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BAA adopts Autodesk® Architectural Desktop to cut costs

BAA plc adopts Autodesk® Architectural Desktop in a drive to cut London Heathrow Terminal 5 construction costs by 10%

You'd never guess...

...especially if you are one of the 63 million passengers who passed through London Heathrow's four existing terminals last year, but the airport actually started life as a tented village in 1946. Then, it served only 18 destinations with a handful of airlines making just 9,000 flights a year. In 2000/01 there were over 90 airlines at this BAA airport, serving around 160 destinations worldwide, operating an average of 1,250 flights per day. Heathrow generates over £5 billion in wages alone each year for the British economy, supporting over 250,000 jobs across the country. Around 108,000 of these jobs are generated by the airport in the local area, of which 68,000 are on-site at the airport. BAA is now the world's largest airport company. Worldwide, almost 130 million passengers passed through BAA airports last year, helping to generate a pre-tax profit of over £500 million and a turnover of nearly £2 billion.



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Targetting savings of £400 million

Last year, capital investment by BAA was £744 million and the company expects to spend over £8 billion in airport development over the next ten years. BAA has a vision for this development through the improved acquisition of buildings for its business: Acquire and Manage Assets (AMA). The AMA concept encompasses the information and knowledge common to everyone working on a project, making it available to all who need it, throughout the life of a building. The benefits of this approach are expected to be huge: BAA is aiming to cut the cost of building procurement by 10%. Worth £4 billion, T5 is one of the UK's highest-profile construction projects and one of the most logistically complex in Europe. Autodesk® Architectural Desktop is already playing a major part in turning this vision into reality.

Significant reduction in waste

The construction industry as a whole, as well as the Building Research Establishment and the Building Services Research & Information Association, reports that up to 30% of the construction cost of a building is wasted during its development and delivery. Mervyn Richards, IS Manager CADD Technologies at Laing O'Rourke, one of BAA's Framework partners, is one of the construction industry's leading experts in this field and has been working at BAA for a number of years helping them develop and deliver the AMA vision. He is clear, "The problem stems from ambiguous information. On a large project, there can be many changes, many of which may not be fully co-ordinated. So when our contractors get to site, they could all be working from slightly different information. Sooner or later, they will end up with the wrong thing in the wrong place. Manpower will then have to be put in place to correct this, swallowing up precious programme time and increasing costs." Richards adds, "Moreover, the various disciplines

in the construction industry have operated in a serial manner, in isolated compartments and not always too concerned about what happens further down the line. We know that by working through a continuous process, with seamless data transfer between all parties, this high level of waste can be significantly reduced."

Trigger for action

Andy Manington is BAA T5 Production Support Manager. He recalls, "The trigger for action was the 1995 tunnel collapse at Heathrow Central during the construction of the Heathrow Express rail link. A large proportion of the documentation required for the subsequent investigation was just not available from a single source. It was in differing formats and not easily accessible." This made the investigation very costly and time consuming. As a result, BAA decided to set up a central information management capability so that for future projects, all information, whether drawings or images, could be reused by other people and could be changed if necessary. Manington continues, "It was also about 2D integration and the elimination of the spatial coordination problem and the ambiguity. The project moved into 3D modelling with Architectural Desktop because three quarters of this project was underground. We had very few ingress and access points and we had to ensure that materials and equipment would fit." He adds, "We also wanted to ensure that everybody was collaborating. Not just communicating, but actually sharing information. The fabricators and manufacturers had to produce their output as 3D models, so the project could be put together in a virtual construction activity. That way we would know that everything would fit."

Award-winning success

The Heathrow Express project was an outstanding success. According to Richards, "Because we were communicating



BAA

electronically, we saved £720,000 over a two year period in printing costs alone. By reusing data rather than redrawing it, we reduced the time it took to create the production information. We saved 18% of our drawing production costs, too." The project was operational 3 weeks ahead of time and won the 1997 Construction Industry Award for the 'most innovative use of IT in a construction project'. The approach became known as the Common Data Environment (CDE).

The Single Building Model

Manington explains, "The Common Data Environment is a single database containing everything we do and everything we are managing: project information, cost procurement, design, lifecycle cost, construction planning, and mail, anything to do with the project. Everything is aimed at delivering the best information for asset management and maintenance." He makes the point that, "... within the CDE, we are managing and bringing together everything in a complete computer model that includes 3D intelligent, object-based Single Building Model in Architectural Desktop. Not just the designers' information but information from the fabricators, the manufacturers, the contractors and the installers." He adds, "Operations and maintenance documentation comes out of this and we can carry out material scheduling and costing." Manington also notes, "Our technique is to introduce Architectural Desktop's object technology without the end user being aware of the technicalities. We want to make this a simple, easy to accept activity."

Driving out waste

Andy Manington points out that T5 is a huge project. He says, "We are building a 360-metre long, single span building between two operational runways with aircraft movements every 90 seconds throughout the day. The 40 tower cranes on site must be no more than 55 metres high, otherwise they show up on the ground radar. The terminal building roof is 40 metres above the finished pavement level, so it does appear on the radar. Each time we raise one of the 50-metre long roof sections we have to synchronise it with the ground radar. That is why we are building a new 87-metre high air traffic control tower, too. At the same time, a new spur road from the M25 is being built, as is a new bridge and transport interchange." Construction has to be complete by September 2007 and the first passengers will be using T5 by spring 2008. BAA's objective is to deliver the project using the CDE, collecting the construction information as the project progresses, driving out the waste and delivering good quality information at the end of the project.

More than just object technology

Talking about object technology, Manington comments, "For T5, we needed software that would go far beyond just producing pretty shapes. To satisfy our needs, the model has to contain the form and function that you normally get with object technology. It also has to contain the property information and

intelligence required to deliver the model for coordination, bills of materials, assets, health and safety information and facilities management." Manington again, "We did not want to have big teams of 3D modellers; we wanted to produce the models through software for applications for structural steelwork, foundations, roadways, HVAC and so on. The ability to support this was one of the criteria for the selection of the software. That is why we chose Autodesk products and Autodesk Architectural Desktop (ADT)."

The construction industry chooses Autodesk Architectural Desktop

Mervyn Richards makes the point that, "Our Framework partners, organisations that we have selected by tender, with each partner specialising in different aspects of airport terminal construction, helped us choose ADT." The partner companies may compete with each other in the construction industry in general, but inside the Framework, they are part of one single team. All of them were involved in the selection criteria for the software we were to use and currently 42 companies, including AMEC, Crown House, Arup and Richard Rogers Partnership, are involved." Richards comments, "There was one other reason: we had to transfer information seamlessly across the different design and engineering applications. In a multi-platform environment, this creates many problems. We chose to eliminate the problems of information transfer by using Architectural Desktop as a single solution, getting rid of any issues of non-compliance so that all the Framework partners could collaborate."

Future-proof viewing of digital design data

In addition, the project makes extensive use of Autodesk viewing technology for the AutoCAD DWG file format and for Autodesk's Design Web Format™ (DWF). Autodesk® Express Viewer is used for viewing and plotting DWF files, and Volo® View is used to allow non-CAD users to measure design data. According to Manington, "These products allow users to view CAD data quickly without having to understand AutoCAD or Architectural Desktop. Images appear the same plotted or viewed and can be plotted to scale. Non-CAD users can measure design data without using the core software." He adds, "A big advantage for us is that as Autodesk products, they are future-proof to changes to the DWG and DWF formats." The DWF file contains complete line weight/colour information, so anyone internal or external to the project can look at the drawing and reproduce it as if it were the original AutoCAD plotted version.

More than 250 seats of ADT

BAA now has more than 250 Architectural Desktop licences. Manington says, "Before we adopted ADT, we had originally chosen AutoCAD® because it had the biggest market share. This meant there were more operators available to us. AutoCAD had the widest number of application programmes available to us to help meet our objectives." Although BAA

has a close relationship with Autodesk, it is supplied with Autodesk products and software applications for the various engineering disciplines by Excitech Computers Limited. Excitech is a provider of AutoCAD based design solutions in the UK. Excitech also supports the software and supplies BAA with contract designers, programmers, trainers and auditors. Mannington adds, "Of course, we had to ask ourselves, as anyone should when embarking on such a major move, if we were still on the right platform, does the software have a forward development path and will the supplier be there in five years time?" The answer was a definite yes.

All projects will use Architectural Desktop

Summing up, Manington says, "The Single Building Model is growing and it will encompass the whole Heathrow site. It will provide up to date information accessible by whoever needs it." He is positive, "We have now reached the point where all projects can be using ADT, aiming towards a full 3D environment. What we will deliver is not what the designers showed in their visualisations, but what the manufacturers actually put onto the site and what we construct. It is real. It is complete in every respect. BAA's Engineering Information Centres will manage the data once it is handed over. The centres are currently preparing to handle 3D and in the next five to ten years, we should see all projects being executed in this way."

Links

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