrated tools and provides high level of automation to air traffic control for safe and efficient procedures. It is scalable and flexible and, as such, ATC tools designed by Techno Sky can be easily harmonized to meet customer's operational needs, in all types of tower complexity scenario (from FIS to A-SMGCS).

Operational scenario:

e-TWR FDPS comes with a high level of modularity in terms of integration with ATCO HMIs (Flight Plans, Air Traffic Surveillance, Paper Flight Progress Strip Printing, Electronic Flight Progress Strips) and external systems such as AWOS for meteorological data, runway status control, AGL for runway lights control, NAVAIDS for status monitoring, to increase the situational awareness during the operations.

e-TWR HMIs are the result of a continuous and strict collaboration with the Italian Air Navigation Service Provider (ENAV) ATCOs.

Key benefits:

- Fully integrated with Techno Sky **e-AWOS System** to:
  » Increase the situational awareness in normal and severe weather conditions
  » Meteorological data embedded into CWP and EFPS
- **Technical Supervision** System available
- Simulation Platform available with the same ATCO HMIs
- Maintenance tool **e-MAPS SUITE** included to:
  » Create/upgrade maps with aeronautical graphic elements (SVG - Scalable Vector Graphics multi-layer maps format)
  » Generate ATC geography for e-TWR FDPS following EUROCONTROL AIRAC Amendments
- Standard formats with third-party systems (ADEXP and FMTP)
- Standard interfaces with external systems (OLDI, AFTN, AMHS)
- User-friendly user interfaces
- SSR ORCAM (Originating Region Code Assignment Method) Rules application with local SSR codes bank
- Mode-S compliant
- Interface with Airport Ground Lights systems to control runway light from the EFPS HMI

- Interface with NAVAIDS to monitor status from CWP HMI
- Radar Labels/Flight List integrated hooking
- Airport safety support service CATC, RMCA and CMAC (CP1 compliant)

Main technical features and overview:

The suite comes with a minimum set of ATC tools:
- **TWR FDPS** (Tower – Flight Data Processing System)
- **CORLM** (Correlation Manager)
- **STRIPS** (Paper Strip Printing Server)
- **Airport Safety Support Service Server**
- **TECSUP** (Technical Supervision Server)
- **RPS** (Data Recording and Presentation)
- **TWR CWP** (Surveillance Controller Working Position HMI)
- **TWR FDO** (Flight Data Operator HMI)
- **TWR EFPS** (Electronic Flight Progress Strips HMI)

TWR FDPS is the core server component in charge of the elaboration and processing of flight data for the tower sector:
- Departure, Arrival and Local Flight Plans Planning
- (IFR/VFR Rules, Route Decoding)
- SID/STAR Procedures
- Airport Runways Scenario
- 4D Trajectory Prediction and Progress Update (Estimated/Actual Times calculation)
- DCT Free Routes currently available in Italian Air Space
- OLDI IFPL/ICHG/IDLA elaboration, CTOT calculation on SAM/SRM Messages
- ATC Clearance and ATC ground-based operations

**CORLM** is the server component in charge of handling flights correlation with surveillance tracks.

STRIPS is the server component in charge of handling paper strip printing (automatically or manually triggered).

Airport Safety Support Service is the server component in charge of handling conflict detections such as Conflicting ATC Clearances (CATC), Runway Monitoring and Conflict Alerting (RMCA), Conformance Monitoring Alerts for Controllers (CMAC) in conformance with Eurocontrol and SES CP1 requirements.

TECSUP is the server component in charge of system technical supervision (SNMP and nagios® based).

RPS is the component in charge of flight and track data recording and allows to reinject data to a CWP to start an interactive replay session. Is has a dedicated HMI to perform queries and generate reports.

Clients HMIs
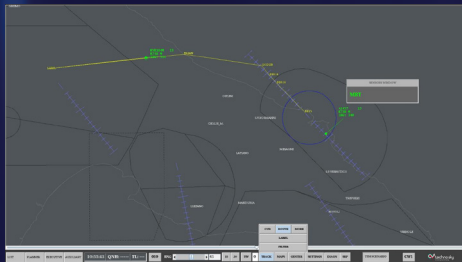
TWR CWP (Surveillance Controller Working Position HMI) is designed to interface both FDPS and surveillance data sources (single sensors or fused system tracks from SDPS) in order to provide ATCO with a Global Radar Presentation of airport air traffic on the ground and in the air. Significant Flight Data received from TWR FDPS are represented on configurable Radar Tracks labels shown on the map to identify aircraft in the local Area of Responsibility. Flights can be also shown in configurable list formats docked beside the surveillance display or floating. Data shown on radar labels are immediately accessible to the ATCO through mouse clicking, shortcuts to customized orders and functions can be properly configured on labels to make the operations seamless. Each e-CWP can have its ATC role with dedicated functions.
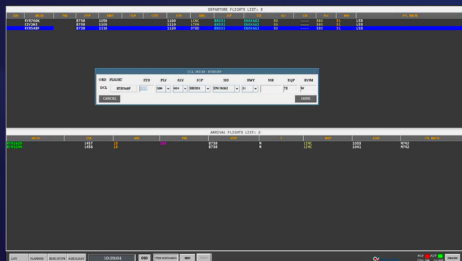
TWR FDO (Flight Data Operator HMI) is based on a long-lasting study dedicated to well arrange flights lists into a monitor of whatever resolution according to users' HMI requirements. Layout, Colors, Fonts, Size, ATC Menu, Toolbars and Warning Functions, related to any flight data changes relevant to the ATCO operations, can be

adapted to the user's needs. Paper-strip printing is provided on request and when automatic events occur. Lists can be adapted in size and dimensions, order criteria of flights in each list are configurable.
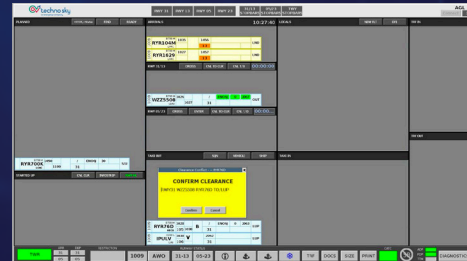
TWR EFPS (Electronic Flight Progress Strips) is designed to allow the management of flight plans mainly for ground operations until take-off and after landing in a TWR environment. EFPS provides ATCO with a realistic electronic representation of paper strips onto an electronic board (touch screen) to track the movement of aircraft and vehicles across bays representing the flight status and location on the airport area. Its goal is to streamline the operational flow of the strips across phases and allow flight transfer of control (TOC/AOC) between ATCO roles.
It is flexible and scalable in terms of ATCO roles bays layout for each role, ATC workflow, number of ATC positions.
Each position layout contains a set of strip bays, whose layout reflects the procedural workflow of a flight. The migration of a strip from one bay to another occurs when an ATCO performs an order on the flight, by drag and drop to the destination bay or by clicking on the order button, each strip always shows the next action button in the same place.

CATC Alerts popups are shown if a given clearance conflicts with a previous one, thus increasing safety of operations.
User interaction with EFPS can be via touch, stylus pen and mouse.

Interoperability with external systems to increase the situational awareness of ATCOs:
- **Airport Ground Lights:** the system can interact with lighting system to manage runway lights intensity and stop bars, providing ATCO with an integrated toolbar
- **e-AWOS System:** bidirectional communication with Techno Sky e-AWOS system allows visualization of weather information as well as runway in use, runway status and Low Visibility Procedures

Each e-TWR HMI is the result of many years of expertise and a strict collaboration with the Italian Air Navigation Service Provider (ENAV). All our HMIs are highly configurable:

- Customizable Layouts, Colors, Fonts, Size, ATC Menu, Maps, Radar Label, Toolbars and Warnings
- Paper-strip printing on request and /or when automatic events occur
- Flights List and Radar displays well-combined on e-CWP (docked and/or floating)
- Customizable shortcuts to ATC orders from radar labels
- Customizable airport Layout: Parking Bays and Holding Point on interactive airport map
- Customizable operational workflow on EFPS (next order always suggested)
- Overlapping Layers of maps to identify the right Area Of Responsibility on e-CWP
- High Configurability of screen layout, to provide different data views
- Multiple ATCO Roles configurable and easily switchable (e.g. TWR, GND, APP, COO, DEL, SUP or Combined)

Interfaces:

- Surveillance data standard formats from single sensors of fused system tracks from SDPS (ASTERIX CAT001, CAT002, CAT010, CAT019, CAT020, CAT021, CAT023, CAT034, CAT048, CAT062, CAT063, CAT065)
- Flight Plan standard interface AFTN and/ or AMHS X.400 (IFPL/EOBT update for Flow Restriction according to Slot Allocation Messaging)
- OLDI protocol for co-ordination and transfer of current flight data between adjacent ATSUs
- International ICAO and EUROCONTROL ADEXP and FMTP Standards compliant
- AWOS System Interface for MET data exchange
- A-CDM integrated solution

Technical Specification:

- 1000 tracks and 1000 Flight Plans proven
- Cluster failover configuration
- Seamless network redundancy at switch and host level
- Open-Source Database
- Enterprise Linux OS based servers and workstations
- Physical, virtualized or mixed deployment
- Failover < 20secs (worst case)

Regulations and certifications:

- EATMN Equipment compliant with Reg.(EU) 2018/1139
- Supporting ANSPs for SoC emission in compliance with Reg.(EU) 2017/373
- CMMI-DEV Level 2 (V.3.0) compliant development cycle
- Software Assurance Level (SWAL) according to EUROCAE ED-153
- Secure Development process compliant with EUROCAE ED-205A

Support:

- Train-the-Trainers service for user and technical topics
- System Remote monitoring and maintenance
- Ad-hoc prototyping to meet customer's operational requirements