

# ENAV. WE LOOK UP.

ALL OUR EXPERIENCE AT THE SERVICE OF AIR TRAFFIC CONTROL.



## AERONAUTICAL CONSULTING & DESIGN

The need to increase airspace and airport capacity, improve efficiency, reduce environmental impact, optimize airport operations while continuing to maintain and promote safety are challenging and paramount objectives in the growing air traffic sector.

With outstanding expertise in Air Traffic Management operations and services, we are the ideal partner for any Air Navigation Service Provider and Aviation Industry aimed at improving and modernizing airspace and airport systems. In Enav, we are fully committed to delivering “turnkey” services to our customers by moving from concepts to operations. Every aspect related to Aeronautical Consulting & Design within the air navigation services provision domain is fully covered by us counting on internal capabilities, from conceptual definition to operational implementation.

**We have the skills, competences and experience to help our customers achieve their strategic and operational goals by providing a wide range of high quality services:**

- Airspace Design & Management
- Flight Procedures Design
- Design and Optimization of the airport air-side component
- Aeronautical Meteorology Services
- Design and Realization of aeronautical databases of terrain and airport Obstacles
- Management and Publication of Aeronautical Information
- Development, Simulation and Validation of new operational procedures, concepts and systems
- Consultancy and Assistance for the design and implementation of Safety and Security Management Systems for ANSPs



## Tangible expertise melted into operational excellence

Our consulting services rely on thorough understanding of real situations, based on our extensive and practical experience as ANSP in the busiest and most constrained airspaces, and post design problem solving ability. By successfully managing professionals with operational and technical backgrounds in ad-hoc programs as required on a case-to-case basis, Enav Departments' key personnel are able to cover the entire ATM value chain and ensure high performance, maximum flexibility, great efficiency and top-level program management. Our deep experience over the last years in domestic and international fields puts us in the position to provide credible, reliable and effective recommendations based on operational needs, thus ensuring the successful compliance to customer's requirements.

## Flexibility to your needs

Operational, governance and company dimensional flexibility are our key features. During any project lifecycle, one of our key success factors is the high degree of adaptability and flexibility to customer's needs and requirements. Our methodologies are fine-tuned and customised on the basis of the specific needs of the project by taking into account our customer's expectations.



## Certification/Qualifications

Our customers can rely on the fulfillment of all international ATM standard taking into consideration that Enav is a certified Air Navigation Service Provider, compliant with the Common Requirements for the provision of ATS, CNS, AIS, MET and Training services. Moreover all our services are provided in compliance with ISO 9001:2008 Quality Standards and are ICAO compliant.

---

## EDAMS

*Embedded Datalogger for Meteorological Systems  
Automatic Weather Observation System*

### System target

Embedded Datalogger for Meteorological Systems (EDAMS) is an automatic weather station for surface weather measurement, providing field-proven reliability and accuracy. It can be equipped with weather sensors produced by any manufacturer, such as anemometers, barometers, thermometers, hygrometers, rain gauges and other sensors, to perform computing, datalogging and dispatching functionalities. EDAMS system acquires sensor's data, elaborates averages and statistics according to ICAO and WMO international standards and dispatches information to peripheral systems (e.g.: AMIS, E-AWOS or third party AWOS class systems) via Local Area Network, serial or leased line modems. EDAMS is an excellent choice for applications which require ease of installation, low power consumption, automatic operations and capability to interface with modern telecommunication options such as packet-switched data networks. EDAMS provides a heavy duty rugged waterproof case that allows indoor or outdoor installation in regular or harsh environments.

### System description

EDAMS system is an embedded datalogger able to interface analog and digital sensors. The basic sensor suite includes wind speed/direction, pressure, temperature, relative humidity and precipitation sensors. System modularity allows optional smart sensors like transmissometers, ceilometers and visibilimeters to be added as well. EDAMS is based on an embedded x86 single board computer equipped with at most 7 I/O expansion modules, including 16-bit ADC for analog input, Pt100/ Pt1000 interface for temperature sensors, counter and serial ports. The large number of ports and interfaces also allows legacy sensors to be interfaced, supporting reuse and enhanced cost effectiveness. The embedded software performs data acquisition from connected sensors and elaborates meteorological data such as wind (direction and intensity), temperature, humidity, as well as QNH, QFE, dew point and other derived data to be dispatched to peripheral systems. The board computer also includes a Compact Flash slot for data and log storage.

### Power Management

The Power supply unit consists of a 120W AC/DC power supply and a 12V Pb Battery. The internal UPS guarantees long term operation during main power failures. Using the default battery, EDAMS system is able to operate seamlessly for 12 hours without main AC Power. An additional 220W AC/DC power supply is also included for sensor heaters and obstruction lights.

## Telemetry and Communication

EDAMS system provides redundancy in communication interfaces, allowing data to be transmitted by means of different technologies.

**Serial I/O line:** EDAMS system has one RS-232 or RS-485 port as standard. Two optional plug-in communication modules can be used for enhancing the number of serial I/O channels up to seven. A serial I/O line can also be used in conjunction with a leased line modem to provide data transmission on copper wire.

**Local Area Network (LAN):** Edams system has two Gigabit Ethernet interfaces, allowing it to be connected to up to two networks or to a single network with redundant interfaces. Data can be sent over the IP connection, using both UDP and TCP (client or server) protocols.

## Mechanical characteristics

The housing is made up of a steel box and an aluminium shelter. They are both made in 1.4301 (AISI 304) stainless material and painted with RAL 9003 color. The whole housing is compliant with IP66 protection rating in accordance with EN 60529/09.200 allowing indoor and outdoor mounting on masts, wall or towers.

## Operating environment

EDAMS systems has been especially designed for unattended operation in open-field environments, including harsh ones. EDAMS system has a wide operating temperature of -50° to +60° C. When installed outside, the enclosure is efficiently protected by a white radiation shield against excessive sun radiation. The shield also minimizes temperature differences between day and night, thus preventing internal condensation.

## Certifications

EDAMS is certified in conformity with the following standards and other normative documents:

**Electromagnetic compatibility:** EN 61326-1: 2006

**Product safety:** EN 60950-1: 2006 +A11:2009 +A1:2010 +A12:2011

The product is compliant with the provisions of the following European Directives:

**2004/108/EC:** Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.

**2006/95/EC:** Directive of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

---

## E-AWOS

*Automatic Weather Observation System*

Meteorological information is a critical factor for air traffic control. Starting from this evidence, we developed a new meteorological standard system for pertinent airports, designed by Meteorologists together with ATC experts, for a better managing of observed meteorological data in TWR and APP operations.

E-AWOS (Enav Automatic Weather Observing System) is based on a four subsystem architecture, composed by the AWOS system itself (which is the main application) the RVR system (whose data are usually integrated into the AWOS client, but can also be displayed on a separate monitor, if required), the ATIS system (where required) and the TRAINING system, capable of simulating different meteorological scenarios, customized on local aerodrome, for training purpose (also if required).

### System description

The E-AWOS system is based on a client-server architecture, with automatic failover management (a fault tolerant cluster system which consists of two servers organized in a master/standby redundancy). A modular design approach makes it versatile for any required customization, in order to create a system suitable for any customer's need. The system has, of course, the required flexibility for being upgraded according to the ICAO amendments or local operational needs and it can also be easily interfaced with any other meteorological existing system or sensor.

#### **The E-AWOS system generally performs:**

- Data acquisition from any field sensors, dataloggers and external systems
- Data validation and processing, in accordance with ICAO Annex 3 rules
- Meteorological data viewing in MET observers, ATC operators and maintenance working positions
- Sensors status monitoring and management
- System supervision and alerts management
- Aeronautical and synoptic weather report compilation and emission through national networks
- Data dispatching to external peripheral systems
- Data storage and archive consultation

## Client presentation

The E-AWOS system provides different layouts customized for each user's operational needs. All the GUI are adaptable to screen size and fully configurable. If required a predefined data layout can be easily modified according to specific needs.

The **TWR/APP** client provides an innovative user friendly HMI for ATCOs, in a way that only data really useful for TWR and APP operations are reported. It shows the overview of the airport meteorological situation, displaying real time data from field sensors and local reports, and allows the management of RWY(s) status.



The **MET client** provides a geo-referenced overview of real time data from field sensors and external systems, allowing both the setting of alarms thresholds and a direct field sensors managements. Specific tools allow the compiling and emissions of aeronautical and synoptic weather reports, both in a manned and unmanned way. A historical archive for browsing and managing functions is also available.

A **MAINT client** is also available, providing alerts to technical operators and allowing maintenance staff to easily monitor and manage status of systems, connections and sensors and to quickly resolve any occurred failure.



## CRS

*Central Rostering System*

CRS, Central Rostering System, is the answer to the ever growing request of efficiency, flexibility, information and optimization in personnel rostering by Air Traffic Management industry.

### Efficiency

CRS offers a complete set of features with the aim of reducing the complexity of the monthly planning and daily management. In every phase of the rostering process, CRS calculates and displays all the useful data on staff employment taking into account all constraints and rules in order to produce optimal rosters. The aim is obviously to reduce errors, reduce work load and increase data sharing.



### Flexibility

Constraints and work organization rules are highly configurable, so CRS can plan and manage all type of rosters. Not only ATCOs of ACCs and towers, but also technical and administrative departments. CRS is not an exclusive prerogative of structures with numerous ATCOs but can be very effective in the optimization of smaller rosters.

### Information

In order to reduce offices workload and to improve services for the employees, CRS offers an interface via web browser, iOS and Android apps that allow employees to remotely control their shifts, request days off and shift changes with colleagues. Such requests are automatically forwarded to shift managers that can rapidly accept or reject them having the possibility to verify the employee indexes of presence and position respect to the standing regulations.

## Optimization

CRS offers a set of tools to support both the planning phase and the daily management allowing the automatic production of monthly plans and daily logs in conformity of all company rules and constraints and providing optimized solutions taking into account company costs, even distribution of workloads and ratings usage.

## Integration

Thanks to the use of standard software interfaces, CRS can easily be integrated to pre-existent systems like:

- Access control systems;
- Document management systems;
- Financial systems;
- Digital signage systems.



## TRAINING SERVICES

Due to the strong importance given to professional training and continuous development, we have been able to reach the highest levels of performance amongst international Service Providers for both quality and quantity of services provided.

The Enav Academy is a recognized Centre of Excellence in Aviation Training for all the players of the Air Transport Industry. Thanks to its solid training platform based on knowledge, experience, technologies, continuous innovation and adaptive capabilities in addressing requests and finding solutions, the Enav Academy designs, develops and provides a wide range of Training Programs, according to the standing regulatory prescriptions and customer's needs. The Enav Academy has two Training Centers - in Rome and Forlì - and its Products Portfolio is structured in different Training Solutions:

- ANS Training
- Technological Training
- Meteorological Training
- Managerial Training

Training courses can be tailored to specific customers' needs or, alternatively, students can join the courses planned in our yearly training calendar.

### Our training centers

The Rome Training Centre is mostly dedicated to managerial and technical training activities. It offers a multimedia classroom with 16 PC stations, 3 classrooms including a main lecture hall for 24 participants and 6 self-learning stations (PTT - Part Task Trainer).

The Forlì Training Centre is strategically located in the central part of Italy and it is a branch of the Aeronautical Technological Centre, a pivotal point shaped by industrial players and educational institutions that are working together to provide aeronautical training and competence development. The Forlì Training Centre is one of the largest civilian ATC simulation and training centers in the world.



## Advanced systems

The ENAV Academy is designed to provide a comfortable training environment and is equipped with a comprehensive range of facilities including state-of-the-art Radar and Tower Training Simulators. The following facilities and simulation systems are available:

- 9 classrooms to accommodate a total of 160 participants
- 1 Conference hall with 200 seats
- A library with several Internet access points
- 8 3D Tower simulators
- 1 classroom with 7 self-learning stations (PTT - Part Task Trainer)
- 2 radar simulation rooms (for approach and en-route traffic management)
- 1 procedural simulation room (for approach and en-route traffic management)
- 1 certified flight simulator (FNPT II)
- 2 multimedia classrooms (64 stations)
- Catering area

All simulation systems have the capability to provide representations of different operational scenarios, from airport operations to area or terminal environments.

## Certifications/Qualifications

Enav ATC Training courses benchmark all international standards: European Common Core Content Specifications for Air Traffic Controllers Training and ICAO Standards and Recommended Practices. Moreover, all our services are provided in compliance with ISO 9001:2008 Quality Standards.



---

## ATIS

*Automatic Terminal Information Service*

The Automatic Terminal Information Service (ATIS) provides a critical information for ATC. According to ICAO last SARPs, Techno Sky has realized a new generation ATIS, acknowledging the overall standard updates.

ATIS system can be either integrated as a subsystem of the E-AWOS developed by Techno Sky, or coupled with any third party AWOS system. It receives airport weather real time data provided by the local MET system and processes them in order to create an ATIS message, that can be extended with additional information or also substituted by ATCOs with an emergency message. Eventually, ATIS message is broadcasted over a VHF radio channel as an audio stream towards the landing/taking off aircraft in the terminal area. The provided service is fully automated but the ATCOs can manually perform operations to manage conditions of unavailability of upstream systems or sensors.

### Architecture

#### DESIGN

ATIS system is based on a client-server architecture, ensuring significant software quality factors such as reliability, scalability and availability. The system has been designed with the intent of achieving a high level of modularity. Each software module has a specific task and interacts with the other in order to generate the final ATIS message. This high degree of modularity allows an easy tailoring of ATIS system to better suit customer's needs.

#### RELIABILITY AND AVAILABILITY

ATIS system is based on a fault tolerant architecture that relies on a cluster of two servers organized as a master and a hot standby server. Whenever a fault occurs on the master server, the hot-standby server is able to take full control with minimum or no loss of data. ATIS system provides 99,995% time availability and also supports online operational changes, in particular cutover or hot swapping.

#### FLEXIBILITY

To face the continuous innovation of ICAO regulation, Techno Sky has designed an ATIS System than can be easily updated, allowing to support any future needs with no infrastructure or architectural modification.

## Services and features

### AUTOMATED SERVICES

ATIS system autonomously manages the whole workflow of data acquisition, data processing and radio transmission of airport information. It performs the acquisition of the local reports and the real time data provided by the AWOS system. The most used airport weather and ATC information provided by AWOS system are supported: they are semantically and syntactically validated according to the ICAO rules. During the elaboration of a new ATIS message, all valid data are retrieved and grouped according to the appropriate syntax, fully reconfigurable according to local needs.

Finally the created message is converted, through an automated TTS (text-to-speech), into a high quality audio stream ready to be broadcasted. Finally ATIS messages are displayed to ATCOs by means of a graphical interface. This GUI also allows the users to include additional information not directly covered by the AWOS system (e.g. the conditions of the runway surface or the type of approach). Input and output data can be optionally stored in a database in order to keep a historical archive. In contingency condition (such as data source missing) ATIS system is also capable to provide ATCOs with manual data entry features in order to perform the creation and broadcasting of updated ATIS messages. In emergency conditions, the system allows users to manage emergency messages to be broadcasted replacing actual ATIS messages.

### D-ATIS

When applicable the ATIS System can provide pilots with the D-ATIS functionality. In particular, the ATIS System can be easily interfaced with any datalink provider in order to broadcast both the ATIS bulletin and real time data information directly on cockpit displays.



---

## MAINTENANCE & ENGINEERING

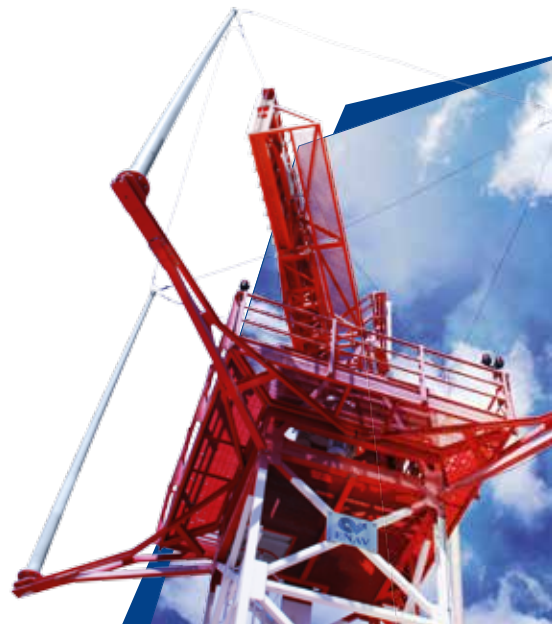
*A strong partnership for your CNS/ATM infrastructure.  
From system concepts to maintenance.*

A well-organized management of its technological infrastructure represents for a modern Air Navigation Service Provider a challenge and a fundamental goal to ensure the provision of efficient services in compliance with the required safety standards.

### The importance of Maintenance

In order to grant the satisfaction of the operational requirements in time, it is fundamental for complex systems to be subject to intense engineering activity all along their lifecycle from the conception to the commissioning, from the integration in the existing infrastructure to the eventual decommissioning. It is proven that constant application of an effective maintenance plan and the implementation of adequate logistics support services can increase the MTBF, extend the lifecycle of any complex system and ensure, through constant spare parts disposal, a high system availability and reliability.

All these competences, blended with the fact that we actually deliver on a daily base logistics and maintenance services on a national CNS/ATM infrastructure, allow us to propose ourselves as a professional consulting partner to all those organizations aiming to innovate and improve quality and efficiency of technical services by means of organizational analysis, competences development and investment planning.



## Our services

Thanks to its know-how and expertise developed running the Italian national CNS/ATM infrastructure, Enav is capable of supporting all those stakeholders involved in the technical management of a complex system delivering a wide number of services.

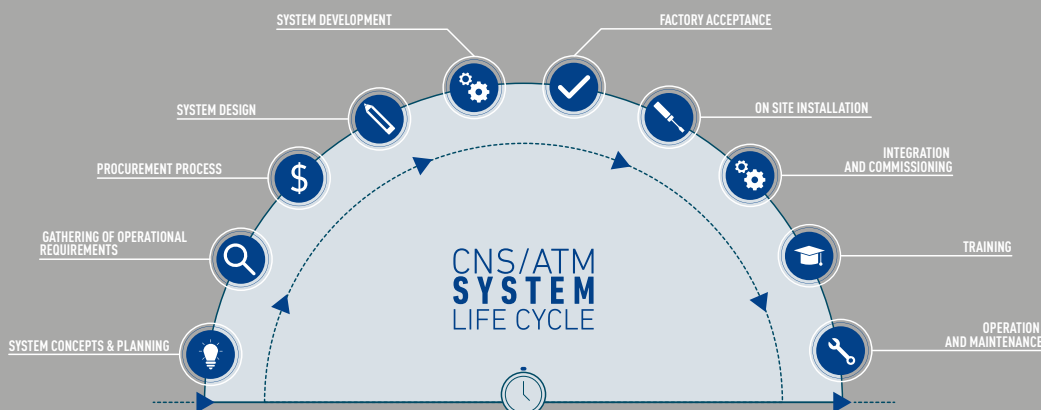
**CONSULTANCY SERVICES** – Where our direct “on-field” experience allows us to support ANSP’s Technical Department with tailored consultancies covering:

- CNS/ATM Infrastructure Master Planning
- Technical processes re-engineering
- Maintenance and logistics processes re-engineering
- KPI definition and availability/reliability indicators analysis
- CNS systems on-site assessments

**TRAINING SERVICES** – To meet the competence development needs at all levels of a technical organization, from managerial training to type-rating/OJT training on specific equipment.

**ENGINEERING AND SYSTEM INTEGRATION SERVICES** – To design, define the requirements, install and commission CNS systems and advanced maintenance tools.

**AFTER-WARRANTY LOGISTIC SUPPORT SERVICES** – To favor the extension of the system’s lifecycle through the execution of preventive maintenance interventions, spare part repair, on-site technical assistance during corrective maintenance and instrument calibration.



## METEOROLOGICAL SERVICES

### Your all-in-one provider for Meteorology

Weather is an important part of the natural environment as it directly or indirectly affects many of our activities. Timely and effective management of meteorological information, from observations to delivery of forecasts to the various stakeholders represents a challenge for most organizations whose accomplishments are influenced by weather phenomena.

### The benefits of a good meteorological service

It is easy to understand the benefits that could arise thanks to a professional understanding of the meteorological conditions and from the availability of various time scale forecasts (from nowcasting to long range forecasts) in agriculture or where the optimal managing of hydrological resources is pivotal; or the positive impact that could be generated in different business activities, like in the transport and tourism industries or, most importantly, the role that a correct management of meteorological and environmental monitoring plays in the effectiveness and efficiency of early warning systems.

All these competences blended with the fact that we actually deliver on a daily base observation and forecasting services allow us to propose ourselves as a professional consulting partner to all those organizations aiming at improving the quality of their meteorological services.



## Our services

Thanks to its know-how and expertise developed in its long-lasting activity in the field of aviation meteorology, Enav is capable of delivering, to a varied type of end-users, services and solution all along the Meteorological data management value chain.

### ENGINEERING AND SYSTEM INTEGRATION

Engineering and system integration capabilities are used to design, deploy and maintain weather observation networks specifically tailored to meet the customer's needs is acquiring and disseminating meteorological information.

### METEOROLOGICAL SOFTWARE DEVELOPMENT

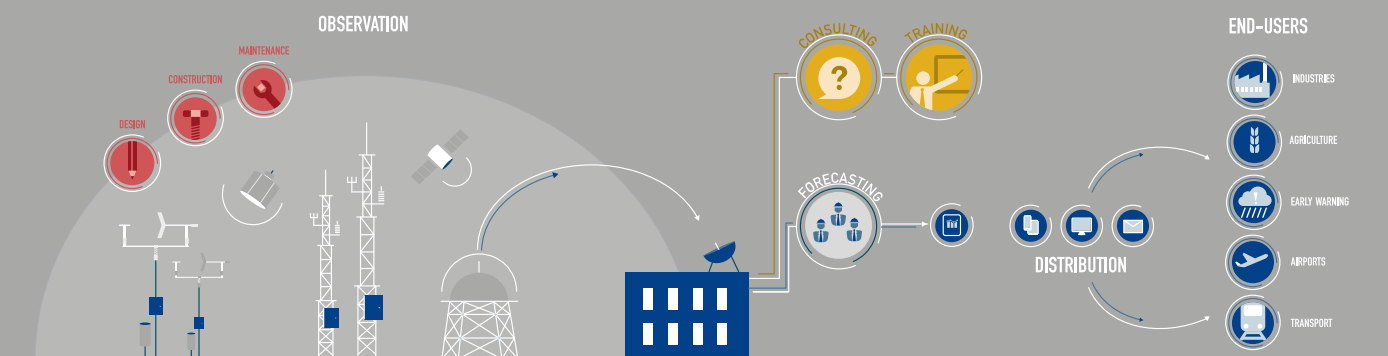
Thanks to our Meteorological Software Development Department, we can enrich observation networks with a software platform, either entirely design "in-house" or integrating "off the shelf" solutions.

### OUR TEAM

A team of meteorological experts and professional observers and forecasters can support end-users from requirements definition to the elaboration and delivery of a tailored product suiting their needs of precise and timely meteorological information.

### OUR CAPABILITY

We have the capability of delivering professional human resources services, from organization to selection and training, tailored to the needs of operational and managerial staff.



---

## *FLIGHT CALIBRATION AND VALIDATION SERVICES*

Today the conventional air navigation infrastructure is complemented by satellite based systems, with space or ground based augmentation capability to increase navigation accuracy.

New airways and approach procedures are developed almost on a daily basis to increase airspace capacity and efficiency and to protect the environment while at the same time keeping or improving the safety level. The challenges that all Flight Inspection Providers are facing at this time are mostly related to R-NAV procedures validation and supporting infrastructure (ground or space-based) calibration.

In Enav, we have accepted this challenge through the implementation of a technological plan aiming at fulfilling these new requirements. Across Italy and many other countries around the world, the Enav Flight Inspection Department is committed to delivering flexible, eco-friendly and cost effective flight services tailored to meet individual customer's requirements.

Enav Flight Inspection: reliable flight calibration services since 1984.

### **Our fleet**

We can rely on a brand new fleet of 4 Piaggio P180 AVANTI II aircraft exclusively dedicated to flight inspection activities. These aircraft, and their Flight Inspection System are able to deliver the efficiency and precision required for the Flight Inspection activity.

In terms of general performance the P180 is the fastest turboprop in production today with a top speed of 402 Kts, a certified ceiling of 41,000 feet and a range of over 1,500 nautical miles. Professionally flown by our crew, the combination aircraft/flight inspection system will provide the edge over competitors, with greater efficiency, reduced emissions and top precision in the flight inspection results.



## Our Flight Inspection System

The Flight Inspection System installed on board on each aircraft, composed by a UNIFIS 3000 Console by NSM and all the necessary dedicated receivers and antenna, is a state-of-the-art System using the latest technologies available to obtain the highest accuracy in measurements.

## Certifications/Qualifications

Enav brings a unique value: we are a certified organization and we determine new standards, having among our staff, members of the ICAO Instrument Flight Procedures Panel and International Committee for Airspace Standards and Calibration.



## Our services

In Enav, we can perform flight check of any element of the CNS infrastructure including:

- ILS CAT I, II, III
- VOR, VOR/DME, DME
- TACAN, VORTAC
- MLS, DME-P
- MARKER BEACON
- NDB/Locator
- VDF and UDF
- COM VHF and UHF
- IOP (PAPI)
- Airport lighting
- Surface Movement Radars, PAR and SRE, PSR, SSR, MODE S, MLAT and WAM

The flight calibration activity and all the related reporting are performed according to ICAO (DOC 8071, Annex 10, Annex 14) standards and/or approved national standards. Enav Flight Inspection and Validation department has the capability to validate any kind of IFP, conventional or GNSS based (including LPV) according to ICAO Doc. 9906 Vol. 5.