

AIRPORT DESIGN ENTERS 21ST CENTURY

The accessibility of global travel and technological advancements in aeroplane design has prompted a new wave of airport development within the Gulf region. Infrastructure investment into strategic centres is manifesting itself through terminal facilities and 'airport cities' that epitomise the next generation of travel hubs.

Passenger expectations have also risen substantially in the last few years with airports vying to secure lucrative transit business by creating a seamless stress-free experience designed to engender emotional attachment to a particular destination, thereby substantially boosting revenue potential.

Infrastructure development in the UAE is delivering airport facilities that encompass strikingly innovative design and futuristic operational facilities. **Claire Malcolm** reports

Within the UAE, both Abu Dhabi and Dubai are setting new standards. The Emirates Airline-dedicated Terminal 3 in Dubai has quickly established itself as a 24/7 user-friendly destination, while Abu Dhabi's new Midfield Terminal development – part of the airport's US\$6.8 billion extension programme – is also promising a unique passenger experience. Meanwhile, Qatar and Saudi Arabia are also investing heavily in state-of-the-art airport redevelopment for both Doha and Jeddah.

The evolution of airport sites, from former military airfields to commercially-focused transport hubs, has leapfrogged the decades since Berlin's Neo-Classical

Tempelhof airport, built in 1934, set the standards for modern airport design. Functionality over form remains the core focus and, while the region's airports are bringing in big name architectural firms to introduce iconic potential, it is not a trend-driven sector. Claudius Schweickert, program director for the Supervision Committee for the Expansion of the Abu Dhabi Airport (SCADIA), comments: "Airport design really is the least trendy thing as it asks for a lot of technical capacity and has to be functional. It calls for absolute precision in the way that you design spaces for people to smoothly move within, but you also have to make it an experience."





2



3



Infrastructure investment into strategic centres is manifesting itself through terminal facilities and 'airport cities' that epitomise the next generation of travel hubs

ICONIC AIRPORTS

The redevelopment of Abu Dhabi International Airport's existing site will have a new world-class terminal building as its centrepiece. New trends in airport design are increasingly geared towards maximising the operational fast-tracking of passengers. Schweickert says: "The winning design for the Midfield Terminal was by KPF International and its very distinctive X-shape has one major advantage – it minimises the walking distances, in particular in the transfer terminal, which is always the biggest challenge in airport design."

"It will initially be able to accommodate 20 million passengers per annum, but has the capacity to grow to take anywhere from 30 to 40 million passengers. Its size is defined by the span of the wingtips between an aircraft, so with the X-shaped design, where planes are parked on both sides, even in transit you have a much shorter distance to walk."

SCADIA's design brief for both the exterior and the interior also looked to incorporate a distinctive sense of place. "The waved roofs and façades are a clear reference to our surroundings," says Schweickert.

"There are three elements that define the country – sand dunes, sea and greenery – and we really are trying to actively promote these into the design right down to the colour schemes. It is very important that the space

we are creating is such that you don't feel like you are in a mousetrap," he adds. In addition to the terminal, a second focal point will be the new air traffic control tower. "This landmark building is already under construction, and will be the highest tower of its kind in the Middle East, at 110 metres. It's a mixed-use building with the lower floors housing administration and technical space for the Civil Aviation Authority," says Schweickert.

The architect for the project is Aéroports de Paris' engineering and design offshoot – ADPI – which specialises in airport design, a must as far as Schweickert is concerned. "It's a prerequisite for us that if you are going to work on a project like this then you have to have people on board who have designed facilities of that size and provenance, with an excellent track record."

SETTING NEW STANDARDS

The terminal façade stretches four kilometres in total, and this also gave SCADIA the opportunity to capitalise on the uniqueness of its public spaces, as Schweickert explains: "We wanted to do something special with the large central spaces. Most airports don't have a big central piazza and you are forced to walk down long corridors. The idea with this building is to give it an iconic entrance and exit for passengers coming into and leaving Abu Dhabi. →

4/5 Dubai International Airport



4



5

"We also wanted to develop the space to satisfy all their different needs. We will have a huge shopping world which is a combination of seven different retail centres – so people can really use the time in between flights. This is a major focus for us, as business prospects for carriers in the UAE are fuelled by the determination to establish Abu Dhabi as a globally strategic hub. The average traveller is always a bit anxious about transferring in an unknown location and so we have really put a lot of effort into the design."

"We are seeing growing opportunities to fly through hubs, and people will not only look at price but increasingly at the products being offered on the plane as well as on the ground – from easy gate access to relaxation areas."

The benchmarking of design and operation has been an integral part of the process, with thorough analysis of other high-volume international airports allowing SCADIA to cherry-pick the best ideas.

Schweickert remarks: "We try to select best practice from around the world and then combine it into a unique new product. For example, BAA Airports Ltd. in London is very good at retailing and the shopping experience. Other airports are experts in terms of quick transfer, such as Munich Airport where the minimum connection time is 35 minutes."

"Others are unique in leisure and business experiences, like Singapore's Changi Airport, where you get everything from a massage to quiet spaces in which to check emails. What we are trying to do is look at international best practice and adapt the best of everything."

This train of thought extends beyond the departure experience, as Schweickert explains: "We also want to make a difference in the arrivals area where we are taking the daylight down, as well as a water feature, so that even when you pick up your bag you get a true sense of place. I believe that the arriving passenger should get more attention than the departing passenger, as it is the gateway into the country, and your first impression."

"There will be retailing opportunities on the land side as well. Airport terminals need to have a reasonable amount of space for friends or family waiting for passengers to be able to have a cup of coffee, shop or pick up a magazine. We are doing a lot of research into airports like Singapore which place a big emphasis on these areas."

We are seeing growing opportunities to fly through hubs, and people will not only look at price but increasingly at the products being offered on the plane as well as on the ground

TERMINAL 3 Q&A

Khalifa Al Zaffin, executive chairman, engineering projects, Dubai Airports

Who was the architect for T3?

Concourse 2/Terminal 3 has been designed by the joint venture team consisting of M/s Dar Al Handasah and M/s Aéroports de Paris, led by Dubai Civil Aviation's engineering projects team.

Which airports did you use as benchmarks?

Concourse 2/Terminal 3 has its own defined requirements with its own specific challenges, defined by the fact that this was a major expansion to a live operational airport. We took care to learn lessons from many international airports, although no single airport was a major benchmark.

Will Al Maktoum International supersede T3 once completed?

T3 can certainly be categorised within the league of the most advanced airport facilities in the world and has incorporated the latest technology, some of which is visible to the traveller and some not. Al Maktoum International Airport should supersede the existing Concourse 2/Terminal 3, keeping in line with the trends we set for ourselves, and again taking the opportunity to introduce the latest technology.

What were the major challenges with development of the existing airport site?

Maintaining the operations of the live airport while T3 was designed and constructed. The enormous structural challenges, due to the deep excavation and high water table, make T3 the largest underground passenger terminal in the world.

How relevant is planning in terms of airport zoning close to residential sites?

A great number of studies have been conducted for the overall development of Dubai World Central and Incorporated within the master plan in line with development regulations and guidelines proposed for this area.

What environmentally-friendly design elements are incorporated within T3?

The construction of T3 has taken advantage of international best practice. Energy efficient lighting and controls to switch off unused lights automatically are installed throughout; and passenger and baggage movement equipment will stop when not in use and restart on demand. One of the biggest factors was the decision to build T3 underground. In summer this reduces the solar heating effect.

What kind of technological innovation has been integrated into the new facilities?

State-of-the-art Skytrains (largest elevators in the world) for rapid vertical movement of passengers and technologically advanced baggage and passenger screening machines are some examples.

LIFE CYCLE

Safety and security concerns have also necessitated increased investment in recent years and this is just one element of the airport life cycle that is a major red flag. "The various operational elements of an airport have clear life cycles, some of which are very short – especially those related to technology. Within six or seven years we believe that nobody will check-in at a check-in counter. It will all be done through our Blackberries," says Schweickert.

"The past 10 years taught us that security is of tremendous importance and a very quickly evolving feature. It is also a major factor in determining not only the look of an airport, but also how passengers feel about them," he adds.

The level of security in this region is also something that Schweickert sees as a vital integration into the fabric of the new airport. "Security is definitely a key issue here and the UAE already has some of the most advanced technologies in operation."

"And that's why we are not sure what will be in the Midfield Terminal in terms of technology. These are things that we try to be flexible about, but also mindful of a client perspective."

GREEN MOVES

In a move that combines both sustainability ideals and subtle destination marketing, the Midfield Terminal will also feature extensive internal landscaping, as Schweickert explains: "We are trying to incorporate a lot of greenery because the overall concept is driving a green theme which runs from the outside of the building throughout. This means that Abu Dhabi's reputation as a city that has transformed part of the desert into a lush green oasis is reinforced to arriving or departing passengers."

"The terminal garden in the central piazza will also have water features and palm trees – elements that we believe will make people feel very comfortable as well as conveying the emirate's positioning. It's an emotional journey as much as anything else."

On a sustainable design front, Schweickert talks about the new legislation in Abu Dhabi and confirms that some buildings will apply for formal Estidama certification. "To support this, we are trying to do as much as possible in all our buildings. It starts with our overall plan to introduce as much greenery as possible and extends to active and passive solar usage – so we will have buildings that are designed to utilise solar panels and sun collectors."

"We are also equipping buildings with environmentally-friendly facades, as the biggest challenge in the UAE is to deal with the outer envelope of the building to keep cooling costs down. We will also go as far as separating grey and black water, and using the grey for irrigation." →

6 Dubai International Airport
7 Abu Dhabi International Airport



AIRPORT ADD-ONS

SCADIA is also undertaking numerous other projects to expand the cargo and support facilities as well as creating significant new infrastructure and facilities through the development of a major free trade zone.

Schweickert says: "There are a lot of things that you don't see at an airport; a large portion of the investment is stuck in the ground and yet it is a vital part of a development such as this."

"Another big cluster is our commercially-related projects. An airport exists on its aviation-related revenues including cargo and infrastructure, but they are increasingly becoming an integral part of cities, and even cities in themselves."

Phased developments as part of the master plan include Airport City – dedicated to high-end office developments, four and five-star hotels, inter-modal connection points for the proposed UAE railway link as well as Abu Dhabi's own forthcoming urban transport system.

To the south of the terminal will be a free trade zone development, including a hotel, which is being designed to house global players with office and warehouse space. "This will be the first free trade zone for Abu Dhabi and construction has already started, with delivery of the first ware-



GREEN TERMINAL

Florida, USA, will be the home of the world's first green terminal in 2010 with work on the new Panama City - Bay County International Airport (PFN), already underway.

The US' first new airport since 9/11, the US\$330 million project has been designed by PBS&J and will be a LEED Silver-certified building – a first for the country.

A total of 4,000 acres of land were donated by the St. Joe Company as part of a mammoth West Bay Plan that is being positioned as a 'landmark conservation effort'. The greenfield plan includes the establishment of an Audubon Nature Center and the local airport authority is committed to designing, building and operating a 100 percent green facility.

The long-term plan is to make the surrounding airport development carbon neutral.

houses ongoing as part of a phased build-out. And to the east we have recently acquired a piece of land that is currently in the master planning phase. We are also looking at what our 'neighbours' are doing in the surrounding area, to see what is missing," says Schweickert.

"There is a massive construction period in front of us so there will also be a worker housing component in the interim, and part of our thoughts for the eastern section master plan is also to develop a residential component for people working at the airport. In 2015 the main terminal building will be able to handle 20 million passengers, so most probably there will also be around 20,000 people working in the airport zone," he adds.

COMPLETION CHALLENGES

Airport expansion programmes in Europe and North America are also subject to strict zoning regulations and noise level controls, but Schweickert says that this hasn't – as yet – been a mitigating factor for SCADIA.

"I think people here are less sensitive to these issues. It may come, but you have to also consider the fact that aeroplanes are getting quieter. We do have a lot of night flights in this region but no aircraft in the Etihad fleet is older than three years, and it's the old aircraft that have noise issues."

"Also, most of the existing residential developments are sited parallel to the runways and not at the outer ends, so this makes a big difference."

He is also confident that the project will run on schedule and to budget. "In terms of site challenges, there is never a perfect piece of land; however here it is good because it's rather flat and we don't have a huge amount of site levelling etc. to be done."

"The challenge here is the ground conditions as we are close to sea level, and so we are putting the terminal building on piles – 7,600 to be precise. There are certainly challenges, but nothing that we can't deal with."

The final budget for the project was only confirmed within the last year, as the master plan has grown significantly since the 2004 launch. Schweickert says: "I am quite confident that we will deliver within budget. We saw a heavy increase last year in construction prices, especially in the UAE, but with the current market consolidation, prices are becoming much more reasonable and there's a good sense of competition once more, which is a healthy process."

Once all phases are completed, SCADIA hopes to set not only regional, but international standards, as Schweickert comments: "I believe we will be unique not only in the region, but in the world with this design." ●



2



1/3 Abu Dhabi International Airport
2 Dubai International Airport



Infrastructure investment into strategic centres is manifesting itself through terminal facilities and 'airport cities' that epitomise the next generation of travel hubs

ICONIC AIRPORTS

The redevelopment of Abu Dhabi International Airport's existing site will have a new world-class terminal building as its centrepiece. New trends in airport design are increasingly geared towards maximising the operational fast-tracking of passengers. Schweickert says: "The winning design for the Midfield Terminal was by KPF International and its very distinctive X-shape has one major advantage – it minimises the walking distances, in particular in the transfer terminal, which is always the biggest challenge in airport design."

"It will initially be able to accommodate 20 million passengers per annum, but has the capacity to grow to take anywhere from 30 to 40 million passengers. Its size is defined by the span of the wingtips between an aircraft, so with the X-shaped design, where planes are parked on both sides, even in transit you have a much shorter distance to walk."

SCADIA's design brief for both the exterior and the interior also looked to incorporate a distinctive sense of place. "The waved roofs and façades are a clear reference to our surroundings," says Schweickert.

"There are three elements that define the country – sand dunes, sea and greenery – and we really are trying to actively promote these into the design right down to the colour schemes. It is very important that the space

we are creating is such that you don't feel like you are in a mousetrap," he adds. In addition to the terminal, a second focal point will be the new air traffic control tower. "This landmark building is already under construction, and will be the highest tower of its kind in the Middle East, at 110 metres. It's a mixed-use building with the lower floors housing administration and technical space for the Civil Aviation Authority," says Schweickert.

The architect for the project is Aéroports de Paris' engineering and design offshoot – ADPI – which specialises in airport design, a must as far as Schweickert is concerned. "It's a prerequisite for us that if you are going to work on a project like this then you have to have people on board who have designed facilities of that size and provenance, with an excellent track record."

SETTING NEW STANDARDS

The terminal façade stretches four kilometres in total, and this also gave SCADIA the opportunity to capitalise on the uniqueness of its public spaces, as Schweickert explains: "We wanted to do something special with the large central spaces. Most airports don't have a big central piazza and you are forced to walk down long corridors. The idea with this building is to give it an iconic entrance and exit for passengers coming into and leaving Abu Dhabi. →

4/5 Dubai International Airport



4



5

"We also wanted to develop the space to satisfy all their different needs. We will have a huge shopping world which is a combination of seven different retail centres – so people can really use the time in between flights. This is a major focus for us, as business prospects for carriers in the UAE are fuelled by the determination to establish Abu Dhabi as a globally strategic hub. The average traveller is always a bit anxious about transferring in an unknown location and so we have really put a lot of effort into the design."

"We are seeing growing opportunities to fly through hubs, and people will not only look at price but increasingly at the products being offered on the plane as well as on the ground – from easy gate access to relaxation areas."

The benchmarking of design and operation has been an integral part of the process, with thorough analysis of other high-volume international airports allowing SCADIA to cherry-pick the best ideas.

Schweickert remarks: "We try to select best practice from around the world and then combine it into a unique new product. For example, BAA Airports Ltd. in London is very good at retailing and the shopping experience. Other airports are experts in terms of quick transfer, such as Munich Airport where the minimum connection time is 35 minutes."

"Others are unique in leisure and business experiences, like Singapore's Changi Airport, where you get everything from a massage to quiet spaces in which to check emails. What we are trying to do is look at international best practice and adapt the best of everything."

This train of thought extends beyond the departure experience, as Schweickert explains: "We also want to make a difference in the arrivals area where we are taking the daylight down, as well as a water feature, so that even when you pick up your bag you get a true sense of place. I believe that the arriving passenger should get more attention than the departing passenger, as it is the gateway into the country, and your first impression."

"There will be retailing opportunities on the land side as well. Airport terminals need to have a reasonable amount of space for friends or family waiting for passengers to be able to have a cup of coffee, shop or pick up a magazine. We are doing a lot of research into airports like Singapore which place a big emphasis on these areas."

We are seeing growing opportunities to fly through hubs, and people will not only look at price but increasingly at the products being offered on the plane as well as on the ground

TERMINAL 3 Q&A

Khalifa Al Zaffin, executive chairman, engineering projects, Dubai Airports

Who was the architect for T3?

Concourse 2/Terminal 3 has been designed by the joint venture team consisting of M/s Dar Al Handasah and M/s Aéroports de Paris, led by Dubai Civil Aviation's engineering projects team.

Which airports did you use as benchmarks?

Concourse 2/Terminal 3 has its own defined requirements with its own specific challenges, defined by the fact that this was a major expansion to a live operational airport. We took care to learn lessons from many international airports, although no single airport was a major benchmark.

Will Al Maktoum International supersede T3 once completed?

T3 can certainly be categorised within the league of the most advanced airport facilities in the world and has incorporated the latest technology, some of which is visible to the traveller and some not. Al Maktoum International Airport should supersede the existing Concourse 2/Terminal 3, keeping in line with the trends we set for ourselves, and again taking the opportunity to introduce the latest technology.

What were the major challenges with development of the existing airport site?

Maintaining the operations of the live airport while T3 was designed and constructed. The enormous structural challenges, due to the deep excavation and high water table, make T3 the largest underground passenger terminal in the world.

How relevant is planning in terms of airport zoning close to residential sites?

A great number of studies have been conducted for the overall development of Dubai World Central and Incorporated within the master plan in line with development regulations and guidelines proposed for this area.

What environmentally-friendly design elements are incorporated within T3?

The construction of T3 has taken advantage of international best practice. Energy efficient lighting and controls to switch off unused lights automatically are installed throughout; and passenger and baggage movement equipment will stop when not in use and restart on demand. One of the biggest factors was the decision to build T3 underground. In summer this reduces the solar heating effect.

What kind of technological innovation has been integrated into the new facilities?

State-of-the-art Skytrains (largest elevators in the world) for rapid vertical movement of passengers and technologically advanced baggage and passenger screening machines are some examples.

LIFE CYCLE

Safety and security concerns have also necessitated increased investment in recent years and this is just one element of the airport life cycle that is a major red flag. "The various operational elements of an airport have clear life cycles, some of which are very short – especially those related to technology. Within six or seven years we believe that nobody will check-in at a check-in counter. It will all be done through our Blackberries," says Schweickert.

"The past 10 years taught us that security is of tremendous importance and a very quickly evolving feature. It is also a major factor in determining not only the look of an airport, but also how passengers feel about them," he adds.

The level of security in this region is also something that Schweickert sees as a vital integration into the fabric of the new airport. "Security is definitely a key issue here and the UAE already has some of the most advanced technologies in operation."

"And that's why we are not sure what will be in the Midfield Terminal in terms of technology. These are things that we try to be flexible about, but also mindful of a client perspective."

GREEN MOVES

In a move that combines both sustainability ideals and subtle destination marketing, the Midfield Terminal will also feature extensive internal landscaping, as Schweickert explains: "We are trying to incorporate a lot of greenery because the overall concept is driving a green theme which runs from the outside of the building throughout. This means that Abu Dhabi's reputation as a city that has transformed part of the desert into a lush green oasis is reinforced to arriving or departing passengers."

"The terminal garden in the central piazza will also have water features and palm trees – elements that we believe will make people feel very comfortable as well as conveying the emirate's positioning. It's an emotional journey as much as anything else."

On a sustainable design front, Schweickert talks about the new legislation in Abu Dhabi and confirms that some buildings will apply for formal Estidama certification. "To support this, we are trying to do as much as possible in all our buildings. It starts with our overall plan to introduce as much greenery as possible and extends to active and passive solar usage – so we will have buildings that are designed to utilise solar panels and sun collectors."

"We are also equipping buildings with environmentally-friendly facades, as the biggest challenge in the UAE is to deal with the outer envelope of the building to keep cooling costs down. We will also go as far as separating grey and black water, and using the grey for irrigation." →

6 Dubai International Airport
7 Abu Dhabi International Airport



AIRPORT ADD-ONS

SCADIA is also undertaking numerous other projects to expand the cargo and support facilities as well as creating significant new infrastructure and facilities through the development of a major free trade zone.

Schweickert says: "There are a lot of things that you don't see at an airport; a large portion of the investment is stuck in the ground and yet it is a vital part of a development such as this."

"Another big cluster is our commercially-related projects. An airport exists on its aviation-related revenues including cargo and infrastructure, but they are increasingly becoming an integral part of cities, and even cities in themselves."

Phased developments as part of the master plan include Airport City – dedicated to high-end office developments, four and five-star hotels, inter-modal connection points for the proposed UAE railway link as well as Abu Dhabi's own forthcoming urban transport system.

To the south of the terminal will be a free trade zone development, including a hotel, which is being designed to house global players with office and warehouse space. "This will be the first free trade zone for Abu Dhabi and construction has already started, with delivery of the first ware-



GREEN TERMINAL

Florida, USA, will be the home of the world's first green terminal in 2010 with work on the new Panama City - Bay County International Airport (PFN), already underway.

The US' first new airport since 9/11, the US\$330 million project has been designed by PBS&J and will be a LEED Silver-certified building – a first for the country.

A total of 4,000 acres of land were donated by the St. Joe Company as part of a mammoth West Bay Plan that is being positioned as a 'landmark conservation effort'. The greenfield plan includes the establishment of an Audubon Nature Center and the local airport authority is committed to designing, building and operating a 100 percent green facility.

The long-term plan is to make the surrounding airport development carbon neutral.

houses ongoing as part of a phased build-out. And to the east we have recently acquired a piece of land that is currently in the master planning phase. We are also looking at what our 'neighbours' are doing in the surrounding area, to see what is missing," says Schweickert.

"There is a massive construction period in front of us so there will also be a worker housing component in the interim, and part of our thoughts for the eastern section master plan is also to develop a residential component for people working at the airport. In 2015 the main terminal building will be able to handle 20 million passengers, so most probably there will also be around 20,000 people working in the airport zone," he adds.

COMPLETION CHALLENGES

Airport expansion programmes in Europe and North America are also subject to strict zoning regulations and noise level controls, but Schweickert says that this hasn't – as yet – been a mitigating factor for SCADIA.

"I think people here are less sensitive to these issues. It may come, but you have to also consider the fact that aeroplanes are getting quieter. We do have a lot of night flights in this region but no aircraft in the Etihad fleet is older than three years, and it's the old aircraft that have noise issues."

"Also, most of the existing residential developments are sited parallel to the runways and not at the outer ends, so this makes a big difference."

He is also confident that the project will run on schedule and to budget. "In terms of site challenges, there is never a perfect piece of land; however here it is good because it's rather flat and we don't have a huge amount of site levelling etc. to be done."

"The challenge here is the ground conditions as we are close to sea level, and so we are putting the terminal building on piles – 7,600 to be precise. There are certainly challenges, but nothing that we can't deal with."

The final budget for the project was only confirmed within the last year, as the master plan has grown significantly since the 2004 launch. Schweickert says: "I am quite confident that we will deliver within budget. We saw a heavy increase last year in construction prices, especially in the UAE, but with the current market consolidation, prices are becoming much more reasonable and there's a good sense of competition once more, which is a healthy process."

Once all phases are completed, SCADIA hopes to set not only regional, but international standards, as Schweickert comments: "I believe we will be unique not only in the region, but in the world with this design." ●