Demands for shorter maintenance TATs are putting pressure on MROs to streamline their workflow processes. A smooth transition through the hangar input is key. Advancing customer portals and mobile applications are further accelerating this transition.

The developments in M&E IT system customer portals

Maintenance and engineering (M&E) IT system customer portals provide a direct interface with the customer, the maintenance, repair and overhaul (MRO) organisation or airline engineering department. Leveraging productivity gains as a result of greater communication between the customer and the MRO during aircraft maintenance execution is a key focus of M&E system customer portals.

There is of course more than one type of MRO and MRO customer. Whether the maintenance is being performed within an airline's own MRO, or at a third-party provider, there will always be a customer associated with the aircraft. They will just be considered either internal or external to the business.

During maintenance it is now standard practice to have workflows built into the M&E system for MROs and their customers to interact in a purely paperless environment. This includes functions such as quotation for work, additional work approval, status displays, and invoice monitoring. An increasing focus of customer portals is to draw all the communications into the M&E system to expedite the workflow process.

The latest developments in customer portals, including new communication options, workflow monitoring and approval methods, and the new business practices required are examined here.

Types of MROs

Although scheduled and unscheduled maintenance is the core business of all types of MROs, commercially they can have very different foundations.

"We generally see three types of MRO," says John Stone, vice president, product management at Ultramain Systems, for the ULTRAMAIN software. "One is complete third party, where 100% of the work is sourced externally, and is not operated adjacent to any one airline. The MRO just goes out and finds any operator it can do work for.

"Then there are the MROs or M&E departments affiliated with an airline," continues Stone. "The internal versus externally sourced work can be a 50:50 split. An example of this is where an airline MRO has spun off its own third-party profit centre.

"Another option is where an airline's own MRO picks up third-party work on top of maintaining its own fleet," adds Stone. "This can be line or heavy maintenance based. The third-party work represents 5-20% of its business."

The main difference between these types of MROs is that those carrying out a large amount of third-party work have to deal with the requirements, policies and procedures of many customers. In an airline MRO, the biggest customer is itself, even if it is doing third-party work. This results in slightly different implications commercially, and therefore different requirements within the selected M&E system in use.

"At IFS we have had airline customers that have gone through the transition to third-party MRO work," explains James Elliott, director, MRO product line, aerospace & defense business unit for IFS. "What they find out is that there is a difference in how work is contracted and treated between the internal and now new external customers. Airlines must adjust and determine what new processes they will follow. For example, when working with a new third-party customer they know less about the aircraft condition and customer-specific tasks. They also do not have the same kind of inventory pool to fall back on as with their own fleet."

As more airlines are providing third-party maintenance, and in turn sending more aircraft to third-party maintenance providers, M&E systems have had to adapt to the changing needs. Airlines will want a free flow of information like they had in their own MROs. Independent MROs want a controlled means of communication to assist the progress of the check. This is where increasing developments in customer portals help.

"In recent years it has become a big component of M&E system providers to have a dedicated focus on the needs of independent MROs," adds Elliott. "If you apply an airline system to a third-party MRO, you will miss out on a lot of the needed commercial aspects. You also need the ability to interact with the customer and include them on what is happening on their aircraft."

An added complication of third-party work is that airlines can force MROs to use their own M&E systems for the maintenance execution aspects of the check. The MROs have to go back into their own system and re-enter all the required information for their commercial requirements. Dual data entry starts to take place with M&E systems being run in parallel to each other. While this is difficult to overcome, customer-to-MRO communications will still be critical to the success of the check.

Portals

In digital terms, a portal is a way of providing an access point for information and/or links within an IT system or product. Such portals are well developed, for example, in the exchange of information in Content Management Systems (CMS) and aircraft Safety Management System solutions (SMS). Customer portals within MROs are used to view maintenance check data and provide a platform to request and approve additional work.

In using the word portal, it must be acknowledged that it is used for both a designated section of an M&E system, and the creation of customer access via a role-based login. For the purposes of this article 'portal' is used for information viewing and communication exchanges available within the M&E system.

Customer portals create user interfaces or a direct login to the M&E IT systems in use at MROs.

"Within the industry, the term portal is generally how we refer to a user interface or direct log in the M&E system," explains Elliott. "In terms of technology, however, it is really an access-based login into a configured system with set permissions. This can be configured for either on-site use or in cloud-based installations. A customer therefore does not have to be on-site if given appropriate permissions by the MRO to access live data during the maintenance event, or access and respond to notifications."

"Within an M&E system, the term portal can be used to define a specially configured workspace for a customer which has role security applied to it," adds Stone. "Therefore, only the people with that role, such as a customer representative, can access pre-defined filtered views of the MRO's M&E system data. In this respect it is not a specific portal, but happens through natural role security.

"This is the preferred option in ULTRAMAIN because it allows the MRO to decide what is and is not important in their own customer portal," continues Stone. "This cuts down on the modification software requests and allows MROs to get things done without the vendor in the way."

Whether the M&E system in use is an integrated solution covering all departments, or a modularised overlay onto an existing enterprise resource planning (ERP) system, it is important to recognise the workflow process, and where bottlenecks in communication can be eased by customer portals.

The legacy path

In the past, planning and production engineers at MROs would have received physical paper requests for additional work to be processed into a work card for hangar-floor staff. The internal process of additional work approval, however, meant key members of the quality, commercial and production departments had to be found to physically sign the work request to confirm it could be raised.

So the run-around in the office would begin, phone calls would be made to locate the approved personnel, and a glance at the car park would indicate who was still at work. Time was lost through inefficient work processes.

The process of confirming NR work could be just as difficult. Often NR information was extracted from the M&E system and placed onto XL spreadsheets, filtered to comply with contractual man-hour (MH) and materials thresholds, then passed to the customer for approval. Work could be on hold waiting for the customer representative to return on-site or access their emails.

Finally, after aircraft departure, the commercial team gathered around a table of completed work cards. The objective: to find any information possible to justify excessive hours booked to the customer so invoices could be agreed and paid.

All this distracted from the prime objective of moving the aircraft through the workflow of the check as quickly and cost-effectively as possible.

The MRO workflow

Today's M&E systems divide their products into various modules. Although these modules differ in title and function, for example commercial, planning or production, it is important to note that they form an integrated system to support the workflow of a maintenance check. Customer interaction with these systems can start before aircraft arrival.

Commercial contracts

Maintenance contracts include the pricing of all tasks required within a workscope and any additional ancillary costs. Tasks are often priced commercially into different groups. It is common for routine inspections to be covered by a fixed price, while defects and additional materials will be covered up to a set threshold per defect finding.

All this creates the commercial quotation, and eventually if a bid is successful, the customer contract for the input. It is the contract details that create the financial workings and equations that run through the integrated M&E systems. On the commercial front customer portal interaction can start with the quotation.

"Within Trax when airlines send a task list or workscope of what they need the MRO to do, the airline is created as a customer and given a login for the customer portal," explains Reed. "After the MRO completes a quote for the work package to include all the labour and material costing, it publishes it for that customer in their portal, so that they can log in and review it.

"Of course, not all quotes are successful," continues Reed. "If the customer decides not to bring the aircraft, then the quote is closed and the login de-activated. If the quote is approved, then the contract information including the workscope creates not only the workflow, but the commercial rules and logic applied to it which is entered into the M&E system. This includes the MH and material thresholds you agree and the terms and conditions on them. This may be, for example, at what point you require authorisation from the customer to continue with NR additional work."

Additional work

Having a degree of visibility and timely control over the approval of additional work is an important factor for MROs to keep the labour as

Customer portal interaction can start before the aircraft arrives for quoting and contract negotiations purpose.

productive as possible. Therefore, the approval and non-approval of additional work is a primary function of customer portals.

There are two types of additional work that might pop up during an input: those which result from defects from the maintenance inspections known as NRs; and those that come from the customer often referred to as customer requests.

Non-routines

"In Seabury's ALKYM the whole process from proposal, to contract, to work programme is interconnected," says John Barry, senior vice president, head of sales and marketing at Seabury Solutions for ALKYM. "If an estimate for NR defect work goes outside of what is pre-agreed, for example 10 MHs, the task goes to what we call a Non-Routine Explorer. This is a tool where the customer can sign in and approve that work automatically in the system. The work cannot be performed until the customer approves it.

"The same can be done with spares needed for the defect rectification," adds Barry. "If the contract in place requires all consumables in the fixed price check up to $500 to be supplied by the MRO, this would all be handled in the system. But if a part is ordered above and beyond the contract terms then that needs to be approved by the customer, either via a direct interaction with Alkym, or a mobile device application configured for internal MRO or customer use."

M&E systems have slightly different system configurations and applications to handle NRs for the same result.

"In EmpowerMX's FleetCycle®, once the NR is raised it goes into a workflow process which requires evaluation and estimation," explains Mark S. Schulz, senior vice president, worldwide sales for EmpowerMX. "The contracts module considers the agreement between the customer and the MRO before it automatically goes to the customer portal. When the customer logs into the portal it receives a notification that action is needed. There is also the ability to send the customer an email or SMS message that there is an action requiring approval at that point in time.

"Once the customer accesses the portal, it can see all the actions pending approval," continues Schulz. "This can be performed via mobile devices, so it can be done in a hotel room in the middle of the night or in the office during the day. This expedites the process. What helps is that the customer has access to see the original taskcard work instructions, the NR write-up, and the estimate for the additional work all in the same place. If, for example, 40MH is estimated, it is possible that the customer initially only authorises 20MH. This information then goes back immediately to the MRO."

"A fundamental piece of ULTRAMAIN's M&E/MRO software is the Non-Routine Action Desk," explains Stone. "Once an NR is raised it must go through a workflow quoting process by the MRO and approval process by the customer. The customer can approve or reject the quote and comment against it. The NR then goes back through various stages of that workflow until it is approved or deferred by the customer. This all happens in the system. These processes are now completely paperless."

Often existing NR workflow processes are advancing into customer portal interactions.

"More recently, adjacent to the Non-Routine Action Desk we have customer portals," continues Stone. "ULTRAMAIN is designed in such a way that role security can essentially expose any aspect of our software and filter it down to anything specifically related to that customer's aircraft. The information is then delivered to them by their personalised customer portal."

Customer requests

In the reverse situation the MRO needs to evaluate the impact of additional work requested by the customer on the aircraft turnaround time (TAT) and resources.

"The customer can raise additional work requests on its side, and that would go into the quoting and vetting section of our ULTRAMAIN software," explains Stone. "As we have full contract management within our system, if the work fits into the existing contract, the MRO can get a quote back to the customer quickly."

Raising customer requests straight into the system allows MROs to determine trade requirements earlier. "Within Trax we allow the customer to request additional work within its portal, and to categorise the work," explains Reed. "For example, the work may be an additional cleaning request, a structural modification, or a cosmetic requirement. The type of work will affect the trade required for the work. Once the request is in the system the MRO can process it, quote on it, and send the response back through the portal for the customer to approve the costs. If there are materials needed, the customer can also approve these and communicate who is to buy them all through the portal. It is another example of a workflow process."

The pre-approval of work prevents any disagreements between the customer and the MRO post-event. A further advantage of controlling the approvals digitally within the M&E systems is the creation of paperless 'paper-trails'.

Communications

The choice of communication methods within M&E systems now closely matches those of the chat functions available in everyday social media platforms. It is therefore possible in today's MROs to be 'email-less' in terms of communication if they choose.

A growing use of chat functions within M&E systems will require MROs to implement business practices or policy to apply common sense to its use.

"Ultramain has been offering paperless options to MROs and airlines for a number of years and we decided that email is part of the paper problem," explains Stone. "So, we have been trying to think of ways to keep all the data inside ULTRAMAIN, by ensuring that all communication occurs inside ULTRAMAIN.

"Apart from the time saving, a major advantage of this is that communications can be tracked in the system and all be brought back out again for post-check meetings and efficiencies analysis," continues Stone. "Everybody that was involved in the input, including the customer, can see what happened and when. You can collect all the metrics to better identify the problem areas."

To stop using emails is a challenge. If, however, an MRO has defined 400 types of workflow threads that will send out email notifications, then the workforce will quickly get lost in the noise of communications. A way around this is to make the system become part of the conversation.

"ULTRAMAIN has an in-built threaded discussion feature that allows authorised users to have WhatsApp or SMS type communications around specific topics," explains Stone. "This allows users to have discussions, set statuses, or raise alerts, all of which the customer can be included in or not. That is up to the organisation to decide. Using the role security mentioned earlier, there could be a detailed discussion of which the customer is only privy to certain parts. This includes the system-generated elements of the discussion.

"An example of a threaded discussion is when a mechanic raises an entry into the system and says, 'AOG for troubleshooting'," explains Stone. "The next entry is 'troubleshooting complete' and 'found a faulty bleed valve'. Next you can see the system respond with 'bleed valve ordered'. The system responds automatically, it understands the association between the conversation and the unit of work that has been performed. There is a conversation going on between the mechanic and the system, and it is just people doing what they are doing. The customer can be involved in this, or not."

The customer's view

What maintenance information is displayed to the customer through portals comes down to the MRO, and what it wants to share with the customer. It may be that the MRO may not want to share information until they have reviewed it. How the information is displayed visually will differ between M&E systems.

"In ALKYM, the customer can see an overview of the workflows including milestones, workplans, and downtime estimates at the production planning stage," explains Barry. "During the actual production greater detail can be shown to include rates of defect rectification and any impact on the check if that rate was to increase. It is also possible to show the percentage of open and closed tasks by area or by trade, and what resources are available for the shift patterns. It depends on what the MRO wants to show them, and how they want to customise the information."

Like the NR approval process, M&E systems have slightly different configurations to display information for the customer to view.

"In our customer portal at Trax, check information can be displayed on two gauges showing both the number of tasks completed and percentage of MHs used," explains Reed. "This would display, for example, that the MRO has completed 300 tasks, so they are 20% of the way through the task list, and the MRO has used 50% of the MH. The customer is able to see the difference between all the figures.

"If the customer has multiple aircraft on site or in planning, then the first part of the login screen would show the checks on a calendar view," adds Reed. "Once an aircraft is selected the customer can see all the information on the check. Once they click into a check, the MRO gives them the granular view, including down to an individual task card level."

Customer portals also give visibility on parts progress and workshop status.

"If a part is not going to be back in time for the end of the check it is highlighted within the portal, so an exchange or loan item can be sourced," adds Reed. "If there is a defect that requires a part to enter workshops for repair, the customer can see this along with the means to approve the work. The costs once known will show on the invoice section within the portal."

Invoicing

Traditionally final invoices relating to the work carried out during an input were sent to customers once the aircraft had returned to service. This led to many hours of debates and even lengthy negotiations over final costs post-event. If an M&E system is configured to start generating the customer's invoice during the check, a means of viewing the costs associated with the check can take place through customer portals.

"Within the Trax customer portal, customers have an invoice tab to see a dynamic build-up of invoiced costs," explains Reed. "If the MRO has completed a task agreed at a fixed price, then it will appear on the invoice. If parts have been already approved or a staged payment made, the cost jumps onto the invoice. If the customer is not happy with anything they can put a query in right away, crucially while the check is still in progress. That is critical from the MRO's perspective, since they will be able to clear up any invoicing queries before the aircraft leaves."

Through a controlled acceleration of everyday work processes, MROs are achieving results previously thought to be impossible in reduced TATs and MH usage.

M&E systems in general will collate the information for the final invoice and send it to the accounts receivable area of the MRO's chosen system for collection. Sometimes this is an interface to a preferred specialist finance tool.

"All information for creating the invoice, including MHs and materials, is produced within Alkym to interact with the finance systems in use," says Barry. "The customer has access to the system to see all the MH and materials usage, including what has and has not been approved. Often this information is used to argue if work is believed to be taking too long or needs to be justified. If needed, any resultant changes to the figures from discussion can be made by the MRO. Deferred costs like repair costs from a third-party vendor may still be due after the aircraft has departed, but they can be noted on the system."

"At the invoicing side of the check, how much of the M&E system the MRO deploys comes into play," adds Elliott. "For example, at IFS we have both independent MRO M&E system capabilities, and ERP-based capabilities, which include areas such as Human Resources and Finance modules. If used, the ERP-based capabilities expand the interaction and control of the finance aspects of the check internally within the M&E system. The option is there."

File exchange

Customer portals, if configured to do so, can allow the customer to view digitally-signed PDF task cards during the check, and download completed work packages post-aircraft release.

"At Trax our customer portal works with our mobile capabilities," explains Reed. "When digital task cards with electronic signature are in use, there is the ability to generate a digitally signed PDF copy. At any point during or after the check, the customer can view all those digitally-signed PDFs for that check from the customer portal.

"For electronic task cards, the most efficient way of doing that is to use the XML and SGML data from the manufacturer," adds Reed. "If you only have PDF task cards, the production team can sign off the PDF card in the mobile app at the header level of the document, and send a copy back to the customer."

Of course, work packs can be supplied electronically in varying formats, including paper. Not all airlines and MROs are moving to paperless environments, and it is possible to have paper in at the start of the check, paper out at the end of it, but all the MRO work in between completed electronically. In the end, digital copies of the completed documentation can enter the customer portals.

Controlled acceleration

By accelerating the communication of information, customer portals can create a controlled acceleration of MRO processes and procedures. It is important to note that this must happen in two places for the greatest impact. Both with the customer, and internally within the MRO.

"When you apply a controlled acceleration to every communication internally across the maintenance process, and which has to be driven back externally to the customer, you have a dramatic impact on the check," explains Schulz. "At EmpowerMX we have seen a 20-40% reduction in TATs and labour consumption as a result. This is attributed to the controlled acceleration of many different practices that culminate in an improvement of the entire process. When you go into some of the best facilities it looks like a school of fish swimming in one direction. People are focused, working fast and in control.

"For example, if a mechanic is up in the tail of the aircraft, and their work is due an inspection, they could spend well over an hour in total extracting themselves from the work space, potentially get distracted and have a break, before finding an inspector to return to the work," explains Schulz. "Through our 'portal' processes they can request an inspection from their mobile device, and the inspector comes out immediately. It is possible to reduce the TAT of such inspections by up to 90%. The portal process is therefore very important internally within the MRO, as well as externally with the customer."

To maintain the level of optimisation gained through the controlled acceleration of communication, processes must be supported by the M&E software.

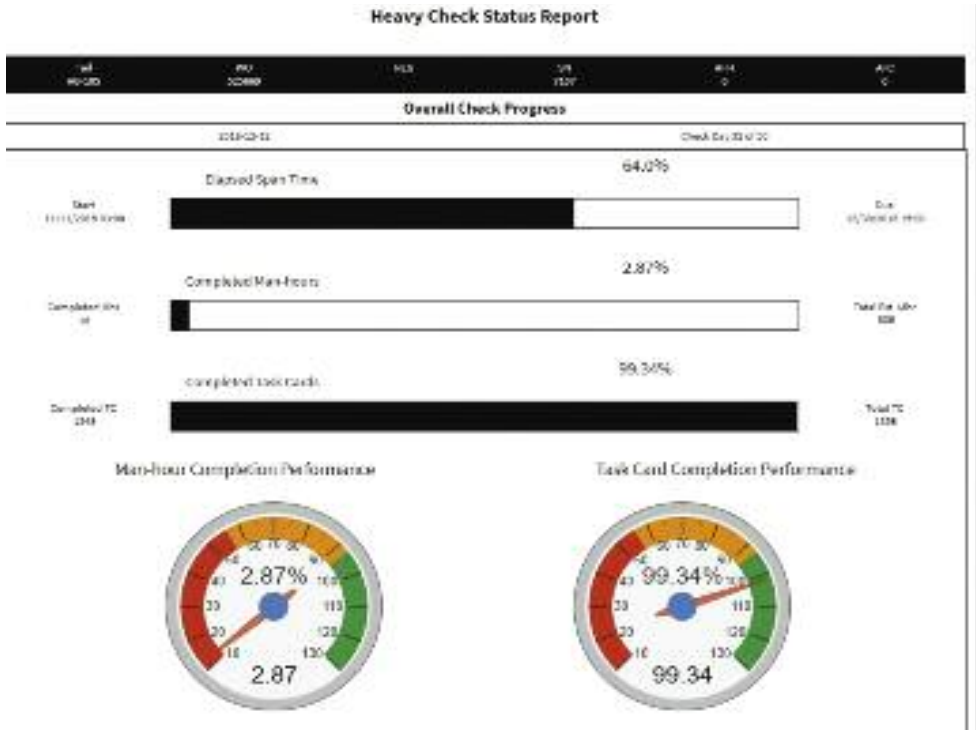
"At EmpowerMX we have created tools that model an optimised process and then repeat it through the software," adds Schulz. "You can create the best processes and business practices in the world, but if it is not controlled, or people do not follow them, optimisation does not occur."

Best practices

As a result of the increased efficiencies that customer portals offer the internal MRO work flow process, company best business practices require greater attention, in terms of communication and business information to be shared.

"What we have experienced in the MROs is an acceleration of the communication process to the point where we have to start implementing business practices or policy to control it," explains Schulz. "There arises a risk of introducing too many unnecessary back and forth exchanges between the MRO and the customer, so that new business processes are needed."

As developments in technology easily cross over from the personal into the professional environment, there are



Live data capture as statistical overviews are available for customers to view. What information is on display for the customer is always down to the MRO to decide.

additional human factors to consider.

"Mobile technology made it possible to be contacted and contact others at any time even for a minor issue," continues Schulz. "Just because the technology exists and mobile phones are left on during the night for an emergency, does not mean contact should be made. There must be a thought process. 'Should I send this notification right now in the middle of the night, wake them, potentially leading them to respond?' Common-sense business practices need to be added to the new capabilities."

How the MROs and airlines should leverage the advantages of customer portals to be the most efficient in their environment must be considered together with not compromising confidential information.

"We have about 1,000 different configurations in our system that can be selected by the MRO to turn things on and off, such as text messaging and emails," explains Schulz. "We also have permissions that enable what information goes to the customer. For example, we may want to share the status of the aircraft to the customer, but most MROs will not want to share the internal costs of working on it. We do what is necessary to expedite the process of maintenance, but we do not share business information where it is not necessary."

Implementation

Best business practices knowledge also comes into play during the implementation of M&E systems. Expert knowledge from within the M&E system provider can guide the MRO through the issues of transformation, such as the use of customer portals. Additionally, support internally within the MRO is vital.

"From the MRO side, my customers have reported three things that make it possible for them to implement a system successfully," explains Schulz. "There must be a management directive that this will be the new way of doing business. That they are behind it, encourage it, and enforce that this needs to happen.

"There also has to be a team of people that represents their departmental environments within the MRO," continues Schulz. "The team must know that it is their responsibility to manage the scope of the project and the change management of the people in their environment.

"Importantly, the team must include an evangelistic supporter of the implementation," adds Schulz. "This is someone with reputation and expert knowledge on the subject, who wants to make it happen. An enthusiastic project contributor can be the key to its success. Only one thing is more contagious than enthusiasm: the lack of it."

When introducing new product, easing technology such as customer portals into M&E systems, the implementation process must also be monitored and staged carefully.

"Every customer, whether airline or MRO, is at a different point in its IT journey," explains Nick Godwin, managing director, at Commsoft OASES. "When it comes to discussing new technology and processes, every business has to develop a value case for each one of the new elements of change and the resultant implementations.

"In relation to customer portals, I think the customer would ideally like to have great transparency with the MRO, and I suspect bigger customers enforce that," adds Godwin. "This can be by demanding that the MRO give them access to their systems or by giving the MRO access to the customer's own. But you must remember that airlines and MROs are horizontally opposed to each other commercially, and there are business confidentialities to maintain. While the airline is determined to get the most efficient compliance to the scheduled work, the MRO has the challenge of trying to maintain its profit margins by working as much additional out of scope activities as possible.

"At Commsoft, as I see some of our airlines grow, they want greater visibility on what is being carried out in the MROs," continues Godwin. "If an airline puts 20 'C' checks through a facility, it wants a certain amount of visibility of the workflow and access to the system. For the smaller airlines it may be the first time they have put work through a particular MRO. They are not going to trust the software to tell them everything. They will want an on-site representative with competent knowledge on the aircraft type to build a relationship with the MRO."

Summary

As MROs are further coming to terms with the digitisation process and resultant productivity improvements, MRO customers are now being able to move from having just an overview of the status of work performed, to actual work within the MRO M&E system.

It could be said there is no limitation in terms of what customer portals or designated interfaces are capable of. Realistically the interaction that takes place is down to what the individual MROs want to or allow their customers to do and see.

The MRO environment is still a business, and customers will be trying to cut the cost down and the organisation is still trying to make a profit. It is now increasingly possible though to leverage the latest technology, and through the controlled acceleration of communications, work together more efficiently in moving the aircraft through as quickly and safely as possible. AC