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- Tray conveyor belt
Barcelona El Prat: A new star at the heart of a shining Catalonia

By José Blanco, Development Minister

Since its official opening last June, the T1 terminal at Barcelona El Prat airport has become a new icon of the dynamic entrepreneurial spirit of Catalan and Spanish society, and an excellent example of the Spanish government’s commitment to develop an extensive and efficient transport network, and to connect it with the rest of the world.

This commitment has resulted in an open, continuous and renewed dialogue between central government and regional authorities – the best way to merge the multiple objectives of each public body in one go – in the government’s ongoing effort to give equal opportunities to each Spanish citizen, no matter where they live.

This is the purpose of actions like the expansion programme of Barcelona airport, which is going to make El Prat a first-line international hub in the heart of a region packed with commercial, industrial and logistic opportunities.

Although the new terminal, with an investment of €1.258 billion, is only the showpiece of this ambitious scheme, which is taking several years’ work and the costs of which amount to more than €5.1 billion, its opening marks a turning point for El Prat as it has significantly increased total airport capacity and cut travel times for airlines using it.

Located between runways, its unique architecture and operational design has cleverly combined usability, light, accessibility, simplicity, convenience and modernism, as almost 700,000 passengers discovered on the first month of commercial operation at the new terminal and its new facilities.

T1, with its wing-shaped, 544,000sqm building, has 43 jet bridges plus 74 aprons, 101 boarding gates, 66 check-in counters and 52 check-in machines. Its new automated baggage handling system is also impressive, with a 25 kilometre-long conveyor network handling 8,000 bags per hour.

With Terminal 1, which could serve more than 30 million passengers per year, and the new runway, El Prat airport can now manage 90 flights per hour and serve more than 55 million travellers per year. The future construction of a new satellite building connected to T1 would further increase El Prat’s annual capacity up to 70 million passengers.

To connect this renovated airport with the rest of the Spanish transport system and transform it into a real inter-modal hub, the Ministry of Public Works has also redesigned its terrestrial links by building new branches connecting to the C-31 motorway, and is currently planning the construction of new rail access for high-speed commuter and long distance trains for both terminals.
The current economic crisis and the challenges of the future at the Spanish airports

By Juan Lema, President of Aena

The global meltdown has had a serious impact on all economic sectors and air transport, as a major player, has been significantly affected. Airports and airlines worldwide are suffering from low demand, consumer spend cuts, restricted access to capital markets and volatile costs.

This difficult environment creates major challenges for airports. The Spanish airports are facing them through a double strategy: facilitating traffic growth while maintaining low airline costs. By offering infrastructure that meets the airlines’ efficiency requirements at a competitive price, Aena is addressing the current crisis and contributing to the future needs of air transport, as forecast by international organisations.

One of the best examples of the implementation of this strategy is Barcelona Airport’s Terminal 1. One of the top ten airports in Europe, Barcelona Airport has been able to adapt, modernise and enlarge its infrastructure. Opened on 16 June 2009, the new T1 has increased the airport’s capacity to 50 million annual passengers and 90 movements/hour. With more than 540,000sqm, the new terminal is destined to become one of the iconic buildings of the city. Its state of the art technology and modern facilities make the operation at Barcelona one of the most efficient in Europe and worldwide, as has been recognised by its clients, the airlines.

Aena is completing this and other projects, such as the new terminals at Malaga and Alicante airports, or the refurbishment and enlargement of the Canary Island airports, while maintaining airport charges lower than the European and world averages (48% and 36% respectively) and introducing proactive measures to foster traffic growth, such as the waiver of charges for additional passengers or the freeze of aeronautical charges in 2010.

A lot of work remains to be done, for example, to continue with the implementation of improved operational processes and innovative technology to obtain relevant efficiency gains. But now, more than ever, cooperation is a must. I am sure that we will be able to successfully face the present situation working hand-in-hand with airlines, handling agents, service providers, and all the relevant stakeholders of our sector. Only by this cooperation shall we be able to obtain such positive results as we have in Barcelona Airport’s new Terminal 1.
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- Abu Dhabi International Airport, UAE
- Maiquetía International Airport, Caracas, Venezuela
Plan Barcelona was developed in 1999 and is the third great transformation for Barcelona Airport. It includes a set of actions aimed at placing the airport among the best in Europe, as Fernando Echegaray, Director, Barcelona Airport, explained to Ross Falconer.

**Terminal 1: A ‘new airport’ for Barcelona**

The new Terminal T1 is described as a ‘new airport’ for the city of Barcelona, which doubles passenger capacity and establishes the basis for future economic growth. “It is a commitment to functionality, modernity and above all, excellence in services for the traveller,” said Echegaray.

The main developments that have already taken place are the construction of a new control tower, the third runway and Terminal T1. There is also a new Corporate Aviation Terminal for business flights, and works to the Cargo area where 60 hectares are available. The satellite building for the Terminal T1 project is currently being drafted. “Airports are living facilities that become part of the society, a society that is constantly changing. In recent decades Barcelona Airport has experienced tremendous growth and in order to meet the new demand, there have been several redevelopments that adapt to the changing situation,” said Echegaray.

**Strengthening the Barcelona hub**

The new facility has a total area of 544,066sqm, of which 155,200sqm are public areas; the commercial side occupies 23,866sqm. The new Terminal T1, by itself, can handle more than 35 million passengers a year, which means Barcelona Airport as a whole can handle 55 million passengers. The future satellite building will further increase capacity to 70 million. In terms of infrastructure, Barcelona Airport has capacity for passenger growth up to 2025. “We have a team actively working to bring new services to Barcelona, these will, we hope, be predominantly on intercontinental routes but we foresee growth in many different areas,” said Echegaray. “Undoubtedly, one of our main objectives is to strengthen Barcelona Airport as a hub with connecting flights. We have set the groundwork for that because we have three daily flights to New York, and one to Atlanta, Singapore and Philadelphia. We

More than 700 guests attended the inauguration ceremony of the largest public infrastructure constructed in Catalonia in recent decades.
also have flights to Mexico City, Montreal, and Vancouver.

Also during the first half of 2009 the number of intercontinental flights was increased with the addition of new destinations such as Islamabad and Lahore, as well as additional flights to Casablanca, Tangier and Nador. “However, we are continuing to work to consolidate Barcelona Airport as the main airport of the Mediterranean area and southern Europe, and to continue the excellent growth we have had so far,” said Echegaray.

**Comfortable passenger experience**

One of the major challenges has been to coordinate the activities of such a major facility, particularly in the areas of operations and service. “At the same time, our work aims to continually provide high quality services to our customers, the passengers and the airlines,” said Echegaray.

There is a ‘human’ feel to the new facility, despite its huge dimensions. The passenger experience is described as very comfortable, with the terminal very bright, well signposted and having an attractive commercial area. “We have had very positive feedback from travellers that have used the new terminal,” said Echegaray. “Since Terminal T1 entered service in mid-June 2009, normalcy has been the keyword at the airport. The gradual transfer of companies to the new terminal has been very positive and we believe that the passenger has left satisfied with their experience here.”

The Terminal T1 processor building consists of a central and two lateral piers that host check-in, security control and baggage reclaim and boarding gates. These areas are unified in a way that optimises space and it is very clear where the user has to go next. “The main new technology in Terminal 1 is SATE, which is an automated baggage processing system that has a high reliability by ensuring the efficient delivery and sorting of baggage,” said Echegaray. Another of the improvements that users will notice is in the airport security check area – here, passengers can go through security by using the automatic reading of boarding pass or data codes sent to mobile phones by the airlines. There are also scanners for shoes in this area; all this speeds up passage through the airport facilities for the passenger.

Looking ahead, there are plans to build the satellite building for Terminal T1, as well as to upgrade other infrastructure at the airport and construct an airport city with hotels, an office building and a business centre.

**Echegaray:** “The main new technology in Terminal 1 is SATE, which is an automated baggage processing system that has a high reliability by ensuring the efficient delivery and sorting of baggage.”

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*The Terminal T1 processor building consists of a central and two lateral piers that host check-in, security control and baggage reclaim and boarding gates.*
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- Hermes Airport

Denmark
- Billund Airport
- Copenhagen Airport
- Sonderborg Airport

Finland
- Helsinki-Vantaa Airport

France
- Angoulême Cognac Airport
- Angers Loire Airport (Coming Soon)
- Bordeaux airport
- Lille airport
- Lyon airport
- Marseille Provence Airport (Coming Soon)
- Montpellier Airport (Coming Soon)
- Poitiers Airport (Coming Soon)

Georgia
- Tbilisi International Airport

Germany
- Allgäu Airport
- Cologne Bonn Airport
- Hamburg Airport
- Leipzig Halle Airport (Coming Soon)
- Munich Airport
- Nürnberg Airport (Coming Soon)
- Stuttgart Airport

Greece
- Athens Airport

Hungary
- Budapest Airport

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- Cork Airport
- Dublin Airport
- Shannon Airport

Italy
- Cagliari Airport
- Verona Airport

Latvia
- Riga Airport

Macedonia
- Ohrid Airport
- Skopje Airport

Malta
- Malta International Airport

Montenegro
- Podgorica Airport
- Tivat Airport

Netherlands
- Amsterdam Airport Schiphol
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Norway
- Bergen Flesland
- Oslo Airport
- Stavanger Airport Sola

Poland
- Katowice Airport
- Kraków Airport
- Poznan Airport
- Rzeszów Airport
- Warsaw Airport

Portugal
- Faro Airport
- Lisbon Airport
- Porto Airport

Russian Federation
- Moscow International Airport
- Domodedovo
- Pulkovo Airport
- Novosibirsk Tolmachevo International Airport (Coming Soon)

Serbia
- Niš Airport

Slovakia
- Bratislava Airport

Slovenia
- Ljubljana Airport

Spain
- Castellón-Costa Azahar Airport (Coming Soon)

Switzerland
- Zurich Airport (Coming Soon)

Turkey
- Istanbul Atatürk Airport
- İzmir Adnan Menderes Airport
- Istanbul Sabiha Gökçen International Airport
- Antalya Gazipasa International Airport
- Ankara Airport

United Kingdom
- Birmingham Airport
- Doncaster Sheffield Airport
- Durham Tees Valley Airport
- Gatwick Airport (Coming Soon)
- Jersey Airport
- Liverpool John Lennon Airport
- Stansted Airport

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DGM - Network Planning

“‘The Route Shop is valuable because I can see with a click of a mouse which routes the airports themselves feel are the most important. Plus there is data there, such as catchment areas, that is tough to get on corporate websites or Google.’”

BRIAN COUNCIL
Manager, International Route Planning

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Designed by Ricardo Bofill – Barcelona’s Terminal 1 is a gateway linking Barcelona with the rest of Europe and the world. Bofill summarised its key visual elements and his vision for the modern airport to be “a city within a city”.

Designing a complex piece of infrastructure such as Barcelona’s 525,000sqm new terminal, of course, presents numerous challenges. “There is a great command of scale for a building of this size. Changing scales, the scale of a city or of a large building has been my main challenge throughout my professional career. Only after more than 40 years of experience – successes and mistakes – is it now possible to master the scale of a building such as T1,” said Bofill.

As a flexible modular structure, the terminal can be expanded to handle up to 35 million annual passengers. “The airport facility combined with the remodelling of the existing Terminal 2 and the satellite has a maximum capacity of 70 million passengers per year,” explained Bofill.

He is confident that the building will be able to accommodate a phased expansion in line with Aena’s long-term traffic forecasts once economic recovery occurs. “While air traffic isn’t growing at the same rate as it was in 2007, our extension plans are ready and the extension strategy has been fully mapped out,” he said.

The building itself is designed to be compact – it is located between the runways with one entrance for traffic. Use of light and space is distinctive; the glass walls maximise the incoming sunlight and the terminal is divided into three areas: the central building where passengers check-in, the baggage claim area and retail area. Facilities include a spa, fitness centre, hair salon, multi-faith church, beds and 80 shops and restaurants. Maximising dwell time is a key consideration, explained Bofill: “Passengers at Barcelona want a building that is powerful and iconic, yet at the same time welcoming and comfortable.”

Bofill took his design inspiration from the existing airport infrastructure and local culture. “You learn by looking at Mediterranean landscapes, and in particular the relationship with El Prat, its trees, the sea and its constantly-changing light. With Terminal 2 we used Barcelona’s ‘Las Ramblas’ as our reference point when designing the retail space. In Terminal 1 we used the idea of a square, the size of a Roman circus, which would centralise all retail spaces and uses. The remaining retail facilities are strung out along the docks, like enclosed streets,” he said. “A terminal can become a ‘city in the city’, featuring all of those uses you would expect to find in daily life and the pathways you could follow.”
The Aldeasa Thinking Barcelona shop inspired by the works of the Spanish architect Antoni Gaudi has received the prestigious Frontier Awards 2009. We would like to thank Aena for its unconditional assistance in this project, showing once again its great business vision in the airport environment.
The first phase of Plan Barcelona will see a €3.5 billion investment over a period of nine years, following approval of the Master Plan and Environment Impact Declaration. The main goals of Plan Barcelona Phase 1 were to prepare for serving 55 million passengers per year and 90 operations per hour, and these objectives have been achieved. Phase 2 will add capacity for a further 15-20 million passengers per year.

In order to understand the transformation in airport capabilities it should be remembered that in 1999, when the Plan started, capacity was 19 million passengers per year and a maximum of 42 operations per hour. “We can say it was a ‘handicraft’ airport and is becoming a ‘post-industrial’ airport, many of its activities relying on advanced electronic and computerised applications,” said Gutiérrez.

Terminal 1 has performed very well since opening on 17 June 2009. The clear signage means a smooth passenger journey from check-in to boarding. Significantly, explained Gutiérrez, there have been no problems with baggage management – an important factor for passenger confidence.

The redevelopment of El Prat

The new €1.3 billion Terminal 1 is the central element of Plan Barcelona Phase 1, which also includes improvements to the airfield, notably construction of a new third runway, one parallel taxiway and eight express taxiways, extending one of the existing runways, and a new control tower. The overall vision was for a rational building, giving passengers all of the services required around their flight, as Francisco Gutiérrez Ferrández, Plan Barcelona Director (to October 2009), explained to Ross Falconer.
“Terminal 1 is a friendly building for passengers. On entering the check-in hall, passengers are greeted with a broad space far from each possible obstruction and proceeding along the security barrier on their path to the boarding gate, they experience natural light from the glazed façade, which affords spectacular views of the airfield,” he said. “There is a relaxing atmosphere for leisure travellers, meeting rooms for executives, special areas for VIPs and authorities, shopping, prayer rooms for all religions, fast check-in and security controls, sure management of baggage, and central control of the entire airport in both operative and security aspects.

Seeing the way Terminal 1 is performing, I can conclude that all projects have been successfully achieved.”

Phase 2 will see a new satellite building, which was planned alongside Terminal 1 and will provide the capacity increase of 15-20 million. It will actually be built around the new control tower, which opened in February 2007. A new apron is also planned. “When the satellite opens depends on passenger numbers. If we return to the rate of growth of previous years, it might open in seven years. A decision will be made when we finish the project,” said Gutiérrez.

Other elements of Plan Barcelona include a maintenance hangar for Iberia, a site for an ‘Engine Run-up Enclosure’, and improvement of Runway 02/20 by reinforcing areas with a low PCN (Pavement Classification Number) and by improving the texture and skid resistance of its surface.

In the coming years, projects will include tunnels for the People Mover, SATE (Automatic Luggage Treatment System) and General Airport Services linking Terminal 1 with its satellite, a de-icing platform close to the 2SL threshold, and development of the industrial area. Hotels and office buildings will also be built in front of the old Terminal 2, constituting ‘Ciudad Aeropuertaia’.

The rail station, providing the metro connection to Terminal 1, will open in 2013. Meanwhile, improvements are also being made to the existing Terminal 2 in order to optimise the space.

Environmental protection

The Barcelona Airport site has some special environmental characteristics. Close to a large town on a coastal delta formation, it is surrounded and limited north and south by two Special Bird Protection Zones on the wetlands of La Ricarda and Remolar.

“We think about the environment from the first moment when we are at the planning stage. This is vital for the airport. The airport is located between two national protected areas. It is important to protect the environment and preserve all nature that lives in these areas,” said Gutiérrez. “We have done a lot of work with the University of Barcelona to avoid the breeding of birds in the channel of the airfield.”

Between the runway and the shoreline is a biological corridor containing a coastal pinewood with a surface area of 90Ha and allowing the special continuity of two lagoons. Water management also has a unique and significant role at Barcelona Airport. Apart from management of consumption and sewage produced by the airport’s activities, also of note is the water management due to the airport’s location and surroundings, a delta area characterised by two aquifers and in which there are abundant lagoons around the perimeter that are included in the ‘Spaces of Natural Interest Plan’. The first of the aquifers is located between 3m and 13m beneath the airfield and is historically polluted. The second aquifer, located between 47m and 60m beneath the airfield, contains clean, pure water and is environmentally-protected.

A principle concern has previously been noise, after discussions with local municipalities, the airport changed operations, meaning noise is no longer a problem.

Innovation

Management of the airport can be undertaken from one room – the Airport General Control Room. This innovative concept, using the latest available technologies, means all data relating to computer surveillance and operations surveillance, as well as energy management and maintenance engineering on the airport, are sent to this Control Room. Every operation can be monitored and checked from this one room; there is a similar room for security surveillance – the Airport Security Control Room – to which images from 2,000 cameras located around the airport are transmitted, monitored and registered. “The innovation of Terminal 1 is that it’s all in one room, which can also take control of Terminal 2,” said Gutiérrez. “In another innovative aspect, Terminal 1 is operatively a three-storey building. This allows the use of two floors for international flights with vertical separation of departures and arrivals, and a third for national flights, where both arriving and departing passengers can mix. It is an efficient, flexible approach.”

The success of Terminal 1 since opening demonstrates that Barcelona Airport has achieved the overall vision of a rational building for passengers. The terminal is easily accessible. It is a friendly building for travellers with lots of natural light and easy orientation. “Terminal 1 has been achieved,” concluded Gutiérrez. The first phase of Plan Barcelona is effectively complete; the focus now moves on to Phase 2.
Growing airline services

Barcelona Airport’s strategy is to become a hub for the Mediterranean and southern Europe. As Anita Gackowska, Head of Marketing, Barcelona Airport, explained, the airport sees clear opportunities in Europe and North Africa. Ross Falconer reports.

In terms of business and logistics, Barcelona is a central point in the Mediterranean. There has been a huge amount of investment in business in the city, of the Japanese companies with a presence in Spain, 70% are based in Barcelona, for example.

While Barcelona’s throughput fell -9.6% to 27.3 million in 2009 as a result of the economic downturn the airport saw the traffic recovery begin towards the end of the year. Growth of 3.9% was recorded in November and 4.1% in December. That growth continued in January 2010 with a 2.9% increase year-on-year. Plan Barcelona provides the infrastructure for future growth and Aena plans to capitalise on the dynamic economy in Catalunya. “We consider Barcelona a hub for Southern Europe and the Mediterranean. We have the three airline alliances here – all of which are strong in Barcelona – so we have opportunities worldwide,” said Gackowska.

Gackowska: We consider Barcelona a hub for Southern Europe and the Mediterranean. We have the three airline alliances here - all of which are strong in Barcelona - so we have opportunities worldwide.

She also explained that cruise traffic has also grown significantly since the 1992 Olympic Games. “More than two million people a year take a cruise, a large proportion of which come through Barcelona Airport. Barcelona is the busiest port outside the Caribbean.” Many cruise passengers are able to check their bags in remotely, self-service check-in, internet check-in and mobile check-in are also available to passengers.

Balance of services

Barcelona has an Air Route Development Committee (CDRA), comprising Aena, the Regional government, the City of Barcelona and the Chamber of Commerce, which work together to promote the city. With the key stakeholders working together the airlines have the key data, information and contacts
that add significant value, and help them make a robust business decision.

The key areas of opportunity are considered to be Asia, South America and the Middle East. “Obviously we would welcome airlines from all over the world. We are making progress on our targets,” said Gackowska.

“Barcelona presents opportunities for business, leisure and cargo traffic. We have some of the lowest charges in Europe and a fantastic infrastructure, which is great both for our customers and operationally.”

There has been significant growth in services to North Africa, with Spanair and Vueling increasing traffic. In July 2009, Air Arabia Maroc also launched a three times weekly service between Casablanca and Barcelona. Jet2you and Royal Air Maroc also serve this growing market.

Meanwhile, Pakistan International Airlines launched services to Barcelona from Lahore and Islamabad in 2009 with a significant proportion of VFR traffic, and in June, Qatar Airways will launch daily services between Doha and Barcelona. Air Canada will also launch three times weekly services to Barcelona from Montreal and also three times weekly to Toronto in June.

“The Zagreb route was also recently restarted with Croatian Airlines after 15 years. It’s about getting the balance of services right,” said Gackowska. “We market Barcelona to airlines and airports; we don’t hard sell. We want companies to grow and become a success here.”

The introduction of a high-speed rail link between Madrid and Barcelona in 2008 has meant traffic has fallen on the route, but in line with expectations. “We actually see it as another way for passengers to get to Barcelona Airport,” said Gackowska. Passenger numbers between Barcelona and Madrid peaked at almost five million in 2007. Last year, that figure had fallen by 40% to just under three million. So while this route was the busiest in the world, it is now only the busiest in Europe!

Plan Barcelona provides the infrastructure for future growth. Barcelona’s new terminal has been designed with flexibility and maximum utilisation in mind. Boarding gates are situated on more than one level, which can be used for international or Schengen and domestic traffic. The Midfield Terminal concept is an efficient design that means reduced taxi times. “They are amazing facilities that we have here now,” said Gackowska.

Barcelona has a solid mix of passengers and airlines, low-cost and intercontinental traffic are growing. The airport is exploring key areas of opportunity, including Asia, South America and the Middle East, as part of its strategy to become a hub for the Mediterranean and southern Europe, and to capitalise on the dynamic economy in Catalunya.

How to reduce costs at trolley management?

As the leading supplier of luggage trolleys since 15 years, FEDERICO GINER, S.A., proudly presents a patented coupling system, unique in the world, maneuvering up to 50 trolleys at once, now in service at Terminal 1, Barcelona Airport.
Performance of the ABHS in Terminal T1 has been outstanding, with no major problems reported and a lost bag rate below the project requirement of one in 1,000. All bags arrive into the system via the 160 check-in desks and six transfer induction lines, for final sortation into 22 make-up carrousels. The complete system has 6,000 driven motors or conveyors with a total distance of 25km. The sortation is done by 1+1 tilt tray sorters (TTS) and 1+1 high-speed sorters (HSS).

This concept of tub design has been implemented with RFID technology for tracking bags, with the tubs travelling at up to 6m/s on high-speed lines. The tubs also provide efficient space optimisation with two early bag stores installed in the system, with capacity for 1,400 bags.

The main objective of any ABHS is to sort bags in a timely and safe manner. Timing is achieved by optimal processing and tracking, and safety by placing the right screening sequence into all bags before loading the aircraft. “At Barcelona Airport we have implemented up to five safety levels of screening (Explosive Detection System) by standard X-ray machines, tomography machines, reconciliation areas with the passenger, and controlled explosive containers, all fully automated and integrated into the ABHS,” said Yague.

**Keys to success**

As soon as a traveller checks in their baggage, the airline agent at the check-in desk prints and attaches baggage tags to each piece. These tags carry all of the traveller’s information through means of a simple bar code made up of a ten-digit number. Since every bag has its own unique number, before the bag is mounted on top of a tub, the code is read by a 360-degree bar code reader, creating a relationship between the bag code and the RFID code of the tub; from this point a computer is in charge of tracing the tub all over the 25km conveyor lines for optimising travel time.

“Another significant characteristic of this ABHS is the availability requirements defined at the early project stages. To fulfil this requirement, ABHS has to be conscientiously designed with the most appropriate redundancy. Full redundancy is a utopia that can never be achieved, and therefore a compromise between cost and efficiency performance has to be met. I must say that this is the most challenging part of any ABHS project,” said Yague.

The new ABHS in Terminal 1 has been designed to process up to 8,300 departing bags per hour in the initial phase and 5,800 arriving bags. Once the satellite building is opened, the system will be able to process 13,600 departing and 9,500 arriving bags per hour.

The typical issues of a baggage handling system are coordination and synchronisation of the processing units, minimisation of the baggage travel time, avoidance of collisions between tubs, prevention of buffer overflows/lack, and minimisation of the energy costs. All of these issues were carefully studied from the early project definition stages with Aena. “Our project team faced several challenges during the installation and commissioning stages, mainly because of the huge size of the system and the tight schedule defined by the client (installation and commissioning in 24 months). However, all of these challenges were overcome through careful study and analysis by our specialists,” said Yague. “Further, constant liaison with the client and ensuring client participation at various stages of critical decision-making were important keys for our success.”
“I see the universe getting a little bit smaller”

One way to see the future is to look at the stars. This is the only way to understand SENER’s mission in aerospace engineering. That mission is to bring the universe within our grasp. Actually, we have facilitated the flight of satellites and spacecrafts even before Man set foot on the moon. We have been conquering the heavens, carried by the wings of our aeronautical solutions. And we have come back down to earth to develop concentrated photovoltaic technologies and products, and defence and security technologies. And even make a deeper exploration of human beings possible due to our advances in medical robotics, expanding the possibilities of surgery.

The way to see the future. SENER Aerospace
Aena’s environmental activities are focused on two areas, the first of these are actions aimed at improving the compatibility of the airport with the local community – this focuses on the central issues of noise and emissions, and a number of measures are in place to reduce both. “On the other hand, we have everything related to energy efficiency and the utilisation of renewable energies – a field of activity in which we have a lot of work ahead and that has major importance,” said Hesse.

Efforts to reduce noise and emissions include the design of new SIDs and STARs, the establishment of noise preferential routes including closure of the runways at night, the establishment of a noise quota system at night, the implementation of noise and track monitoring systems and control nets of atmospheric pollution, as well as a important plan to soundproof homes affected by noise from the airports.

Key environmental initiatives include implementation of new P-RNAV SIDs for Madrid and Barcelona airports, which ensure a more precise follow-up of the routes of departure. Continuous Descent Approaches (CDA) are being tested at Madrid-Barajas, with the aim of publishing CDA procedures for all airports in the Aena network, this will facilitate reduced fuel consumption and a decrease in emissions into the atmosphere.

Reduced energy consumption

Before any infrastructure project such as Terminal T1 is undertaken in Spain, an ‘Environment Statement’ is required; this determines the environmental conditions under which the construction can be carried out. “This legal requirement together with the great importance that Aena gives to the environmental considerations in the development of its projects, justify the

Environmental considerations are at the forefront of any large infrastructure project such as Terminal T1. Indeed, a key aspect of the development was the application of sustainability criteria from the very conception of the building. Jose Manuel Hesse, Director of the Environmental Division, outlined the key environmental initiatives.

In terms of the sustainability criteria, a priority was the use of natural light. The air conditioning system has been designed for maximum efficiency to reduce energy consumption, while the construction materials were selected to guarantee sustainability from origin.

Sustainability key to Aena’s development strategy
affirmation that, without any doubt, the environment requirements have always been in a preferential place,” said Hesse.

In terms of the sustainability criteria, a priority was the use of natural light. The air conditioning system has been designed for maximum efficiency to reduce energy consumption, while the construction materials were selected to guarantee sustainability from origin. Terminal T1 has thermo solar plates to produce hot water and a complex system to control temperature and humidity; this permits precise regulation of the air conditioning devices by zones, making it possible to control energy consumption.

There are two environmental projects as part of the Terminal T1 development that Hesse described as “outstanding” due to their uniqueness. The first of these saw two nurseries set up to conserve the important vegetal diversity of the area, which would otherwise have been severely affected during the works. One nursery was dedicated to the recovery of different tree specimens, such as the orange tree, olive tree and plane tree. These were transplanted, looked after in the nursery during the construction works and afterwards replanted in the airport’s ‘green’ areas. The second nursery was used for the reintroduction of indigenous species. “The second project consisted of creating a littoral park between the beach and the new runway to provide a biological corridor between the two highly protected areas, which are located near the two ends of the runway. This project has been executed in coordination with the local authorities,” said Hesse.

**Renewable energies**

Carbon efficiencies are a key goal; Aena is experienced in the use of renewable energies – for example, wind power facilities at La Palma airport and solar power facilities at Jerez airport. It supports the development of facilities that allow renewable energies. Hesse is supportive of programmes such as ACI EUROPE’s Airport Carbon Accreditation; the independently assessed, institutionally endorsed scheme recognises the efforts airports are making to manage and reduce carbon emissions, via four levels of accreditation: Mapping, Reduction, Optimisation and Neutrality. Aena is developing a pilot project looking into the concept of the carbon neutral airport. “This project will have as its objective the application at an airport of all the feasible technologies, to check its applicability in a real operational environment, and to evaluate by when it is possible to achieve the aim of a carbon neutral airport,” said Hesse.

Aena’s environmental activities are aimed at improving the compatibility of the airport with the local community – this focuses on the central issues of noise and emissions, and a number of measures are in place to reduce both.
When planning new infrastructure such as Barcelona Airport’s Terminal 1, airport security requirements are, of course, taken into account at the earliest planning stages. Mariano Domingo, Aena’s former airports security director, outlined the key security requirements that needed to be met in the Terminal 1 development.

The technological evolution of Aena’s security

Those responsible for security at Spanish airports (Forces of State Security) and Aena and other stakeholders are subject to common European legislation; in Spain, there is also the National Security Programme. This means that the security requirements are the same at all airports, as are procedures developed for the effective implementation of safety regulations. “All the standards and security procedures, as in the rest of Europe, are audited by the European Commission,” explained Domingo. “Additionally, in Spain the State Agency for Air Security (AESA) undertakes exhaustive audits. In the past year, AESA has made a great effort to constantly audit all airports in Spain.”

A good design that takes into account all security requirements naturally makes it easy to achieve the final objective of ensuring the protection and safeguarding of the airport and its users. Of course, over the lifespan of a project it is necessary to adapt the initial design to changing legislation and the constant technological evolution. Aena successfully met these challenges with the Terminal 1 project.

The new terminal has a large security-restricted area – the twin priorities have been to ensure control of this area and to facilitate user access. “This control, apart from the corresponding human resources, is done through integrated access control and video surveillance managed from the airport management center (CGA). 100% inspection of hold baggage takes place in five steps and is fully integrated into the automatic baggage handling system,” said Domingo.

The main security requirements included simplification and clear definition of the security-restricted area, minimising access points to it in order to achieve more efficient control of access. After the initial design and during project implementation, different requirements emerged in terms of adapting the security-restricted area. “As an example of that, I would like to comment that from approximately 1,000 elements of the access control system, only 100 of them have been necessary to define and control access to the security-restricted area,” said Domingo.
Also key was ensuring compatibility between the security aspects and the facility of operation for passengers, aircraft crew and workers in the terminal area. This has been one of the main challenges, according to Domingo, and an area in which great success has been achieved. "The flow of passengers in the terminal, combined with the security requirements, has not been an impediment to smooth operations."

Terminal 1 has three security control points in public areas, with a total of 28 X-ray machines and 15 WTMD (walk through metal detectors) that can reach a maximum capacity of around 9,000 passengers per hour. There are also seven control areas for workers and a total of 52 passport control points. 14 Explosive Detection System (EDS) machines are in place for the inspection of hold baggage, while four high-tech computed tomography-based EDS machines allow the airport to have five levels of hold baggage inspection. This enables the inspection of around 8,000 hold bags an hour.

"These objectives in the security requirements and the result have been obtained after proper design and execution, with a thorough and comprehensive testing process that allowed us to obtain sufficient information to correct all the issues not showing the expected results," said Domingo.

**Innovative security solutions**

In addition to the standard X-ray equipment at security checkpoints, Aena has installed special WTMD for shoes and automatic returns systems that facilitate tray management via operator controls. "Talking about the inspection of hold baggage, we must emphasise the use of high-tech computed tomography-based explosives detection system machines," said Domingo.

"Regarding access control and surveillance, apart from use of the latest technology in all elements and a high-capacity multiservice network for the system, we must emphasise the use of Aena’s self-developed security software for the management of all integrated security elements. This system (GSA - Airport Security Management) enables high efficiency and control system access control and video surveillance. Within that access control, we have begun to implement a system at Barcelona Airport that allows users to control their boarding pass at the security check via their mobile phones."

Development of security technology across Aena’s network will follow a similar path to that started at Barcelona, particularly in the implementation of the GSA that is going to take place in the coming years. Aena is also testing several existing technological developments, which, based on the results, may be incorporated into its network of airports on a gradual basis, such as biometric systems, digital image analysis and a perimeter automatic detection system.

**Biometric technologies**

While Aena has not yet implemented a Registered Traveller Programme, it has undertaken an initial study into the possible implementation of such a programme, taking into account the Spanish regulatory framework and the various experiences of some international airports. "We are currently analysing the results and hope to make a decision soon that will allow us to implement these solutions in our airports," said Domingo.

He recognises the benefits of biometric technology in offering flexibility and efficient passenger flow. Although biometrics have not been implemented in the first phase of Terminal 1, Aena is looking into introducing a biometric solution. "Depending on the results that we obtain in the various analyses and tests we’re doing, we’re going to gradually incorporate the technology because the systems installed in Terminal 1 at Barcelona Airport allow it," said Domingo.

One of the first applications of biometrics will be the installation of an automatic border control system on arrival, through biometric characteristics such as fingerprint and facial recognition. This project is led by the Ministry of Interior – which is responsible for border control in Spanish airports – in collaboration with Aena and will initially take place at Barcelona and Madrid-Barajas airports.

The size of Aena as a network of airports can often achieve higher levels of effectiveness in implementing security measures and regulations. In many instances, the resolution of security problems in one airport can provide the opportunity to anticipate and avoid the same problem in another airport in the network. "Without any doubt, sharing information at a high level allows us, from the security point of view, a great opportunity for continuous improvement for all stakeholders," concluded Domingo.
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The retail vision

With commercial revenues increasingly important for airport operators, the retail offer is planned from the very outset of any new terminal development. Barcelona’s Terminal T1 was no different, with commercial requirements incorporated at the architectural planning stage. “From the beginning, we wanted to have international brands and a local feel,” said Isabel Pardo Martín-Gil, commercial manager, Aena Aeropuerto de Barcelona. Ross Falconer reports.

The philosophy of combining international brands with a local flavour was prevalent throughout development of the commercial offering in Barcelona’s Terminal T1. “Barcelona is famous for fashion and design – we wanted that feel at the airport,” said Pardo.

All concessions were awarded through commercial tender, with the tender procedure detailing Aena’s requirements for each particular concession. The commercial space initially totalled 11,000sqm – that was subsequently increased to 17,000sqm and will ultimately be developed to 24,000sqm. The commercial offer will be increased in line with passenger growth; there are currently 29 restaurants and 51 shops in Terminal T1. “Terminal 2 is being upgraded as well – investment in the airport is not just centred on Terminal T1. It is not just about one terminal, it is about the whole airport,” said Pardo.

The ‘colour’ of the terminal

The Sky Center is the most important commercial area in Terminal T1. In Spain, it is the first time that passengers go straight through the shops after security. “We undertook some studies – looking for relationships between the type of passengers and airlines that will use the terminal. It is all the result of market research. It shows that what we have in Terminal 1 is what people want,” said Pardo.

Terminal T1 has a mix of luxury and medium-priced brands. The difference between Terminals 1 and 2, explained Pardo, is evident in the food and beverage offer rather than the retail outlets. “With the new terminal we have tried to get specific outlets – in the tender, we specified what we wanted from each. There is a flavour of Barcelona in the restaurant area. There is a mix between shops and restaurants in a central square,” said Pardo.

The square is the anchor, around which there are shops and a selection of restaurants that serve hot food, including a Catalan restaurant and on the other side a fast food outlet.”
The Sky Center is the most important commercial area in Terminal T1. In Spain, it is the first time that passengers go straight through the shops after security. A central square is the anchor, around which there are shops and a selection of restaurants.

Pardo: “We undertook some studies – looking for relationships between the type of passengers and airlines that will use the terminal. It is all the result of market research. It shows that what we have in Terminal 1 is what people want.”

Aena decided on the type of outlets it wanted in April 2008 and launched the tenders in May of that year. The decisions were made in September. “We really are the colour of the terminal. It is only in the shops and restaurants that there is full colour,” said Pardo. The Sky Center is the only place in the terminal that has a change of floor colour – there is a strong black floor in the retail area and a red floor in the restaurant area. The rest of the terminal has a pinky-brown floor.

“The space near the check-in desks is the only place in the terminal where people can see the Sky Center without a ticket to travel. There are some restaurants here, including one with a Michelin star. We wanted to have some branded restaurants,” said Pardo.

‘La Plaza’

There is a small landside retail offer, including a newsagent and supermarket. ‘La Plaza’ is an area that everyone crosses between the car park and check-in. A specific offer has been developed for ‘La Plaza’ as there is a mix of departing and arriving passengers.

There is a repetition of area, with three piers – main pier, north pier and south pier. The terminal has a clear layout – it is easy to use and navigate. The idea is that it is immediately obvious to the passenger what they should be doing next.

A public tender was held for Terminal T1’s VIP lounge and Business Centre. A specialist operator is in charge of the VIP lounges. All facilities can be used by the 20,000 people working at the airport. The Business Centre is landside, near the ‘Madrid-Barcelona corridor’ as a lot of business travellers use that route.

The Aena commercial team supervised the planning of the Barcelona Terminal T1 retail space alongside the architect, with the commercial offer a central feature of the overall development. It has successfully employed a philosophy that combines major international brands with a strong local flavour, conveying Barcelona’s fashion and design heritage. Currently totalling 17,000sqm, the commercial offer will ultimately be increased to 24,000sqm in line with passenger growth.
Aena is a service-oriented company that places a strong emphasis on the customer experience. Successful customer service, explained María Luisa Sardá Barea, airport service manager, Barcelona Airport, is about the “fusion of technology with the human element”. “You can’t just have one – you have to have both,” she told Ross Falconer.

Barcelona Airport has more than 24,000 parking spaces, with the new Terminal 1 having more than 10,000 parking spaces in covered car parks. “We developed a long-term car park, which is three minutes from the terminal by shuttle. It is a good service; covered parking spaces are important because of the temperature here,” said Sardá.

Aena has a process in place to handle any complaints from passengers and has enjoyed notable success in this area; Sardá reported that the number of complaints has fallen dramatically by around 50%.

Sardá’s division is responsible for all services that are free to passengers; in addition to these services it is also in charge of parking. Barcelona Airport has more than 24,000 parking spaces. Terminal 2 has more than 14,000 of these, with 4,800 in two multi-storey car parks and the others in surface car parks, while the new Terminal 1 has more than 10,000 parking spaces in covered car parks.

“We are also in charge of all public transport. We have developed a shuttle between both terminals. Our parking is not expensive when compared with other airports,” said Sardá. “We developed a long-term car park, which is three minutes from the terminal by shuttle. It is a good service; covered parking spaces are important because of the temperature here.”

All services are provided to ensure that passengers have a fluent journey through the airport. Information points around the terminals, for example, mean that at the press of a button, travellers receive an instant response. Assistance is provided for the whole passenger process. “If passengers need help with their baggage, everything is prepared so that they can transit alone. It is a very human-oriented service, which is something that passengers appreciate,” said Sardá. “They know that we’re there to help them. There are many services for passengers; we always try to help people.”

A key service is assisting PRMs (passengers with reduced mobility) – it is a service provided from the moment the traveller arrives at the airport, whether
by train, bus or car. Sardá reported that passengers have been very happy with this facility.

**Better service**

Trolleys are available for use by passengers free of charge. The latest models are available for large and small baggage. The trolleys are connected to GPS, meaning they can be located wherever they are around the airport and managed with better results, as the airport can determine how many trolleys are needed in different locations. “Now we know the rotation of the trolleys and how many we need in each area – it is an efficient system. We know how many we need to buy and can take oldest for repair. If a trolley is in an area in which it doesn’t need to be, we will know,” said Sardá. “Next, they will have alarms in case trolleys are taken to an area they need not be. Someone controls and knows how many trolleys we have and when we need more on a particular side of the airport. We also know where bigger trolleys might be needed. The facility is oriented towards having a better service.”

The new Airport General Control Room is central to the customer experience. There are more than 80 members of staff, in different areas of the airport, looking at what is happening in the terminal. If a lift is not working, for example, that will be reported to the Control Room, which is fed images from cameras located all over the airport. “We also know if we have enough taxis, if there has been an accident, or if we need to do road maintenance we can inform passengers,” said Sardá. “The new technology makes this possible – if we inform people it is easier to manage them.”

**Problem-solving**

Every organisation in Spain is required to have a ‘complaints book’ and must reply to any complaint within a certain time period. Aena has a process in place to handle any complaints from passengers and has enjoyed notable success in this area. Sardá reported that the number of complaints has fallen dramatically by around 50%. “We have a paternalistic nature. It is very important, as if someone has taken the time to write a complaint, the problem is obviously important to them,” she said.

Passengers can complain via the information point in the terminal – the Control Room is then contacted and they, in turn, contact the nearest appropriate member of staff in the terminal, who tries to help the passenger. “Most travellers don’t write their complaint as they can see we are trying to resolve the problem. Some of them even write us an official thank you. If the passenger sees someone arriving just to help them, that is very important; it is a very nice, human process. If someone has a problem, give them a solution. Also, try to anticipate the problem before it happens,” said Sardá.

Airports are arriving passengers’ first experience of a destination, therefore, the customer experience is crucial. Aena has a dynamic approach to customer service and it has successfully employed a comprehensive strategy to achieve an efficient, excellent service for passengers.
Innovative IT: Aena ‘one step ahead’

Aena’s approach to IT innovation includes a common network of systems – a global LAN – that allows greater integration and flexibility than independent networks. Iñaki Ascacibar, Director of Information Systems Division (to February 2010), outlined the IT philosophy.

WiFi infrastructure

Aena has developed a new Access Control system for the airport, with video integration and IP connectivity with lockers, card readers and other devices. Identification is achieved using RFID cards; while biometrics are not yet used, modularity allows biometric technology to be included in the future if a standard appears.

“The WiFi LAN has been reinforced and we are providing internal telephony WiFi IP phones and service monitoring using a new mobility system for the staff deployed on PDAs,” said Ascacibar. “We expect to consolidate information about how the services are running, queuing times, broken infrastructure or operational incidences, real time, from the staff supervising the terminal.”

The most innovative application using the...
WiFi infrastructure is the trolley management, which uses WiFi triangulation to locate each trolley in the terminal; this is designed to guarantee the service where passengers need it and to maintain the inventory.

There are two projects being handled on a shared basis by the airports and air navigation divisions of Aena – Collaborative Decision Making (CDM) and Advanced Surface Movement Guidance and Control System (A-SMGCS). Aena’s AODB, called SCENA, is a CDM-compliant system. Prior to the opening of T1, it was running a project to implement CDM procedures on the airport – that was delayed due to the dedication required for the new terminal. “The work has continued at Palma de Mallorca airport and we expect in the near future to restart the project at Barcelona,” said Ascacibar. “The A-SMGCS system we are installing has the ability to integrate information from several sources, like the short-range radar installed at Madrid-Barajas, GPS emitters, WiFi or Mode S multilateration.”

The information is used for surveillance in bad weather conditions, but it is also included into the AODB to present an alarm if the data doesn’t match the timing and stand where the aircraft is moving.

**Common-use philosophy**

Aena believes that one common network of systems – a global LAN – allows greater integration and flexibility than independent networks. It has installed one single network for all systems, but at Barcelona has classified the users on a layered architecture. There is a ‘Red LAN’ for the servers in the core room and the most critical users. ‘Yellow LAN’ groups the majority of the users, and ‘Green LAN’ is devoted to Video IP. ‘Blue LAN’ was deployed for the CUTE and FIDS, and finally ‘Black LAN’ provides services to the SCADA and industrial applications. Several Firewalls provide communication among them.

“The LAN is maintained as a whole, but a layered design will avoid a problem that could saturate the entire airport,” explained Ascacibar. “Each LAN is designed to deal with the specific requirement of the systems and while the electronic for the ‘Black LAN’ was chosen because of its roughness, ‘Green LAN’ for video requires a multicast capability that restricts the options for the electronics.”

While most of the systems Aena develops are outsourced, it always retains the property and knowledge of the applications; future versions and daily maintenance are then done in-house. “We keep in-house the works for integration and development of information charts with crossed information among different systems. I think Aena’s catalogue for airport applications is among the best options you could find today, and although initially externally developed, are now an active part of our organisation,” said Ascacibar.

Infrastructure is installed on a common-use philosophy as much as possible. Check-in counters are common use, for example, and there are 50 CUSS kiosks to be used by all airlines flying from the airport. Airlines are not allowed to install proprietary equipment for self-service.

Communications infrastructure is also common use, LAN, including WiFi, telephones and trunking radio, is provided and maintained by Aena, as is other conventional infrastructure such as FIDS or baggage sortation and reconciliation.

“We expect to consolidate information about how the services are running, queuing times, broken infrastructure or operational incidences, real time, from the staff supervising the terminal.”

The Automated Baggage Handling System control room. Terminal T1’s communications infrastructure is common use; Aena provides and maintains infrastructure such as FIDS or baggage sortation and reconciliation.

There are two projects being handled on a shared basis by the airports and air navigation divisions of Aena – Collaborative Decision Making (CDM) and Advanced Surface Movement Guidance and Control System (A-SMGCS).
**Aena (Spanish Airports and Air Navigation)** is legally and organisationally separate from the Spanish DGAC (although depending also of the Ministry of Development through the General Secretariat for Transport) and 100% state-owned. Carmen Librero, Director of Air Navigation, outlined the structure in Spain and the ATM innovations at Barcelona Airport.

The Air Navigation Directorate of Aena is in charge of providing air traffic control services (en-route, approach and airport ATC), aeronautical information services (AIS) and communication, navigation and surveillance services (CNS) in Spanish airspace. Other services are provided by external organisations, such as meteorological information (MET), provided in Spain by the State Secretariat for Climate Change (dependant of the Ministry of Environment and Rural and Marine Affairs) and Air Traffic Controller training, provided by SENASA.

Spanish airspace is divided, for organisational and management purposes, into three flight information regions – Madrid FIR / UA, Barcelona FIR / UA and Canary Islands FIR / UA operated by Centre-North, East and Canary Islands control area centres (ACCs). Likewise, there are two other ACCs: Southern – by delegation from the Madrid FIR – and Balearic Islands – within Barcelona’s FIR. Each of these provides air traffic control and information services for the regions they cover.

“Aena does not declare the capacity value of its entire airspace or the capacity figures for each of its regions. However, we provide specific capacity values for airports and airspace sectors. Spanish capacity data is managed by CFMU/EUROCONTROL in the same way as for all European Air Navigation Service Providers,” said Librero.

“Our capacity and flow management system has the sufficient flexibility to adapt – upwards or downwards – to possible deviations from traffic forecast. Therefore, we do not expect any significant capacity constraints in our airspace.”

Additionally to its capacity management process, Aena is also implementing measures to increase its operational efficiency through the optimal use of the FUA concept. This results in an increase of available routes, which are more direct, fuel savings for airlines and a significant reduction in CO2 emissions.

Regarding capacity analysis, Aena uses state-of-the-art adapted analysis programmes and tools applied to both the airspace and runway environments. These enable assessment, through occupancy analysis, of their capacity values and allow Aena to anticipate and solve potential capacity constraints. “These tools establish standardised and unified criteria and procedures – based on effective, consistent
methods – that can optimise the design and efficiency of the air traffic control sectors and runways,” said Librero. “Applied methodologies allow reduced personnel costs related to real measurements, anticipation and forecasting of the difficulties of absorbing future demand – ’bottlenecks’ could be identified – and providing ideas and lines of action that serve as a base or support for decision making.”

Aena proactively and intensively collaborates with EUROCONTROL at all levels. Regarding optimisation of airspace capacity, it exchanges scenarios, techniques, tactics and best practices to optimise airspace capacity, not only at national but also at pan-European level. “In this sense, we expect to continue to actively cooperate with EUROCONTROL in designing the European network with a special focus on enhancing its capacity, while we look forward to collaborating with whatever entity is endowed with the responsibility of managing in the future the overall traffic flows,” said Librero.

**SESAR Joint Undertaking**

Aena is a member of the SESAR Joint Undertaking (SJU), created to coordinate and concentrate all relevant research and development efforts related to ATM undertaken in Europe. In this sense, in the coming years Aena’s research and development activities will be mainly focused on its participation in those SJU projects. Among the programmes to be undertaken in the coming years are: New flight plan processing system through iTEC and its integration in our air traffic control system (SACTA); participation to the deployment and management of the future European communications network (PENS) as a facilitator of the SWIM concept; definition, validation and implementation of very advanced systems in control towers including electronic strips, advanced surface guidance systems and data link services; ADS-B implementation in low traffic density airports (with lack of radar coverage); and advanced workload analysis. “It is also important to highlight that we are one of the founding members of the recently-created CRIDA (Spanish ATM R&D Reference Centre). This not only reinforces our commitment to innovation in the field of ATM, but additionally constitutes a specific working environment from which all the expert resources – scientists, engineers, methods and tools – necessary to maintain our state-of-the-art system can be pooled,” said Librero.

Barcelona Airport, meanwhile, will undergo a series of relevant changes during the coming years based on the execution of major innovative projects, including: Deployment of an advanced surface guidance system (based on SMR+MLAT), implementation of an advanced operative in the control tower, commissioning of the new control tower, design of the new Barcelona TMA, and application of A-CDM processes.

In the coming years Aena’s research and development activities will be mainly focused on its participation in **SESAR Joint Undertaking** projects.
The new terminal at the airport of Barcelona – a city considered at the forefront of avant-garde design – presented an exciting challenge for Aldeasa. It took this opportunity to design a new shop which reflected both the airport’s essence and the city’s heritage, with real customer appeal. As a result, ‘Thinking Barcelona’ was created; the shop sells more than 1,500 gift products inspired by the vibrant city of Barcelona, with references to the design synonymous with Gaudí.

Aldeasa, which is integral to the passenger experience throughout the Aena network, also has a strong international presence. Today, Aldeasa has 258 shops in 20 countries, operated by more than 4,000 employees. Significant developments internationally include the duty free shops in Jordan, run by Aldeasa since 2000, and those at Vancouver International Airport in Canada and Kuwait Airport, open since 2005. In 2007, Aldeasa consolidated its international presence firstly by increasing its influence in the American market with the award of Atlanta and secondly by being awarded the first duty free shops in Saudi Arabia at the airports of Jeddah, Riyadh and Dammam.

In addition to these countries, Aldeasa also operates stores in Portugal, Chile, Mexico, Peru, Colombia, Netherlands Antilles, Cape Verde, India, Sri Lanka, the Maldives and Nepal. The company runs shops at cultural sites as well, through its subsidiary company Palacios & Museos, in Spain, France, Turkey, Colombia and Panama.

The close relationship that Aldeasa maintains with airport authorities has been an important factor in achieving development and growth at the airports in which it operates. One of the reasons behind Aldeasa’s successful expansion strategy is its capacity to work in partnership with suppliers, its business partners and airports to maintain the quality of its customer service, key in order to attract passengers to its stores. In the same vein, Aldeasa constantly strives to deliver better commercial standards, improved efficiency and to embrace best practices.

For over 80 years, Figueras International Seating has specialised in the overall creation of seating systems and in optimising and making the maximum use of space. It concentrates on listening to customers and innovating day-by-day.

The new Mauro bench was developed by the Figueras Design Centre and created for waiting areas at airports and transportation terminals. A meticulous design based on smooth lines enhances the aesthetic quality of the bench. The model features a semi-rigid polyurethane seat and backrest that provide a high level of design and ergonomic comfort. Both the seat and backrest are easy to change. The benches require minimum maintenance and are highly resistant to harsh climatic conditions and intensive use. The modular system for arranging the benches facilitates multiple configurations, so benches can be readily adapted to ever-changing distributions of space in contemporary buildings. Figueras has extensive experience providing seating for airports around the world. The firm has installed its products in the waiting areas of airports in northern Peru, at Abu Dhabi International Airport, Pulkovo Airport in Russia, Mohammed V International Airport in Casablanca and recently in Terminal T1 at Barcelona Airport.
Plan Málaga is an ambitious project launched in 2004, which will see €1.8 billion invested in the period to 2013. Central to this is the new Terminal 3, which opened on 16 March. The Plan represents a major transformation, as Mario Otero Andión, airport director, Málaga Airport, explained.

The development will double the airport’s capacity to 30 million passengers per year – Málaga Airport handled around 12 million passengers in 2009 – and is designed to bring it to the forefront of the main Mediterranean tourist airports. Over the last decade, Málaga Airport has become Andalusia’s main point of entry for national and international tourism. More than 60 airlines connect Costa del Sol’s capital with over 100 international destinations. The airport is a key infrastructure for economic activity for both the Costa del Sol and Andalusia as a whole. The Plan offers solid backing for Málaga’s and Andalusia’s socioeconomic development and, despite its scope, it guarantees environmental sustainability by prioritising Aena’s environmental, social and urban commitment to the environment.

A total of €409.7 million has been invested in Terminal 3, which was conceived by architect Bruce S Fairbanks as a single building with a distinctive roof and an area of 250,000sqm. The concept of a vast, continuous canopy was reinforced with a glass wall designed between the atrium and the check-in areas to provide maximum transparency. "T3 is a qualitative and quantitative leap in the service provided, not only doubling operational capacity of the airport, but also offering the passenger a..."
revolutionary commercial offer with a meaningful effect on the service provided,” explained Otero.

The figures speak for themselves: a new terminal area of 385,000sqm compared with 135,000sqm before the opening of Terminal 3, 50 shops and restaurants, 48 gates – 26 with air bridges and 22 remote, 180 check-in counters, and a baggage handling capacity of 14,000 bags per hour thanks to the modern Automated Handling Baggage System installed in Terminal 3. “The benefits the facilities bring are the result of a great infrastructure, a great opportunity for everybody that generates business, employment and wealth for the city of Málaga and for the whole region around it including the Costa del Sol, and they place the airport as a reference point among the Mediterranean tourist airports,” said Otero.

With a commercial area of 12,000sqm, Terminal 3 increases the airport’s total commercial capacity to 18,000sqm. The offer includes an Aldeasa outlet, which is the second largest duty free shop in Europe and the largest in Spain, as well as the largest National Geographic shop in any airport worldwide, courtesy of Areas.

Meanwhile, SSP has opened 12 new bars and restaurants in Terminal 3. The new units include the stylish Lamoraga restaurant and gastro-bar, and Spain’s first Caviar House & Prunier Seafood Bar. Other brands featured include the world’s first Burger King Whopper Bar in an airport, as well as a Burger King 20/20, SOHOCoffeeCo, Caffé Ritazza, O’Leary’s and Pizza Hut Express. Other brands featured include the world’s first Burger King Whopper Bar in an airport, as well as a Burger King 20/20, SOHOCoffeeCo, Caffé Ritazza, O’Leary’s and Pizza Hut Express. Other brands featured include the world’s first Burger King Whopper Bar in an airport, as well as a Burger King 20/20, SOHOCoffeeCo, Caffé Ritazza, O’Leary’s and Pizza Hut Express. Other brands featured include the world’s first Burger King Whopper Bar in an airport, as well as a Burger King 20/20, SOHOCoffeeCo, Caffé Ritazza, O’Leary’s and Pizza Hut Express.

Airfield developments

In addition to Terminal 3, other projects already completed and in service include a new general aviation terminal for corporate and private flights, a new seven-storey car park and 2,500 parking spaces, a new cargo terminal, new high-speed exit taxiways and holding bays on the current runway, and two extensions of the apron. “Plan Málaga includes all actions related to the expansion of Málaga Airport and represents the major transformation in its history,” said Otero. Redevelopment of the airfield is progressing, with the aim of increasing the operational capacity of the airport. Civil works on the second runway will be complete in the first half of 2011 followed by a six-month period of calibration and testing, with operations likely to start at the end of 2011. The new runway will have 2,750m for landing and 3,090m for take-off. A parallel taxiway is also being built, with corresponding high-speed exit taxiways, a new apron and construction of another building for the Fire Fighting Service for the second runway. These projects highlight that Málaga Airport is undergoing the greatest transformation in its history. When Plan Málaga is complete, the airport will cover an area of 550 hectares – equivalent to approximately 750 football pitches. It will also enhance the airport’s economic impact. It is estimated that the direct impact will amount to €861 million and 6,400 full-time jobs, while the indirect economic impact is forecast to be almost €7 billion and 46,000 jobs.
Plan Alicante:
€670m modernisation

Plan Alicante involves the investment of €670 million in the period to 2012, with projects landside and airside. The main goals are to increase capacity and modernise the airport infrastructure, as Santiago Martínez-Cava, Managing Director, Alicante Airport, explained.

Alicante Airport is located in one of the most dynamic business and economic areas on the Mediterranean coast. Traffic growth in recent years has made it essential to expand the airport’s facilities. Passenger numbers grew from six million in 2000 to 9.5 million in 2008. In 2007, the new 9,000sqm Terminal 2 was opened to cope with demand until the New Terminal Area (NTA) is opened in 2011. “Traffic growth forecasts for 2010 are rather good. It could be one of the best airport years as regards traffic volume. We are talking about around a 5.5% increase that would take us over 9.6 million passengers,” said Martínez-Cava.

The Alicante and Murcia regions have enjoyed a significant demographic increase. Between 2000 and 2008, the population in both regions grew by 28% to 3.3 million. Dynamic economic growth means that Alicante ranks fourth in terms of business creation in Spain. Martínez-Cava explained that service industries dominate in the region, with a number of small and medium sized textile, toys, shoes and food businesses. “We should also note

Martínez-Cava: “An airport, as the first and last step the tourist goes through, can never limit its region’s existing demands. Our capacity must always march ahead of demand. When the extension works are complete, Alicante Airport will be able to handle up to 20 million passengers.”

The New Terminal Area and associated parking is the central element of the investment at Alicante. 333,500sqm new terminal building will increase the number of check-in desks from 52 to 96, the number of boarding gates from 16 to 26 and the number of fingers from 5 to 16.
that Alicante province is the fourth most populated in Spain," he said.

The New Terminal Area and associated parking is the central element of the investment. The 333,500sqm new terminal building will increase the number of check-in desks from 52 to 96, the number of boarding gates from 16 to 26 and the number of ‘fingers’ from 5 to 16. The number of parking spaces will also double from 2,000 to 4,200.

“We are also investing airside, with a second high-speed taxiway and extended holding points and aprons,” said Martínez-Cava. “An airport, as the first and last step the tourist goes through, can never limit its region’s existing demands. Our capacity must always march ahead of demand. When the extension works are complete, Alicante Airport will be able to handle up to 20 million passengers.”

Positive impact

Aena has a longstanding commitment to environmental sustainability. Alicante’s new terminal building has been designed with environmental protection measures in mind, primarily those aimed at reducing lighting and air conditioning expenses. The glass façade of the new terminal ensures maximum natural light, while the eastern and southern sides have been reinforced for insulation so as to optimise air conditioning expenses. “Zinc roofs are also more resistant to corrosive weather effects and, therefore, longer lasting,” said Martínez-Cava.

The thermo-refrigeration plant to feed the New Terminal Area air conditioning system with cold and hot water is equipped with an extra pumping station and frequency adaptors on the main one, minimising energy intake. “We should finally underline a new total centralised control system to globally monitor all facilities, reducing individual energy costs and including automatic lighting control for efficient natural light use,” said Martínez-Cava.

Alicante Airport is a major reference for all Alicante, Albacete and Murcia inhabitants for domestic and European journeys. “We should also note that Alicante province is the fourth most populated in Spain,” said Martínez-Cava. “Obviously, such an expansion work causes a major impact on its area of influence. As mentioned before, our airport must not limit demand, in fact the opposite, we should lead and attend to capacity demands. In this sense, our extension project will allow for a passenger traffic increase, with its logical positive impact on job creation and welfare for its area of influence.”

With traffic forecast to grow by 5.5% in 2010 to 9.6 million, Alicante Airport welcomes any profitable new route. “The more destinations we can offer our clients the better for everyone, because we will keep growing as the main touristic destination on the Eastern Mediterranean, which we already are,” said Martínez-Cava.

In 2007, the new 9,000sqm Terminal 2 was opened to cope with demand until the New Terminal Area (NTA) is opened in 2011. Traffic forecasts for 2010 indicate around a 5.5% increase to more than 9.6 million passengers.
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