MRO software implementation

Recent technological advancements in MRO software and its growing implementation means major steps forward have been taken in how maintenance information is provided, controlled and tracked. Specialist technology software vendors have been continuously investing in improving their products over the last decade. Meanwhile, enterprise resource planning (ERP) vendors have been investing heavily in making their solutions more industry specific.

The early generation computer systems which were designed to assist in maintenance procedures were generally limited function systems. They aided only specific maintenance processes, such as part or fault tracking. As they evolved to tackle the entire maintenance spectrum, a "wall" still existed between the core maintenance organisation and the rest of the airline, and its partners, according to Evan Butler-Jones, product marketing manager at Mxi Technologies. Things are different now though. Butler-Jones states: "New generation systems are designed to fit within a fully integrated environment; with operations information coming right from the airplane, maintenance program data loaded direct from the OEM, and vendor part quotes received automatically."

Modern IT software has afforded maintenance planners and engineers two main advantages. The first is in record-keeping and information tracking for required procedures. Engineers now have greater flexibility when scheduling service with automated systems that allow detailed job cards (tasks, sub-tasks, schematics, for example) to be generated

Some of the software on the market

A look at the products that the companies which contributed to this article are offering. Please note this list is not extensive, and does not represent the whole market, but is instead designed to give the reader a flavour of the available software and products.

InfoTrust Group

InfoTrust Group's MRO software suite focuses on providing real time and accurate control of maintenance information and delivery of the right information at the right time in the most usable format to support the aircraft technicians, says Terry McNicholas, executive vice president and chief business development officer. ITG's premier solution, TechSight/X, delivers powerful functionality for process automation and content management and includes a full range of integrations with leading authoring tools. Key features include functionality that automates the business processes associated with routing, approval, distribution, notification and auditing, so accelerating time-to-results dramatically; robust content management services that manage content storage, versioning, publishing, security, tracking and archiving; and a scalable web-based architecture that integrates with existing enterprise systems and provides a scalable repository.

Mxi Technologies

Mxi's Maintenix software is an integrated, intelligent software system that manages engineering, maintenance, materials, and aviation-related finance activities for the aviation industry. Maintenix streamlines the aviation maintenance process to improve labour productivity, and provides powerful compliance management capabilities available through its unique focus on configuration and maintenance program management. These capabilities, combined with the most advanced process automation in the industry, distinguish the Maintenix software solution from other software tools, according to Evan Butler-Jones, product marketing manager.

Swiss AviationSoftware

Swiss-AS' AMOS product has two major advantages over its competitors, says CEO Ronald Schaeuffele. The first is the experience the company has gained having been in the MRO business for two decades. The second is its proximity to Swiss International Air Lines/Lufthansa, making the company an "inherent part of the aviation world" with the opportunity to grasp MRO industry trends at an early stage. AMOS itself covers all MRO core business functions and includes many additional non-core modules (such as a fully integrated "Shift Planning" module). Schaeuffele says AMOS equips its customers with standard interfaces to all applications which need to be linked with the MRO system in order to allow a seamless integration of the product into the customer's existing software landscape.

Trax

The fully integrated TRAX Maintenance product has the advantage of being developed specifically for aircraft maintenance operations (and not converted from a manufacturing or ERP type environment), says Chris Reed, director of marketing/sales. Around ninety airlines and MRO companies have influenced the product in terms of its functionality, allowing a broad but deep coverage within the software. Trax also provides an integrated Digital Document Managements module (for AMM, IPC etc) and is the only MRO software vendor to do this alone (as opposed to partnering with an external software vendor).

Enigma

Enigma's airline MRO solution is not a traditional MRO system, in the sense of acting as a system of record for asset management, procurement and scheduling maintenance activities. It instead combines aircraft, engine and component parts, service and support information into a single aviation encyclopedia that can be deployed as an online, offline or hosted solution, states John Snow, vice president, marketing & business development. All information can be filtered by aircraft or engine serial number (tail number) giving technicians and engineers a fully customised single-source/one-stop-shop for all maintenance and service requirements. Enigma integrates into traditional MRO and ERP systems in such a way that when the MRO system issues a schedule for work that needs to be done, Enigma provides the detailed information for how to do it.

HCL-AXON

SAP MRO and iMRO is a mature and broadly adopted full-suite or ERP MRO software tool. According to Richard Minney, head of product innovation, full-suite tools like SAP and Oracle have the advantage over best of breed products in that they cover a broad range of business functions, and fully integrate maintenance engineering, planning and operations with back-office functions like financial accounting, human resources, contract management and billing and inventory control. Within the two serious MRO ERP systems, SAP and Oracle, SAP has been adopted by about five times as many airlines as Oracle for aviation maintenance, claims Minney.

quickly, without manual intervention. These reflect all the latest revisions in the maintenance schedule, manuals and procedures, and so on.

The second advantage is that engineers can now process OEM revisions to the manuals more quickly and easily. Automated tools identify what has changed relative to the airline version of the manuals, while other tools allow the engineer to accept, revise, and edit these changes before they are rolled out to the maintenance technicians. Technicians then have access to all relevant information (by tail number), allowing them to quickly diagnose, document and resolve unscheduled maintenance requirements, whether they are heavy, shop, line and/or an AOG event.

Mxi's Butler-Jones adds that in his field: "Advanced maintenance management systems drastically improve compliance tracking using powerful configuration and maintenance program management engines that greatly improve traceability and accuracy of compliance records."

Electronic records are therefore gradually replacing the paper based references of aircraft maintenance manuals, illustrated parts catalogues, and service bulletins/airworthiness directives. According to Richard Minney, head of product innovation for SAP MRO and iMRO at HCL-AXON, "the expense and time needed to manually perform record-keeping, planning and part ordering functions are slowly being reduced, and are being replaced by configuration control systems where factors such as the range of alternative parts for a given modification standard, contract policy and availability of parts at the desired location for a given condition, ownership, cost and remaining life are all taken into account. Logbooks are gradually being transitioned from paper to electronic recording with FAA/CAA approval of digital signatures."

From this ERP perspective, Minney also states that maintenance planning for labour, parts and facilities, is becoming more complex and better supported by tools. He says: "Although complex maintenance tasks continue to be bundled into major C or D checks for the purpose of simplifying planning, more aviation maintenance customers are improving their planning tools in order to be able to do more opportunistic maintenance at line stations and during shorter or overnight checks, and to bundle outstanding maintenance tasks with the next C or D check based on availability of resources and time remaining on the maintenance task.

"Technology vendors are developing planning tools which can balance the constraints

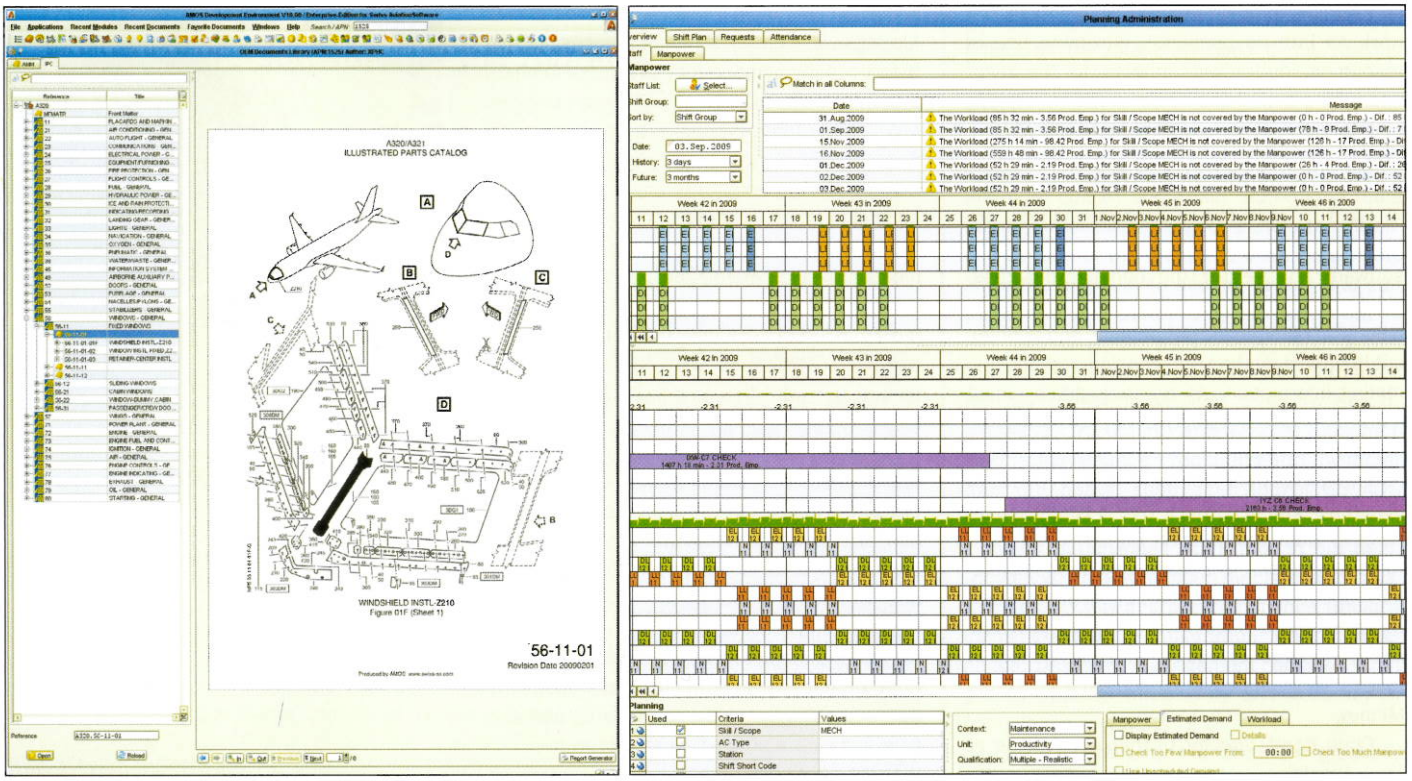
of maximising maintenance yield (doing the work as late as possible), maximise use of resources, and avoid impacts to the flight operations schedules or number of aircraft in maintenance at any given point in time."

Software implementation

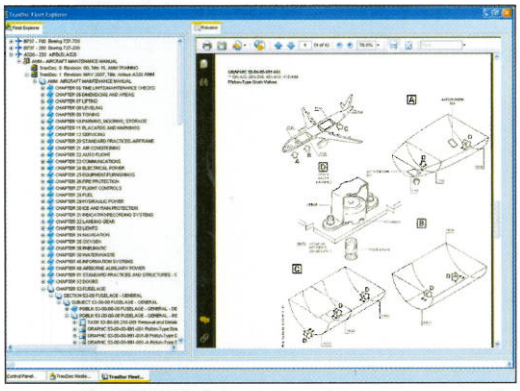
From a technical perspective, there are many challenges in implementing any MRO software and getting the benefits described above to the customer. Each customer has a unique maintenance environment and a different historical method of managing, revising and storing information. As a result, getting input data of consistent quality to support the goals of the implementation can be a challenge. Another problem is that there is often a lack of electronic data to convert. This is because a lot of MRO data today is on paper. A long and tedious cleansing and loading process is therefore required. "Furthermore, this load is reliant on experienced business users, not programmers, who are of course in short supply in today's short-staffed MRO companies," states Minney.

Chris Reed, director of marketing/sales at Trax, identifies user acceptance as another challenge in more established operations. Moving away from systems and processes that have been in operation for many years to newer systems can pose a difficult challenge to meet. Mxi's Butler-Jones states: "Often, [the] adoption of Maintenix means a significant shift in the day-to-day work of many people in the organisation, as their roles change from repetitive data processing and paper based communications to more proactive activities. Recognising the importance of each individual's understanding of the new business approach, Mxi works with our customers to ensure the transition is as smooth as possible."

Process complexity is another issue to be dealt with, as the variability of scenarios across product types, work scenarios (e.g. line, hangar, engine & component maintenance) and contract or billing types (e.g. time and materials, fixed price, power by the hour) makes the resulting software more complex. "It is also a very data intensive industry which compounds both the data conversion and system complexity," says Minney. In the process of adopting new software solutions, customers often find that data held within their existing systems is



Swiss-AS's AMOS is a fully-integrated software package that manages the maintenance, engineering and logistics requirements of modern airlines and MRO providers by fulfilling airworthiness standards. Above left is an illustrated parts catalogue, and above right is a shift planning module.



The TRAX Maintenance system, as an example of a fully integrated product, allows complete information flow between the modules in the system.

out of date, or inaccurate. Adds Butler-Jones: "Maintenix software's sophisticated data checking rules flag these inaccuracies as soon as they enter the system, where previously they may have gone uncorrected. Cleaning the data as it is moved from old systems into Maintenix software is an important factor in ensuring that mechanics and materials managers are not bothered by "bad data" when the new system is turned on."

For John Snow, vice president, marketing & business development at Enigma, avoiding scope creep from the customer is a project management challenge. He reports: "As the implementation progresses, customers often identify additional opportunities for integration and automation. New requirements must be prioritised, and expectations set with the customer, to prevent delays in the initial rollout." Additional functionality can always be added to subsequent projects, points out Snow.

Similarly, Swiss AviationSoftware (Swiss-AS) has found that customers can get carried away with all the options on offer with its AMOS software. CEO Ronald Schaeuffele states: "When it comes to change management some of the project teams get carried away and would like to turn the system upside down without properly understanding the functions of the system. In order to make sure that the project team understands the complexity and potential of AMOS, we have extended the know-how transfer phase for the project team in order to allow them to take well-founded decisions when it comes to defining customisations and/or modifications and enhancements of the system.

"Generally speaking, we highly recommend that new customers start using AMOS "as is" which includes many different options (more than 1,000 parameters steering the inherent processes of the system) and postponing customisations to the after-go-live phase."

Scope of IT solutions

Customers continue to demand full-suite MRO solutions that combine inventory, engineering, planning, operations, human resources, costing, finance, and billing systems into one suite application. At the same time the solutions must be easier and less costly to implement and run. "However, the level of solution sophistication being demanded by customers is still highly dependent on the customer's organisation and where maintenance fits into their structure. While most organisations are looking for a solution that will cover the breadth of their operations, the depth and level of automation being sought is highly variable," says Butler-Jones.

Today's solutions "must leverage leading edge technology, be standards-based and provide flexibility for future changes," says Terry McNicholas, executive vice president and chief business development officer at InfoTrust

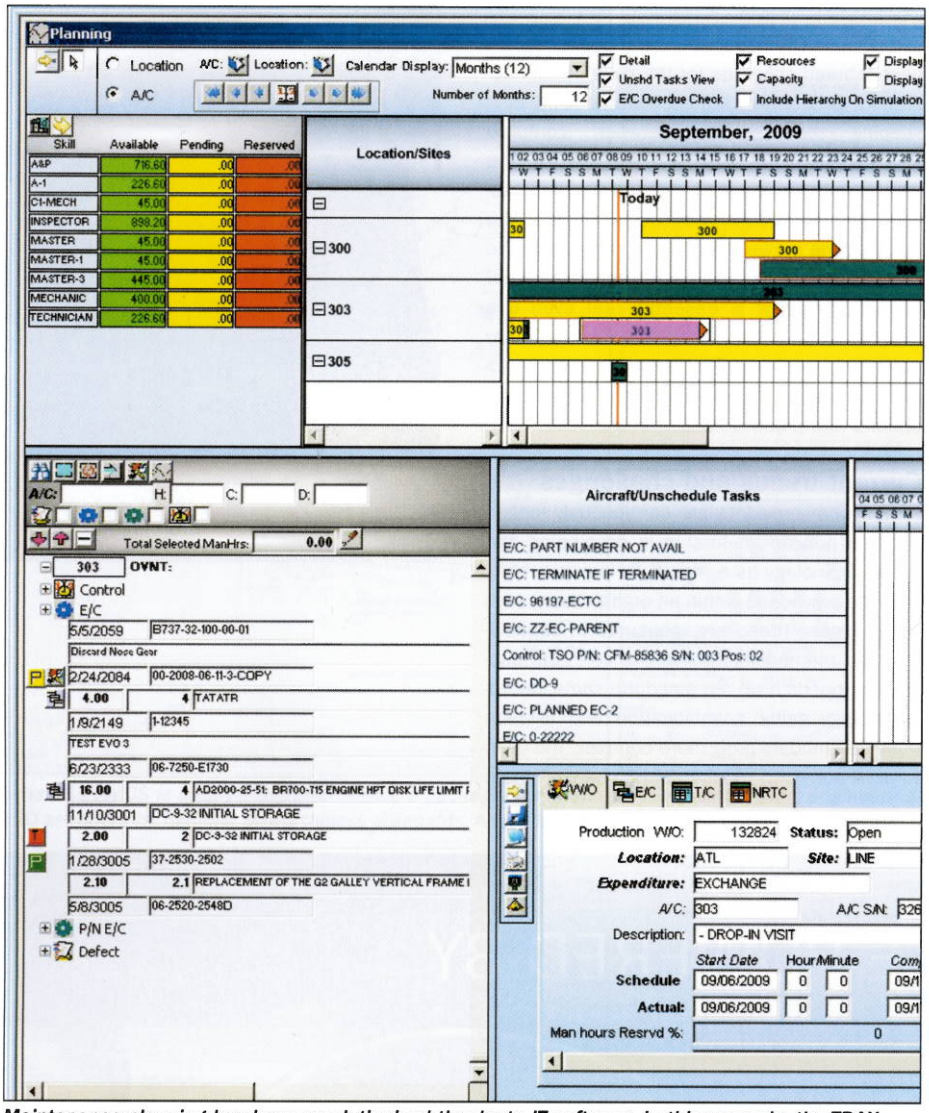
Group. "All of these requirements must be met in a simple to use approach that speeds up productivity and ensures compliance. Standards adoption by the aerospace industry is changing, so solutions must stay flexible to handle change. The advantage of a MRO solution like InfoTrust Group's TechSight/X is that it enables customers to store their entire library of maintenance information, not just certain types of information." There is no miracle solution to fit everyone's needs; instead every customer has common requirements, but the specific details are often quite different. It is important for a software vendor to have a level of flexibility in their product in order to satisfy these differences.

According to Snow, customers tend to fall into one of two extremes. The first group are looking to update a legacy system, which usually represents a significant overhaul of the IT environment. The second group are looking to improve specific processes, like job card generation, AOG response, or OEM revision processing. "Some larger airlines are currently looking at overhauling the maintenance IT environment; smaller airlines are looking for tactical benefits," he says.

Swiss-AS notes a strong tendency for extending the standard core MRO functions in best-of-breed solutions for the sake of full integration. Schaeuffele states: "The difficulty is in keeping the balance between complexity/innovation and usability/stability. If the complexity of a system exceeds the expectations or potential of future users, there is the risk that the implementation will fail due to the know-how transfer not taking place in a proper way. Therefore, it is essential that even if a solution like AMOS is complex and offers many options for the customer there is proper guidance through the "at-first-sight jungle" of options and processes."

Current trends and challenges

Software providers are continuously looked upon to provide leadership in developing and using technology as a means to improve maintenance processes within an organisation, says Butler-Jones. These are measured in capabilities and methodologies. "At the core, our customers' needs have remained the same, but as technology gains sophistication and aviation business models grow more complex, the year-to-year software requirements change. More



Maintenance planning has been revolutionised thanks to IT software. In this example, the TRAX Maintenance solution is illustrated.

recently you can see a trend towards a more integrated approach to business, looking for efficiencies not just within a specific maintenance department, but how that department fits within the entire business structure: from the OEM, to operations, right through to the global supply chain."

One of the fastest growing trends in the MRO industry is the adoption and implementation of content management systems that enable the MRO to provide a more complete service to the customer. McNicholas states: "In today's competitive environment it is not enough to merely do the repair or the overhaul, you need to be able to update the customer data and deliver it along with the service as part of a complete package."

Challenges include more standardisation for certain functions. For example, there are no standards for leased aircraft, so transferring a ship from one operator's software to another 'electronically' will always be difficult.

For Minney, broadly speaking, the most significant current challenge is the lack of capital investments by the commercial airlines in particular, but also across the sector as a whole. He says: "This is driving the MRO software segment to reduce the cost of ownership through a combination of making their software easier to configure, implement and integrate and through providing the software more on a pay-as-you-go model to reduce or eliminate the up-front investment required."

Another factor which is beginning to affect the market is the introduction of new aircraft such as the A380 today and the 787 in the near future. This will raise the possibility of new requirements for managing the onboard software loads or working with the integrated electronic logbook, and will require the incorporation of these 'digital aircraft' within MRO software. The latter requirement will "allow monitoring of the more software-based aircraft 'on-line'," states Reed. These are developments that have been delayed due to the later than expected arrival of the aircraft.

RFID is also a new trend that will become more visible, once airlines start to take-up the standards that the aircraft manufacturers have now finally agreed. However, Swiss-AS is wary that RFID is just another "over-hyped" functionality that "the MRO industry is unfortunately prone to". Although it is being used more and more, for Schaeuffele it is noticeable that today "there is less demand for this functionality than originally expected". Schaeuffele reports that RFID is being mainly used for user authentication and tool administration, rather than other anticipated functionalities.

Next steps

The newest MRO software solutions must not only meet today's industry standards but also provide the foundation for future requirements. This means that the software must be adaptable, and quickly at that. In addition, airlines are demanding more streamlined processes from start to finish.

As always, consolidation is another factor which will affect the future of the MRO software market. "[Consolidation] seems to happen around every five years — struggling vendors will either disappear or be sold on, new vendors appear and become a force for a while — time usually filtering out the good ones from the bad ones. The main players still soldier on and increase their customer base," assesses Trax's Reed.

For the software providers, a massive change that could come in the future would be the arrival of a totally new operating system —

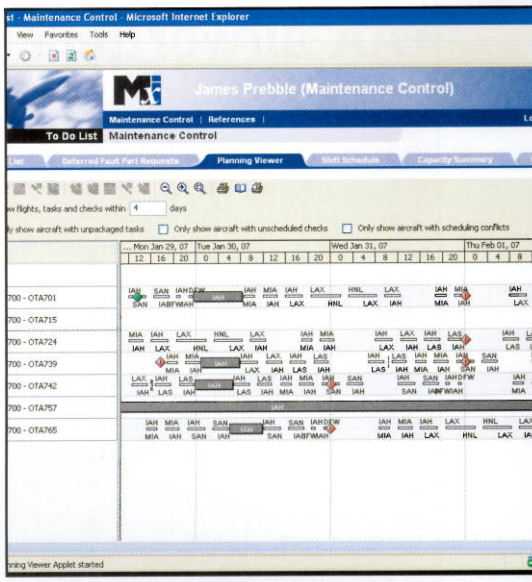
one which is not Windows, says Reed. "This will present a challenge for existing vendors and an opportunity for new vendors, and this would be a repeat of what happened when Windows 95 first appeared in 1995."

In terms of MRO software functionality, the future could lie in data coming from different sources (OEM, MRO provider etc.) to be consolidated in one user-friendly system environment. This would equip users or managers with as much well-processed information as possible to take informed business decisions and perform maintenance in the most optimised fashion. In this context, optimised workflows relying on all sort of new devices, such as mobile devices, SMS/e-mail messaging, devices for user authentication, and so on, are important.

At Swiss AS, Schaeuffele believes that the future of the MRO software market will have to focus on "linking the different processes of a customer's MRO world". He concludes: "Today, customers rely on different MRO providers for line and base maintenance. The implication is that the maintenance data of a customer's aircraft/component is managed in different MRO systems. Nevertheless, the customer claims to have all the data regarding its aircraft and components consolidated in its own MRO software environment. It is therefore essential that the customer has the possibility to export or import data from and to its own system in the easiest way.

"The easy exchange of maintenance data between the different MRO systems in the market will be a major milestone that can be reached in the future. Airlines want to gain more control and flexibility vis-Ö-vis its MRO providers, by all means possible."

As a start, Swiss-AS is currently working on interfacing its AMOS software with Lufthansa Technik's manage/m solution. This is because Swiss Aviation Software is being linked with Swiss airlines, which is itself part of the Lufthansa Group. This interlinking between the software is resulting in data being exchanged in real-time today, which is made directly available in both systems. According to Schaeuffele, "intelligent interlinking will generate a direct extra benefit to the customer in that it will speed up the supply and maintenance processes and eliminate duplication of data entry and clarifications". ■



Mxi is an example of a best-of-breed company in the MRO software market, with its Maintenix software.

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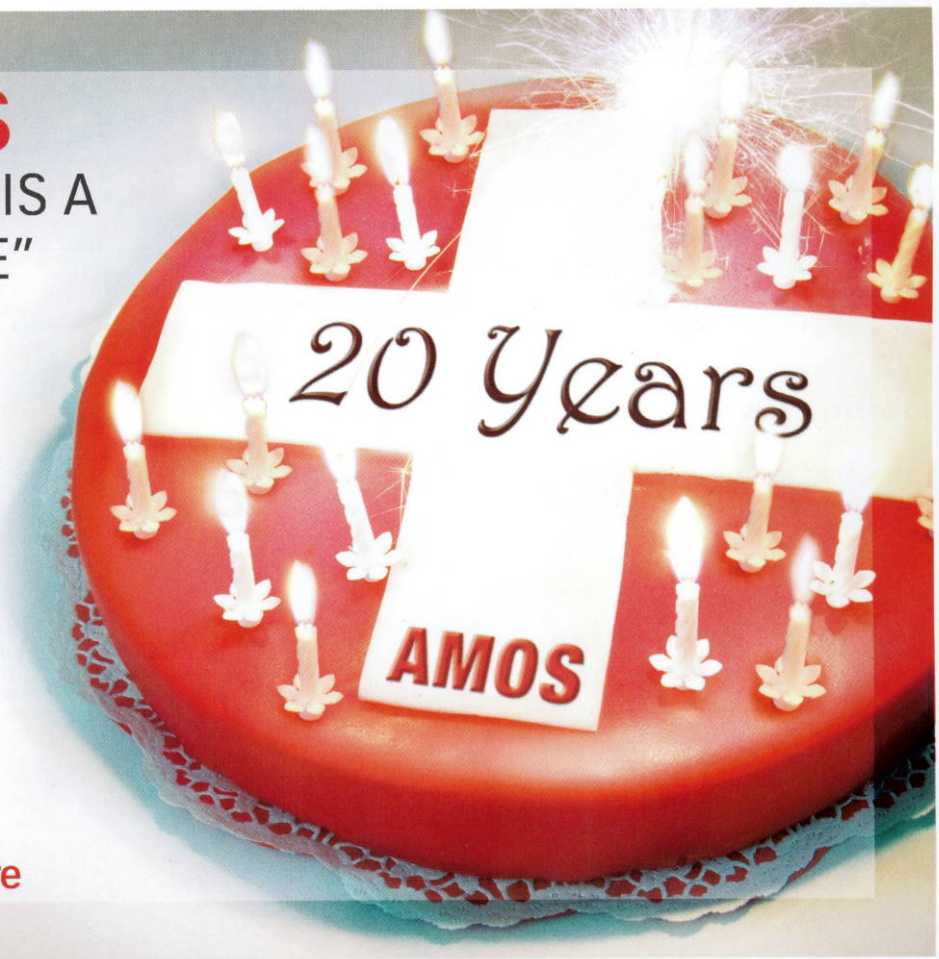

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