Automating the MRO function

The transaction systems that handle day-to-day tasks are the most visible elements of MRO information technology. But they are not the whole story, finds *Bernard Fitzsimons*, and there remains a distinction between whole-enterprise systems and best-of-breed software designed specifically for the MRO environment.

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How should an MRO organisation set about introducing, replacing or updating its information technology infrastructure?

IBM Business Consulting Services has developed business plans and IT strategies for at least eight of the biggest European and Asia-Pacific airlines in recent years. The company's Mark Pemberton says it also provides application and infrastructure management services on either an outsourcing or a hosting basis for several major airlines.

Based on a whole lifecycle approach, in which the IT strategy is driven by the business strategy, the process involves first understanding what technologies are needed to support the business; designing and building the solution come next, followed by operating and maintaining it for the next 15 years or so.

The requirements of an MRO operation depend on the nature of the business, which might be simply a cost centre within a major airline or a separate legal entity that sells its services and consequently requires additional technology to handle accounting, asset management and budgeting. The driver for looking at new technology might be the need to replace a legacy system in order to reduce IT costs, improve processing and performance, or increase speed and responsiveness.

"We can make changes to processes," says Pemberton, "but these days it's pretty hard to separate a process from the technology that enables it. So essentially you end up looking at the technology. And if you take the full range of requirements, our view is that there is no single technology that will support those functions."

The "easy ones to pick out of the catalogue" are the traditional transaction systems that support day-to-day processes and transactions. But MRO operations also have huge amounts of technical data in text and graphical format: "You don't pack that sort of data, text and graphics, into your transaction system because it's going to stop working. So you need a content management system. And if you look at planning and scheduling major maintenance for a fleet, you start to see a need for things like optimisation tools, which is a separate business technology."

Looking at the requirement in its totality, Pemberton says, "I find that generally a total solution would comprise a range of technologies. That could include the SAP transaction system, a content management solution from someone else, such as Jouve or Enigma, and a special planning tool. And there are other technologies like portal technologies and data warehousing."

Data warehousing is needed to deal with the large quantities of performance data generated by aircraft and engines, plus records of all the tasks carried out and defects found — "terabytes of data a year on a reasonable size fleet" — and health monitoring information: "If you want to capture that and be able to store it and analyse it, you start to need what is typically called a data warehouse. They tend not to be readily available off the shelf; they tend to be more a custom solution."

The basic objective is to have all content in a digital format so that it can be shifted around within the organisation and shared with partners

Lufthansa Systems has been involved in several successful implementations of SAP A&D, which is for example used daily by up to 4,500 Lufthansa Technik personnel

and OEMs, Pemberton says: "If I want to have all that data in digital format my total solution will be a range of technologies. What an individual client might want to do first or as a priority clearly depends on their own business priorities."

The transaction system handles basic processes such as generating work orders. Optimising, on the other hand, uses the same set of data but requires a solution that can run through a series of algorithms and analyse multiple what-if scenarios. Then there are portals to interface with the various systems.

"In the past the focus was on systems that could provide the functionality," Pemberton says. "Sometimes the user interface was not the highest priority, but nowadays people want to separate that user interface so that they only see what they need to see." An engineer in the engineering department turning on his computer in the morning might want to see the latest reports on failure rates on the aircraft type he is responsible for, whereas the planner for a heavy check down on the shop floor wants to see that day's plan for a particular aircraft. "That's not just a screen: it is software that links in to the other bits of software," notes Pemberton.

The transaction system remains at the core of the activity, however, and here there is a wide choice. Says Pemberton: "It comes down to the specific client. You have to look at the individual client, their current situation, what they've already implemented, what sort of investment capability they have, what sort of benefits they're looking for, and their capacity for risk. There's quite a lot of factors to consider before you can say, 'this is the best transaction system for you'. When you get to a specific client you can have a view on an overall solution, you can have a view on what you think are the leading vendors, but then you have to look at their needs, their capabilities, their investment capability, their timeframes, their issues, and then come up with an approach that suits that particular client."

ERP systems, claims Mxi's Matt Tobin, are general-purpose business systems designed to administer manufacturing activity; they are not designed to meet the specific and detailed requirements of MRO and require extensive customisation to do so: "Customisation is by its nature expensive and risky, whereas purpose-built MRO solutions are designed to work straight out of the box."

Transaction choice

It is the transaction system that offers the greatest choice of application. Matt Tobin, vice-president marketing and alliances with Mxi Technologies, sees the battle in this marketplace as pitting specialised systems such as Mxi's own Maintenix against more broadly scoped enterprise resource planning systems (ERPs) — and he suggests that results are running in favour of the specialists.

One example he cites is Lockheed Martin's selection in 2004 of Maintenix as the commercial maintenance management system core of the autonomic logistics information system (ALIS) that the contractor will use to support the 2,500 F-35 Joint Strike Fighters ordered by the US and UK armed forces. The selection process was handled by Lockheed Martin Simulation, Training and Support, which picked Maintenix ahead of five other contenders, including the SAP, Oracle and IFS ERPs, after detailed product testing at the customer's site.

In 2005 the Swedish Defence Material Administration followed suit, picking Maintenix ahead of rivals that included SAP and IFS to manage maintenance of the entire Swedish air force as well as to support foreign military sales of the Saab Gripen fighter. One of the major challenges in this implementation, Tobin says, was the fact that Swedish military aircraft are heavily customised, with multiple configurations so that there can be wide variations in material and maintenance requirements among aircraft nominally of the same model.

In addition, Tobin points out, most of Mxi's customers — including OEMs Dassault and Rolls-Royce and the Bombardier-operated NATO Flying

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Training (a Canadian military pilot school), as well as commercial airlines — were already users of SAP before picking Maintenix to provide aviation-specific MRO capabilities. KLM Engineering & Maintenance, for example, originally chose Maintenix in 2004 to support MSG-3 maintenance programmes for its 737 fleet. The following year the division extended its use of Maintenix to support its new A330 aircraft.

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In fact, Tobin can point to one airline customer, Air Mauritius, which originally attempted to use the latest Oracle offering to support its MRO activity. In the event, the airline ended up halting the Oracle implementation and returning to the marketplace, ultimately settling on Maintenix. Often the use of customised ERP modules for MRO is a by-product of an IT update to other business and financial systems, he says, rather than the result of a competitive solicitation focusing on the MRO activity.

SAP specialist

Lufthansa Systems (LHS), meanwhile, can point to several successful implementations of SAP Aerospace & Defense (A&D). Specialists from the company helped SAP software engineers in the development of the A&D solution, which was completed two years ago, and sister company Lufthansa Technik had decided to migrate its entire SAP system even before the its official release. LHS won the business in a competitive tender and a joint core team of around 100 employees was involved in implementing the system, which is used daily by up to 4,500 LHT personnel.

Peter Goebbels, head of development for Aerospace & Defense at SAP, describes the summer 2003 implementation of the system at Lufthansa CityLine as "a model for the whole aviation industry". The project started in November 2001 and was designed to support future strategic development as well as providing process coverage with the SAP software. LHS says its team, in cooperation with the customer, analysed and harmonised all the main business processes in the area of technology, including supply, purchasing, accounting and controlling. Since the implementation CityLine has used the system for all its core processes.

Asiana Airlines has also opted to optimise its business processes with the A&D solution. From the end of 2003 LHS provided consulting services for what was the first major SAP project of the carrier's IT subsidiary, Asiana Information Decision Technology.

The company's latest successful implementation of the SAP system was for Varig Engineering and Maintenance (VEM) in Porto Alegre Salgado, Brazil, one of the world's 10 largest MRO suppliers and one which is currently expanding its services. LHS had previously installed and implemented SAP modules for Varig in Rio de Janeiro and Sao Paulo: the project at VEM, in which 117 employees from both companies were involved, covered a complete SAP R/3 Aerospace & Defense implementation with all modules. The system became operational in February 2004 after nearly two years' work; today there are approximately 1,500 VEM employees using the new SAP solution.

In 2005 LHS signed an agreement with Thai Airways International for the implementation of the SAP solution with the objective of optimising the airline's business processes and achieving sustainable cost savings. In May 2005 a team made up of experts from Thai and LHS set up the project, which was scheduled to run for 24 months. SAP itself has been talking to LHS about possible forms of further cooperation.

Bernd Appel, senior vice-president industry solutions, says LHS has the advantage of being able to offer a blueprint for a standard system: "A potential customer can take a look at our SAP A&D system and see if it's OK for them or not. If you have a standard system the customer and the user, who are not IT people, can have an impression of what the system is able to do rather than being asked what they would like to have. Then when we follow up in the design phase we only have to develop the gaps between our system and the customer's requirements."

LHS has built up substantial experience with the SAP system and can also claim an in-depth understanding of the aircraft maintenance field. "We know what the system is doing and we know about the business processes of our customers," says Appel. "So we can help them to say 'OK, forget it', or we can ask them whether they can change their processes or their organisation to work with the standard. We can act as moderators, and that helps the user."

It can be easier to implement SAP A&D if an airline is already using a SAP finance and control system, says Appel: "That definitely makes it easier for them, because then they have one platform and they are consistent and the implementation is much easier." The system scores particularly highly in the area of process documentation, he adds: "very good, maybe the best in the market".

Devil in the data

Whatever the choice of transaction system, IBM's Mark Pemberton warns: "One of the hardest things to do in an MRO environment is actually to take the data from the old systems, convert it and put it into the new system."

Older systems typically have a lower level of functionality than the new systems, "but to use all this new functionality you need the data. So in a lot of cases you have to manually create it so that you can use the new functionality. It's a big effort. IBM has tools, and we have experience over many projects to help make it easier, but there's no getting away from the fact that to cleanse and create data, the only people who can do that are the business, and it's a lot of work."