AN AIRPORT IN 35 DAYS

Case history of L'Aquila airport

ENAV S.p.A.
ITALIAN COMPANY FOR AIR NAVIGATION SERVICES

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THE EARTHQUAKE IN L'AQUILA
Coping with the emergency

ENAV moved quickly in the gigantic humanitarian operation to help the population hit by the earthquake in Abruzzo in April 2009.
Half an hour after the earthquake on the night between 5th and 6th April 2009 that destroyed whole towns around L'Aquila, the ENAV aid network had already come into operation with a plan to intervene to restore essential services as soon as possible to enable rescue aircraft to take off and land.
From the morning of 6th April 2009, a team of ENAV experts was already on site to assess the ATC facilities of the Preturo Airport at L'Aquila for the immediate management of the massive aircraft traffic in the Abruzzo airspace, involved in medical evacuation operations.

One of the tremors had, in fact, put the control tower out of operation. In a matter of hours, ENAV restored operations thanks to the deployment of its personnel and a highly modern mobile control tower.

The immediate arrival of the ENAV personnel was vital in the support to the heavy flow of helicopter traffic generated by the high number of the injured to be transported to nearby hospitals.
Up to 300 per day the number of flights managed during the rescue operations, a volume unthinkable for an Airport used mainly for flying club activities.

The mobile control tower, installed on the site so quickly not only demonstrated the organisation's skill in the management of disaster-related emergencies, but also confirmed its aptitude in the employment for the modernisation and maintenance of the control towers, ensuring the continuity of operations under safe conditions.

ATM and CNS services based on mobile systems
Air traffic management is tightly related to the organizational and technical means available for the provision of the planned or requested services within the airspace concerned. It might happen to implement temporary air traffic management services in a place where no services or procedures at all have ever been designed (e.g. air show) or it might be required to restore in short time air traffic management services after an emergency situation (e.g. support to civil protection actions) or it might be necessary to install a new system (e.g. location test) or replacing an existing one. For all these mentioned occurrences ENAV can provide a rapid answer organising, everywhere in the world, all-inclusive ATM and CNS services based on a task force of skilled professionals and a number of mobile systems ready to embark on air, marine and terrestrial transportation means.
In case of contingency situations ENAV can rely on:

- Air navigation services personnel contingency team (ATC, MET, TEC, AIS);
- Airspace and flight procedure design office;
- Mobile TWR/APP operation rooms;
- Mobile power and telecommunication stations;
- Mobile NDB/VOR/DME stations;
- Mobile ILS stations;
- Mobile visual aids stations;
- Mobile PSR/SSR stations;
- Flight inspection aircrafts.

Airspace design
Airspace is a valuable resource for both countries and users. Access and use of airspace is guaranteed to all users categories by taking into due account trends in traffic demand, user specific needs, national security aspects and environmental impact. In a scenario characterised by the growth of traffic demand and by new user requirements, the organisations involved in airspace planning and management are requested to undertake actions aiming at guaranteeing the rational use of the airspace. ENAV can manage complex projects for the rationalisation of airspace through:

- Analysis of current and forecasted traffic flows;
- Analysis of the natural and artificial limitations on flight operations;
- Definition and optimisation of the route network;
- Development and publication of ICAO aeronautical charts and airport obstacle charts;
- Development of coordination procedures between neighbouring ATS units, civil and military authorities and neighbouring countries.

READY FOR ATC OPERATIONS IN ONE MONTH
A flying club base turned into an international airport

Upon request by the Government authorities, in just over a month ENAV equipped and transformed the small Airport used by the L'Aquila flying club into a real, technologically advanced airport qualified to receive in total safety dozens of aircrafts for the transport of Heads of State and of Government from Rome to the city of L'Aquila, venue of the G8 meeting.

From 23rd April 2009, the date of the official announcement of the transfer of the G8 original location from La Maddalena to L'Aquila, the race against time started to create what soon became a technological platform, the first of its type constructed in Italy under these exceptional conditions.
In order to allow the safe and correct management of air traffic at the L'Aquila Preturo Airport, the Company installed in just a month all the technology necessary to reinforce all the systems for air traffic management.
The activities undertaken for the G8 Summit included the setting up of navigation systems to allow instrumental flight operations with the relative procedures, visual aids, a secondary RADAR system, and all the ground/air/ground communication systems.

This important deployment of technical systems was necessary to allow the landing of medium size aircraft like C27Js, Canadairs, ATR42s and even Falcon 900s, besides, of course, all types of helicopters on a runway located in the middle of the mountains.
The availability of "mobile systems" in this case was one of the most successful features, since it enabled ENAV to convert in a very short time a landing strip into an Airport provided with all air traffic services in a RADAR environment.

A total of 39 delegations, with 21 Heads of State, transited through the Preturo Airport at L'Aquila, making it, for the three days of the Summit, was the most important and most closely observed airport in the world.

PLANNING IS THE SECRET OF SUCCESS
Moving the G8 summit from La Maddalena to L'Aquila

The transfer of the activities planned for the G8 Summit from La Maddalena to L'Aquila required a considerable effort, especially in the planning of flights within the airspace surrounding L'Aquila airport. In the month before the Summit, intensive planning was undertaken with all the organisations involved in order to reduce the impact on commercial air traffic to a minimum. There was continuous coordination with the officers of the Italian Air Defence Command of the Italian Air Force, the Flights Office of the Presidency of the Council of Ministers, the Civil Protection Department, the police authorities and EUROCONTROL.

The result of this coordination activity during the days of the G8 was that normal scheduled commercial flights were not at all affected by the restrictions imposed by the "No Fly Zone" specifically created for the event and by the application of the security procedures provided for flights carrying Heads of State.

ORGANISATION OF THE TECHNICAL ACTIVITIES
The strength of CNS/ATM mobile systems

Mobile control tower

A few hours after the earthquake, in order to ensure the safety and speediness of the many flights under way (impossible to manage with the existing local infrastructures), a complete control tower, already prepared and loaded on a special truck, was on its way to the L'Aquila Airport.

Although mobile control towers provide a system for temporary use, they are designed to ensure the performance of all the air traffic management operations, being equipped with technical systems designed to replicate the functions of the standard systems contained in any control tower.

ENAV has three mobile control towers available. Each one is equipped with the following systems: VHF/UHF multichannel radio, telephones (also mobile), a weather station, an independent power generator and all the equipment for the installation and connection, depending on the operational requirements, a RADAR screen, a radio direction finder, a computer for the management of flight plans, remote control/monitoring systems for other external devices.

The mobile control tower installed at L'Aquila first of all enabled ENAV personnel to handle the first month of post-earthquake activity and then allowed for the technological improvement of the entire Airport in view of the major event, the G8 Summit.

Visual navigation aids

The cables for mobile visual aids were installed along the runway. Besides the aircraft lights, the runway was equipped with runway end lights using two highly visible flashing units necessary for the identification of the runway from a considerable distance in both directions. All the lighting systems installed were connected to mobile power supply systems designed to guarantee the absolute continuity of electricity also in case of a blackout of mains power distribution.

A PAPI mobile system for runway 36, designed to assist pilots during the approach and landing phases, was installed and flight tested. This unit was also connected to the mobile power supply system.

Flight procedures design

The link between the route network and the airports has a considerable importance in the process of airspace rationalisation. Over time, flight procedures design, both conventional and RNAV, has become increasingly complex for a number of reasons such as: the growing complexity of legislation and design rules, the operational constraints due to the environmental impact, the distance between nearby airports and the national security restrictions. The systems for the simulation and flight procedures design adopted by ENAV are able to carry out all the phases of the conventional, RNAV and PBN (Performance Based Navigation) flight procedures design, such as:

- Analysis of traffic flows between the airport and the route network;
- Analysis of obstacles;
- Simulations of electromagnetic coverage of the ground and satellite radio navigation systems;
- Analysis of electromagnetic compatibility;
- Evaluation of environmental impact;
- Analysis of interference with nearby airports and optimisation of traffic flows;
- Complete development of the procedure and of all the protection areas in compliance with ICAO rules;
- Preparation of the relevant documentation and publication of the procedure.

Design and optimisation of the airport air-side component

Airports are the place where the activities and interests of numerous stakeholders are located. The continuing growth of air traffic demand requires a careful planning of the airport operations taking place in the air-side component. This activity shall be taken into due account both in the construction of a new airport and in the overall projects aimed at the optimisation of the available capacity, delay reduction and minimisation of environmental impact. ENAV has provided leadership in the management of numerous project aimed at improving the efficiency of the operations, both in regional airports and at HUB level. ENAV is qualified to provide customers with the following consultancy and design services:

- Development of requirements for the design of runways, taxiways and parking areas;
- Development of requirements for the design and integration of operational and technical infrastructures (control tower);
- Development of requirements for the installation of CNS/ATM systems;
- Survey of obstacles posing a danger to operations;
- Development and production of ICAO airport mapping, both traditional and digital;
- Development of procedures for the ground movement of aircraft and vehicles;
- Development of methods for the sharing of decision making processes and information.

Radio navigation aids

Before the earthquake, the Preturo Airport at L'Aquila did not have any kind of radio navigation aid. In order to enable instrument navigation for aircraft nearby and approaching/leaving the Airport, ENAV installed a portable navigation system consisting of a NDB (Non Directional Beacon) and a DME (Distance Measuring Equipment).

Surveillance systems

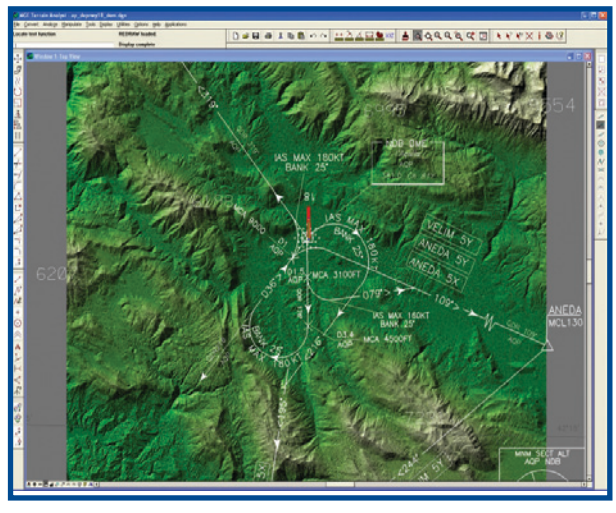
In order to ensure valid support to air traffic control operations, a portable RADAR unit was installed. The RADAR system installed at the Airport was connected both to the mobile control tower and to the Rome Area Control Centre, in order to enable the determination of the aircrafts position in multitracking mode, guaranteeing a better coverage of the service area, greater measurements redundancy and accuracy.

Aeronautical meteorology

Although the meteorological assistance was provided by the Italian Air Force, the ENAV mobile control tower was equipped with an independent system having all the appropriate sensors for measuring local weather data and it was used as an auxiliary system.

Development of the aeronautical cartography and flight procedures

In order to qualify the Airport for instrument flight operations, airport mapping had to be developed and published (obstacle chart and aerodrome chart) and flight procedures in accordance with international standards. This activity started with a massive campaign of topographical observations in order to collect the necessary data (geographical coordinates and altitudes of all the infrastructures and obstacles) to develop the relevant mapping and the flight procedures of the Airport through the advanced design platform available to ENAV.



The complexity of the L'Aquila Airport orography and the numerous critical aspects highlighted in the case of development of instrument flight procedures required the acquisition of high resolution digital data of the territory for an area of over 2,000 square kilometres. Once the orographic model of the territory and the model of the airport environment were determined (creation of a Digital Terrain Model and a Digital Surface Model), the next stage was the design of the instrument flight procedures and their integration within the complex network of national routes.

Given the critical nature of the orography and the limited portion of airspace available for manoeuvres, it was necessary to plan circling approach procedures along trajectories following the terrain profile, even if not aligned with the runway. Many planning problems were solved, also in accordance with the aircraft operators, introducing steep approach flight procedures based on the use of satellite navigation systems. All the flight procedures were tested through one of the flight simulators available to ENAV, and validated by the use of P-180 II aircraft equipped for flight inspection operations.

Finally, in order to provide the RADAR service, specific digital maps were created and integrated in the RADAR surveillance system deployed.

Flight Calibration

All the communication, navigation and surveillance systems installed at the L'Aquila Airport have been tested by the conducting of test flights along the new instrument procedures and on trajectories defined by international technical rules. In less than 3 days and, in a high pressure operating context and within a highly complex operational scenario , all the necessary in-flight checks were conducted to ensure the operational validation of the PAPI, NDB, DME and Radio Direction Finder systems installed. Radio and RADAR coverage within the service area was also verified during the in-flight inspection activity.

Design and realisation of aeronautical databases of terrain and airport obstacles

For an optimal and safe use of modern navigation systems during all the flight phases, the ground movement of aircraft and vehicles, and other applications such as the design of flight procedures, simulation and synthetic vision, accurate numerical representations of terrain and obstacles are required for the use in combination with aeronautical data. ENAV can provide consultancy and technical support for the planning and creation of computer databases for the terrain and for obstacles in accordance with Annexe 15 ICAO (Amendment 33) and the strictest ISO standards for the collection, management, display and quality of the data for the areas identified by customers.

Management and publication of aeronautical information

The air traffic service units must be constantly informed about the situation and availability of the airspace under their responsibility, and the impact on air traffic. Thanks to its advanced technological platform, ENAV can provide customers with:

- The production of all the components of the Integrated Aeronautical Information Package (AIP, AIP supplements, NOTAM, PIB, AIC);
- Consultancy for the creation of a technological platform to implement the Integrated Aeronautical Information Package;

In-flight inspection for CNS systems and visual aids

Using its fleet of specifically equipped aircrafts, ENAV performs a constant monitoring activity of the signals emitted by radio navigation systems, visual aids, surveillance and telecommunication systems in order to guarantee the safety of aircraft in all the phases of flight and, in compliance with domestic and international regulations.
On-request, ENAV is prepared to evaluate the feasibility of providing in-flight checking services to national and international customers.

Preparation of ATS manuals and working instructions

In the world of air traffic services, standardisation, compliance with international regulations and procedures are highly important in guaranteeing safe and efficient operations. ENAV can offer consultancy for:

- Implementation of international regulations at national level;
- Preparation of manuals for air traffic services;
- Consultancy and assistance for drawing up of local instructions.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