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Engineering & Maintenance



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photo: Swiss-AS

INFORMATION TECHNOLOGY

IT for maintenance scheduling and planning

The complexity of scheduling and planning aircraft maintenance requires sophisticated IT solutions which can handle a web of logistical, operational, financial and regulatory considerations. *Joanne Perry* speaks to eight IT providers about the products they offer and hears about recent moves to introduce smartphone applications.

“The aviation industry is a sophisticated industry and challenged as it relates to maintenance scheduling and planning,” observes James Elliott, product marketing manager at Mxi Technologies. “It’s highly regulated across the board and around the globe,” he continues, adding that the complicated assets, business processes and models involved “breed a high level of complexity that needs to be resolved and handled by the IT solution”.

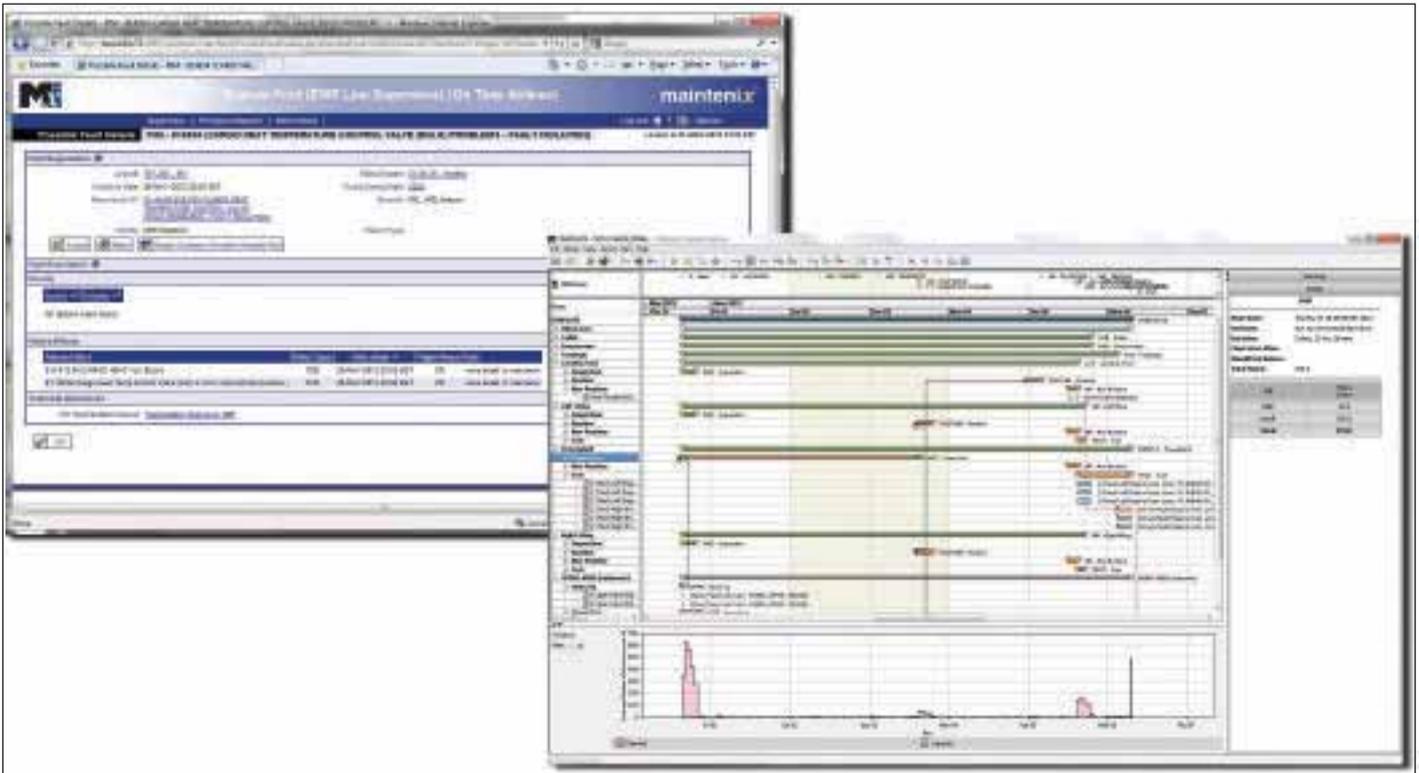
Ronald Schaeuffele, CEO at Swiss Aviation-Software (Swiss-AS) agrees that aviation IT requirements are “unique and immense”, encompassing considerations such as back-to-

birth information, parts traceability, configuration control and life limitations. Rajan Bindra, engineering systems manager at British Airways (BA) Engineering, likens the situation to having “a lot of balls in play at any one time” — balls which have to be juggled according to “exacting quality standards unsurpassed by other industries”.

IT scheduling and planning packages collate and organise the large amounts of information involved in maintenance processes, enhancing visibility and accessibility. “The software aids by removing multiple areas of information within an organisation that’s being held in [for example] Access databases [or] Excel files,” explains Patrick

Toner, managing director at AerData. The information is correlated in a central source and presented in the form which best suits user objectives. According to Andrew Valley, VP of sales at Component Control, the majority of customers “are running separate systems” and “not all aspects of the business are integrated”. He says that maintenance schedules, manpower, and materials systems must function in unison “to really gain productivity”.

Looking at the market as a whole, Elliott explains that IT solutions have progressed from first-generation computerisation of legacy paper-based systems, through semi-automated second-generation software, to third-generation



Above and right: 'Maintenix' from Mxi Technologies is an integrated, web-based software solution which enables real-time data recording and reporting, access to detailed historical information and the modelling of future projections.

web-based packages “that can model business needs with advanced processes and feature capabilities down to the component level”. Mxi’s own solution, ‘Maintenix’, was launched at the third-generation level back in 1996. Elliott regards this as an advantage over competitor offerings that have to be retrofitted with web capability to reach the third-generation.

Another trend is the increasing entry into the tier one market of best-of-breed systems “where previously only ERP [enterprise resource planning] type systems were considered,” according to Schaeuffele. He believes that for providers of generic ERP products such as SAP and Oracle “it is even more difficult to reflect all special regularities and conditions of the aviation industry as well as to keep pace with the changes (regularities and customer requests) in the MRO sector”.

Diverse users

Elliott says that ‘Maintenix’ users are spread across all sub segments of the aviation industry — commercial, business jet and military — including OEMs, operators and pure MROs. The software enables real-time data recording and reporting, access to detailed historical information and the modelling of future projections, with systems and departments such as flight operations, procurement, electronic logbook and third-party maintenance being integrated through application programming interfaces

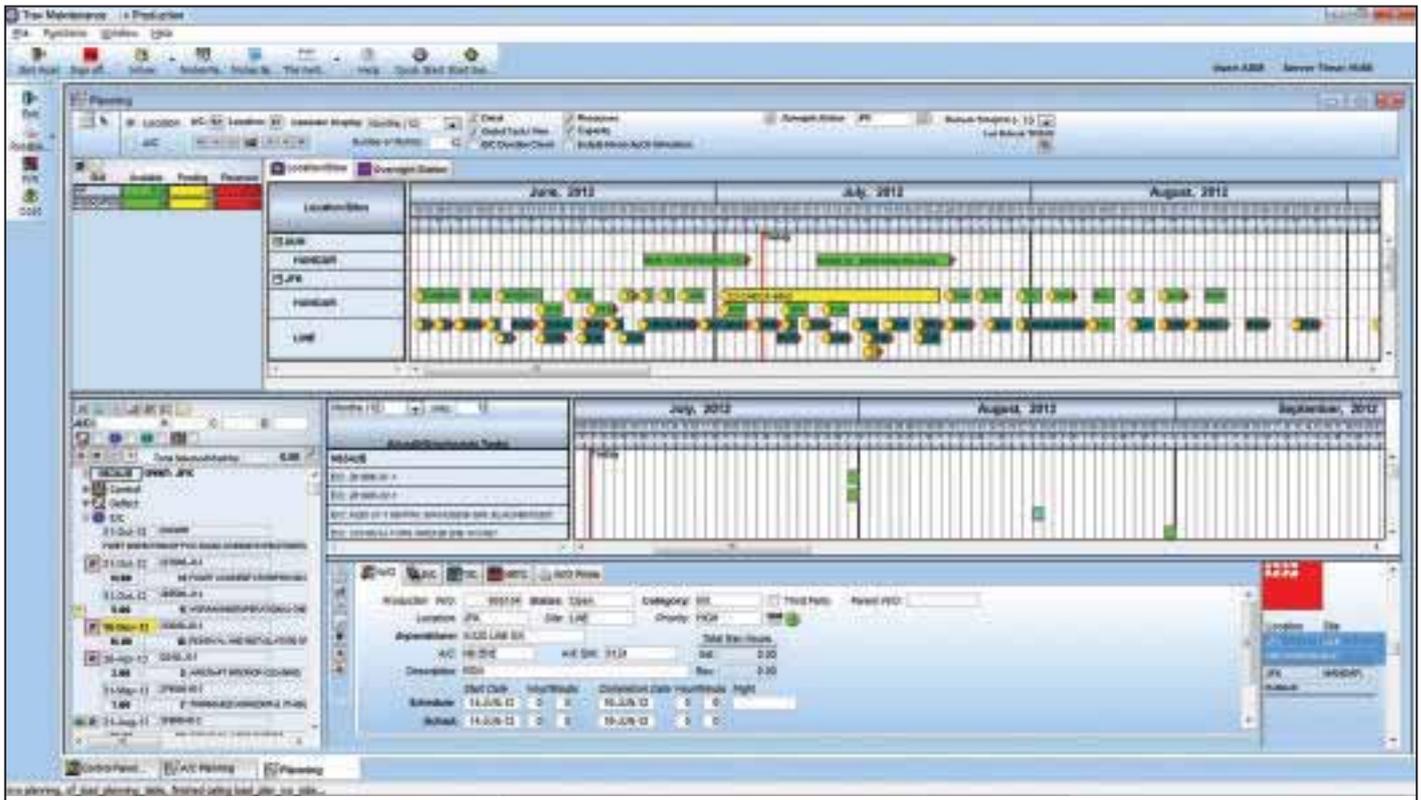
(APIs). In addition to the core modules, value-added features include a long-range planning capability which helps users to build and manage long-term strategic maintenance programmes by analysing inputs and scenarios and identifying areas for concern. Indeed, Elliott describes ‘Maintenix’ as a “business platform” more than a software product, and as such especially supportive of evolving customer needs. In Elliott’s words, this adaptability is “bi-directional”, assisting businesses whether they are “ratcheting up or scaling back”.

Users of ‘Maintenix’ benefit in three key areas: cost reduction or revenue generation — depending on organisation type; change management — including growth, mergers and the addition or retirement of aircraft; and risk management. Elliott says that data configuration, rather than customisation, is used to create a tailored solution which is “user-friendly, asset-centric, role-based and workflow-driven”. The fully web-based user interface is fed by workflow data and the roles of specific personnel within the client organisation; consequently, vast amounts of information can be made digestible to individual users. Elliott believes that the data configuration is “a markedly different approach” from more standard software products, which he says often require “high-cost, complex customisations” in order to achieve “somewhat similar results”.

Other software packages which serve varied user groups include ‘EFPAC’ from AerData, ‘AMOS’ from Swiss-AS and ‘TRAX Maintenance’ from TRAX.

EFPAC integrates technical, operational and financial information through a range of modules which handle issues such as engine trend monitoring and airframe check planning. A “what-if” scenario capability assists asset management decisions, while configurable display details and “drag-and-drop” functions create an easy-to-use interface. Toner says that EFPAC is useful for lessors as well as airlines and MROs.

“Airlines would primarily use it for planning their engine shop visits,” he explains, “for calculating the cost of their fleet or portfolio of engines throughout the course of its life inside the airline.” He says it is “particularly beneficial” to airlines when they are approaching the renegotiation of power-by-the-hour (PBH) arrangements with lessors or OEMs because of its ability to highlight a “delta” in the cost of the agreement. Lessors, meanwhile, can use the software for tasks such as maintenance reserve analysis, for example checking the status of engines when moving them on rentals or leases. “A lot of the MROs would have their own engine lease portfolios and they utilise it in a very similar way,” says Toner. MROs also use EFPAC internally for shop visit planning. The software is applicable not just to engines but to any asset, including airframes



The 'TRAX Maintenance' user interface is designed to enhance the visibility of maintenance requirements through colour-coded displays which combine graphical and spreadsheet data.

“The main value of ‘AMOS’ lies in the fact that, due to the system's flexibility, full functionality, open technology and data transparency, the prerequisites for informed business decisions are fulfilled.”

—Ronald Schaeuffele, CEO, Swiss-AS

and components such as auxiliary power units (APUs) and landing gears.

Chris Reed, managing director of TRAX, says that his company's software initially served airlines which were conducting their own maintenance or third-party MRO, but that since completing an installation with Lufthansa Technik Philippines (LTP) it has gained a MRO customer base. Additional functionality, such as a third-party customer billing module, has been added and Reed says the software is now “equally suited” to airlines and MROs. ‘TRAX Maintenance’ is delivered to each client as a complete product but is customisable through the selection of functions within each module in order to reflect variations in workflows. “Some of our smaller customers may create an engineering document in the system and just want a second person to validate that document,” explains Reed, whereas larger customers “may have four, five different people or departments approving that

document”. Regardless of size, Reed notes that the control and visibility of compliance in all maintenance work is “critical” for customers and the authorities alike.

The ‘TRAX Maintenance’ user interface provides visibility of all aircraft maintenance requirements through colour-coded displays which combine graphical and spreadsheet data. It incorporates “drag and drop” functionality to create work packages on a timeline which co-ordinates with flight schedules and parts, manpower and hangar availability. Reed says that maintenance can be optimised by “splitting items out” into individually controlled tasks and grouping tasks together, resulting in reduced aircraft downtime. The enhanced visibility also gives users a better awareness of the costs involved, providing the potential for greater control. Reed describes the software as “a very easy way” for planners to manage their workload with fewer resources, giving the example of one customer which was able to

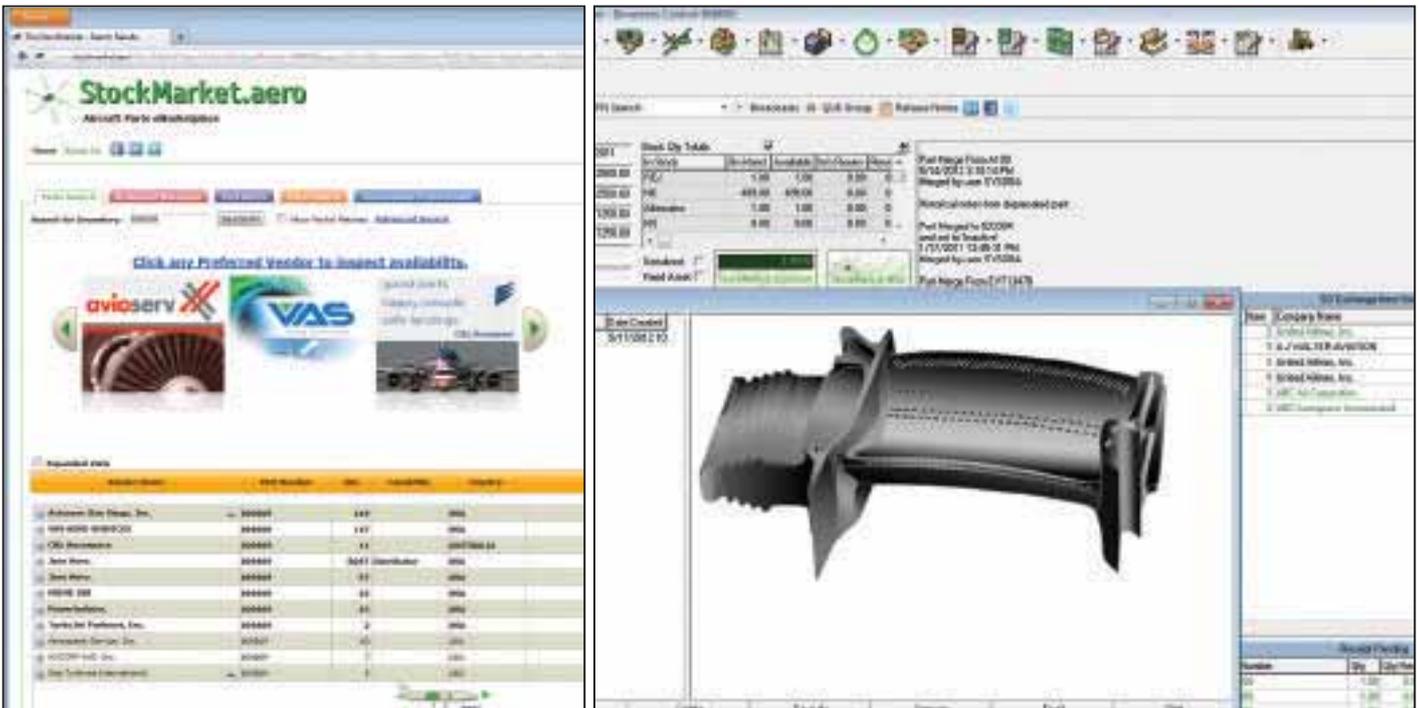
redeploy 19 personnel from a 26-strong planning department.

Like ‘TRAX Maintenance’, the modular ‘AMOS’ from Swiss-AS is also sold as a highly integrated bundle. The software, which Schaeuffele describes as “exceedingly user-friendly”, is tailored to the needs of each customer by parameter setting during implementation and follow-up adjustments. The package has a built-in adaptability which enables administrators “to shape and model ‘AMOS’ according to the requirements of their business without any involvement from Swiss-AS,” says Schaeuffele. This includes a ‘Report Designer’ framework with which users can alter existing reports and create new ones.

Schaeuffele says that the “main value” of ‘AMOS’ lies in its “flexibility, full functionality, open technology and data transparency”, which he believes are “the pre-requisites for informed business decisions resulting in efficient cost management”.

‘AMOS’ serves both airlines and MROs, although the software was originally designed for Swiss International Air Lines’ regional predecessor, Crossair.

Swiss-AS is not only part of the Lufthansa Group via Swiss but has been a MRO IT partner of the group's maintenance division since 2007. Schaeuffele says that the co-operation between Swiss-AS and Lufthansa Technik (LHT) benefits airlines which are using ‘AMOS’ as their key MRO



'Quantum Control' from Component Control handles detailed, integrated information for MRO providers and includes a 'StockMarket' web portal to facilitate parts purchasing.

system “and are also concurrently procuring a wide range of services from Lufthansa Technik”. The business-to-business (B2B) integration provides a “smooth interface” between the two companies’ services. “This speeds up the processing of orders, reduces the paperwork and also prevents errors,” says Schaeuffele, explaining that information is sent directly via interfaces which cover all aspects of maintenance such as component removals, material pooling, quotations and purchase orders, and repair and warranty processes.

Schaeuffele says the “highlight” of the co-operation over the last five years has been the recent transfer of the LHT maintenance programme into ‘AMOS’. Swiss-AS is now also collaborating with Lufthansa Systems Americas as part of a strategic expansion plan.

MRO users and airline users

By comparison, ‘Quantum Control’ from Component Control almost exclusively serves third-party maintenance providers, to date approximately 1,200 component MROs, engine/auxiliary power unit (APU) shops and accessory shops — plus Embraer maintenance facilities. Valley says ‘Quantum’ is “inherently different” from airline planning and scheduling systems because maintenance normally represents a cost for airlines, whereas it is a source of revenue for MRO providers.

One of the most important concerns of ‘Quantum’ customers is parts supply, which Valley believes causes the majority of delays at MRO

operations. The problem has been exacerbated by a tendency to downsize inventory in order to save costs. ‘Quantum’ tackles the issue by integrating maintenance requirements with live inventory data and offering a ‘StockMarket’ web portal that shows purchasing staff which companies are advertising the required material. Valley says that for companies without an integrated system like ‘Quantum’ the equivalent process involves multiple instances of redundant data entry. “In ‘Quantum’ it all rolls though seamlessly,” he explains, “and when you’re buying hundreds or thousands of parts a month, it’s a huge timesaver.”

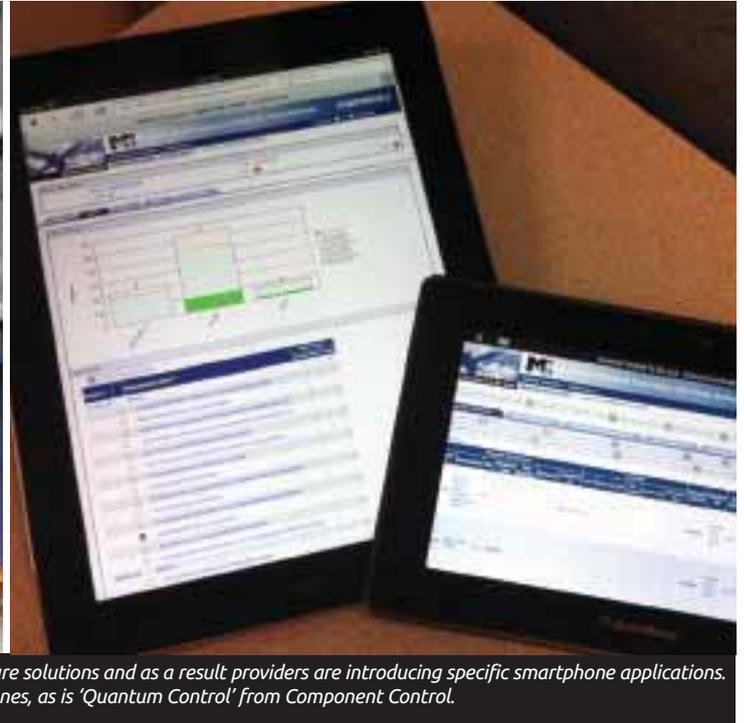
The concept of minimising the number of procedural steps feeds into the way the software is customised for specific users or groups of users — “obviously purchasing has a different view of the world than maintenance planning and finance and sales”, says Valley. While there are standard processes for using ‘Quantum’ modules, the data which is displayed on the screen and the way it is presented is tailored for each user by Component Control instructors or the customers themselves. Valley says it is an important and distinguishing characteristic of ‘Quantum’ that the customisation is not achieved through changes to the coding of the software because it means that “as the software matures all the new features and built-in business flows are available to all of our customers”.

Meanwhile, on the airline side, director of marketing Michael Formby explains that Omega Airline Software’s fleet operator customers “tend

to focus on software solutions that increase aircraft availability”, in contrast to MROs, which are “more focused on the efficiency of the operation in the hangar” and need solutions which assist work order processing. The benefits of ‘Ames’ include: increased aircraft availability; maximised use of aircraft, manpower and facilities; a stable maintenance environment; increased quality and visibility of decision-making information; and planned rather than actual analysis.

Since some of the first ‘Ames’ customers were operating fleets of over 300 aircraft, Formby says the software has always had the capability to handle large amounts of data: “Ames’ didn’t start with small fleets and then move up”. Irrespective of size, all ‘Ames’ customers buy the same version of the software, but some extra reports and functionality are added during installation. Formby believes that because all planning departments are trying to solve the same basic problem, minimal customisation of the software is necessary. If the software that is used is sophisticated and purpose-built, he says it “will save an airline millions of dollars by increasing aircraft availability, yield and overall situational awareness”. Unfortunately, maintenance planning is “a critical area that is sadly overlooked in many airlines’ IT strategies”, he says, with most carriers relying on spreadsheets which “produce a poor to mediocre” plan.

Similarly, Ultramain’s EVP John Warren says that “home-grown systems are not as highly integrated” as his own company’s software. In particular, they may allow a serialised component “to be on an aircraft and in repair at the same time”,



Above left: Maintenance providers increasingly require mobile access to software solutions and as a result providers are introducing specific smartphone applications. Above right: 'Maintenix' from Mxi is already available via tablets and smartphones, as is 'Quantum Control' from Component Control.

whereas Ultramain's products enable workflows to be aligned "precisely" with real-world business activity. "The immediate impact of an Ultramain implementation is that the system actually reflects what is happening within the business," he states. The end result is that "users can trust the data and can therefore trust the decisions made from the data".

Ultramain currently serves airline customers plus one MRO with software which can be integrated with other airline and MRO systems. The product suite includes 'Capacity Modelling', 'Maintenance Scheduling' and 'Maintenance Planning' packages. The 'Capacity Modelling' is suitable for both airlines and MROs to create plans ranging from the short- to the long-term, while 'Maintenance Scheduling' is used by part 145 operations. Warren says that MROs are less likely to use 'Maintenance Planning' unless they provide fleet technical management (FTM) services to an airline. Meanwhile, 'efbTechLogs' provides line maintenance planners with advance information on the condition of an incoming aircraft, so that parts and other resources can be arranged for just-in-time service. "Ultimately," says Warren of 'efbTechLogs', "the result is fewer delays, fewer cancellations, fewer aircraft swaps and higher operational reliability".

According to Warren, a large part of the usability of Ultramain's software lies in "the ability to visualise the information in ways that are natural to the business context". This is accomplished through Gantt charts and process flow diagrams, and users can not only customise the existing interface but build or modify interfaces with other

systems. The capability for large amounts of information to be visualised in layers allows users to focus "on the right information at the right time", states Warren. Another "key advantage", he says, is the range of analytical tools which enable users to assess information without performing data extractions and to disseminate results reports without the assistance of IT support groups.

New developments

A new software solution called 'SWIFT MRO' is in the process of being rolled out and commercialised by BA Engineering. A pre-cursor to the package was deployed in 2006, but the system has now been upgraded in collaboration with Tata Consultancy Services (TCS). Bindra says the partnership has adapted a scalable SAP ERP core for the "highly dynamic" environment of the MRO industry, using BA Engineering's experience in the field. "We are uniquely placed in the MRO IT solution space to work with the aircraft and component OEMs on solutions before they become commercially available," he states, pointing to the advantages of direct access to engineering personnel, equipment and aircraft during testing.

Through a streamlined user interface, 'SWIFT MRO' will automate and integrate common, repetitive tasks while enabling full functionality for the management of more complex, specialised tasks. In addition, the company is working on linking the software to widely used OEM and third-party systems such as Boeing's 'Airplane Health Management (AHM)', Airbus' 'Airman', Aeroexchange and Ultramain's 'eLog'. Bindra says that this capability will be "offered alongside the base solution" and

anticipates that the integration will be "seamless".

The pace of change in the IT industry is customarily rapid, and upgrades to several scheduling and planning packages will be released in the coming months. In general, these will contain fixes, updates and refinements based on customer feedback. Looking slightly further ahead, developers will need to adapt their solutions to assist the maintenance of increasingly software-heavy aircraft such as the 787. "In the past there were some software updateable components," explains TRAX's Reed, "but now with the 787 you are talking about hundreds, maybe even thousands". He says it is a "totally different concept" for MRO and the associated software.

A second important trend is toward increasing mobility, which Mxi's Elliott describes as "a very hot topic". Systems such as 'Maintenix' and 'Quantum Control' are already accessible via tablets and smartphones, but many providers are working on introducing specific smartphone applications. Ultramain recently rolled out 'Mobile Maintenance' and 'Mobile Inventory' applications, Component Control unveiled its own 'StockMarket' app in July this year and BA Engineering will be trialling a 'SWIFT MRO' app this summer at London Heathrow. Reed points out that this kind of functionality will be especially useful for line maintenance activities such as raising defects, requesting parts and checking the illustrated parts catalogue (IPC) and aircraft maintenance manual (AMM), plus warehouse stock checking. In Bindra's opinion, such mobile capability could be "a significant game-changer in the industry".