

Whether supplementing an airline's in-house maintenance capabilities, or an independent MRO provider sourcing work, the maintenance tender process is a complex process of workscope evaluation, risk analysis, and commercial negotiation. It is being assisted by advancing M&E IT systems.

M&E IT systems & the MRO tender process

Aircraft maintenance repair and overhaul (MRO) providers need to bid for work against other MROs to fill their hangar slots. This is particularly the case for MROs independent of any airline. MROs use a combination of original equipment manufacturer (OEM) guide man-hours (MH), commercially-driven pricing formulas, and extracted historical information from data contained within the company's maintenance and engineering (M&E) IT system to produce a quote.

The M&E IT systems used by airlines and third-party MRO facilities provide a core repository in which to store, analyse, and record information. The development of quoting modules in M&E IT software to assist in the bidding process allows the users to bypass previous time-consuming mechanical research and pricing techniques.

Below is a guide to what is involved in the basic MRO tender process, along with examples of how M&E IT systems are being developed to turn supplied workscopes into quotes.

Producing RFPs

M&E IT software systems have two roles to play in the aircraft maintenance tender process, as each independent system can be installed at either the airline (tendering facility), and/or the MRO (bidding facility).

Due to the differences in each aircraft's age, condition, maintenance programme and flight hour (FH) and flight cycle (FC) status, no two aircraft

maintenance inputs are the same. The first stage of the tender process, therefore, for the production of the request for proposal (RFP) is to create a workscope call-up, consisting of scheduled maintenance and out-of-phase (OOP) tasks from the internal M&E IT system.

The workscope call-up for a 'C' check, for example, will comprise a list of due tasks from the aircraft's maintenance programme. These include any required regulatory authority airworthiness directives (ADs) and OEM service bulletins (SBs). These tasks will be selected to clear the aircraft for flight up to the next forecast period of downtime. This can be based on calendar time, FH and/or FC limits, or even contractual terms set in leasing agreements. This call-up will not differ greatly from one that is produced for 'in-house' analysis or check forecast budgeting, apart from the protection of confidential information like internally recorded MH.

Once information is received at the MRO, a growing number of M&E IT systems can be used to upload the inbound work packages for content evaluation. Any existing interfaces or partnerships between the airlines' and MROs' IT systems in the transfer of the digital communications will be an advantage for the automatic absorption of the workscope (See *Connectivity applications in MRO, Aircraft Commerce, August/September 2015, page 76*).

Ronald Schaeuffele, chief executive officer at Swiss Aviation Software Ltd, the vendor of AMOS MRO software solution, explains: "If an aircraft is

always sent to the same MRO, an interface for information exchange (the workscope) would be an advantage. This requires that the counterpart can read and process the information. In the MRO world, the smaller the workscope is the more likely it is that hardcopy papers will need to be exchanged. So within the AMOS community, for example, airlines like easyJet and SWISS, which deal with SR Technics, will synchronise their IT systems for workscope transfer to perform a sizing or a quote. One key advantage is that at the end they can use it to create the work package for the hangar floor."

It is key to note at this stage that no matter what M&E IT system software or legacy spreadsheets are used for bid pricing, the business's enterprise resource planning (ERP) or commercial software programmes will usually be used to finalise the RFP. This will be in the form of a wrap-around document to the required call up. It allows bespoke additional requirements, like cabin or structural modifications not yet absorbed by the M&E IT system, to be included.

MRO workscope evaluation

The RFPs received by the MROs can be in many formats, including PDF, XML, or even in hard copy (literally papers in the mail). XML format is the preferred method, since it allows for easier digital communication that can then be processed by other programmes.

In the past the process of workscope evaluation was a summing-up of the manufacturer's set MH against the

Item	Hours	Labor	Material	Remarks	Status
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select
Task Card: 80 28 007	28.00	638.00	70,288.71		Select

The TRAX work order quoting system contained within the Production Module provides labour and material costing details on a card-by-card level.

workscope content. Planners then allowed for a ‘multiplier’ of the OEM’s predicted times listed in the maintenance planning document (MPD). They then included a defect allowance to deal with snags that will be discovered during the scheduled maintenance visit. These ‘guesstimate’ man-power evaluations would be used for hangar slot allocation and ‘off-line time’ for the aircraft.

With the wealth of digitised historical data now being created by MROs, M&E IT systems can now be populated with OEM MH and/or the company’s own established MH to carry out each task. Material costs can also be recorded. Using historical data, however, requires caution. This information relies on the current value of the information stored in the M&E IT system. Years of poor discipline in the recording of accurate information will result in data that are incomplete or incorrect. This considered, no matter how clean and accurate the data, they still need to be interpreted correctly and adjusted to each MRO pricing requirements.

Man-hours

Most RFPs for larger aircraft types, like Boeing, Airbus, or Bombardier, will contain listings of MPD numbers and task card numbers. MPD numbers are the OEM’s specific inspection number outlining a task requirement and the time when it is due to be accomplished. The task card number, however, relates to the OEM’s document that contains the instructions to do the task.

To establish a final MH count against a given workscope, the multiplication

factors used on the OEM guide figures can vary between MROs. Understandably the MH used and formulas linked to the quoting process are a confidential topic. The release of any such data publicly could expose any time management or operational inefficiencies within the MRO if they existed.

OEM MPD MH need adjusting for various reasons. One MPD MH in reality could equate to 2.5MH on the hangar floor, for example, as a result of the additional time taken once equipment sourcing and access requirements have been taken into account. For greater task breakdown and refinement, however, M&E IT systems populated with historical MH per task can include any deviation from the OEM figures either up or down.

What must not be forgotten is that there are also commercial interests to protect. If a task can be achieved more quickly than the OEM states, then it will be a costing advantage against other MROs. So an OEM-listed task, known to take the MRO 45 minutes, may be sold at 50 minutes. All these considerations need to be accounted for when preparing a bid response.

Labour charges

Default labour rates ideally need to be set for each particular aircraft quote because different manpower skill levels are required during a maintenance input. Labour rates can also be tiered to take into account the fixed prices for certain work or be varied according to the time of day and week for when the work is performed.

Nick Godwin, managing director at Commsoft, the vendor of the OASES Engineering and Maintenance Software System, explains: “The MH rates in OASES or each skill can be defined as a standard, and can be overridden at a customer or aircraft level if required. These can be revised on a periodic basis, for example annually in line with adjustments to company list prices, but OASES retains the full history of the contract data. This pricing method along with OASES’s use of its own MH estimates will be used to provide the quotation. A revision of the estimates based on previous actual times will be undertaken to ensure the MH and charges quoted are accurate.”

For MROs there is also the business management needs for monitoring internal labour costs compared to sold labour costs to consider. Tony Louw, consultant at IFS Aerospace and Defence providing ERP suites to MROs adds: “Within IFS for each skill level, or competence, a generic price can be defined which forms the basis for determining the cost of resources if work was to be performed internally by the MRO provider for themselves. Where work is performed on behalf of a customer, the competence can be related to a sales part, which in turn can be associated with a specific sales price, including sales tax or VAT.”

Yet there are always complications to consider when comparing the predicted labour cost to the actual events that take place on the hangar floor. Schaeuffele explains: “Different skill rates present a problem. For example, if the task requires cleaning, how should it then be priced if the task is carried out by a highly skilled mechanic on the day? No matter how well the labour charges are set up, a degree of man management from the production side will affect the resultant check cost to the MRO.”

Materials

For determining the costs of the required materials or consumables for each workscope, the relevant purchase history and current market price will be calculated. The consumables required at the quoting stage cover items such as lubrication greases, cleaning materials, servicing fluids, filters and o-rings. Any company mark-up and handling costs

would be included in the quote. The required mark-up used can be varied according to the value of the materials and can also be capped if required.

Chris Reed, managing director at TRAX, an MRO ERP software solution supplier, explains: "If the MRO is to supply a new consumable it would be common to add a 5% handling charge and a 2% mark-up on the base price. There may be additional rules and threshold limits to be incorporated into bids as well. This could, for example, be setting a minimum threshold of never charging a customer less than a dollar for a part. Upper thresholds can also be set like never charging a customer more than \$10,000 for consumables on a C check."

Schaeuffele adds: "The advantages of M&E IT systems when defining material limits within the contract are not to be underestimated. When these limits are exceeded, there can be notifications sent out that approval is needed by the customer before further purchases are to be made. If a workscope contract, for example, contains a sum that includes a price capped at \$50,000 for consumables, because you have defined this amount as the upper limit, when or if the next finding is entered requiring materials that exceed the set figure, software like AMOS will automatically inform the users that approval by the customer is needed."

Rotables

Rotable costs can be considerably higher than material costs. The term rotatable is used to describe aircraft components that are usually serialised for traceability. These rotatables due for replacement will only normally appear in the advance copy of the workscope for quoting purposes if the item has a FH-, FC- or calendar-driven expiry.

Most often rotatable purchases, repairs and exchanges that are required during a check are a result of defect findings. A handling charge will often be associated with items where the rate varies between the MROs. Rotable repairs, for example, could be at 20% on top of the cost price, and exchanges at 10%. To add further complications to the handling of rotatables, any item still under warranty needs to be differentiated from items that are re-chargeable.

Defects

Each aircraft's age and maintenance history needs to be established and evaluated if the quote is to include a fixed price MH allowance for defect coverage. This is often sought by airlines before the input, either for budgeting purposes or for ease of check progression by allowing all minor defects to be worked without prior customer approval.

The older the aircraft, the more likely it is that defects will be found due to general wear and tear, passenger traffic, metal fatigue and corrosion. On the MRO side for bidding purposes and downtime prediction, the history of the aircraft's previous owners and operators and where maintenance has been performed will also be taken into consideration. An aircraft with five different owners/operators in 12 years, for example, will be treated with a little more caution than a sheltered aircraft with one owner and one maintenance system.

The aircraft's potential condition is not the only influencing factor when setting defect allowances. The financial certainty of the operator can lead the MRO to take caution, since a higher defect allowance included in the up-front contracted fixed price will lead to a greater percentage of the payment up front.

There are many ways to 'play' this part of the quote. To avoid the risk of under-estimating the defect allowance within a fixed price, an MRO may choose to put in place a defect cap on MH within the bid.

If a defect allowance capped at 10MH per defect is contractually covered in the fixed price, then a defect using 11MH will result in 1MH being re-charged upon the aircraft's release to service. To put this into perspective, a 'cap 10' input where

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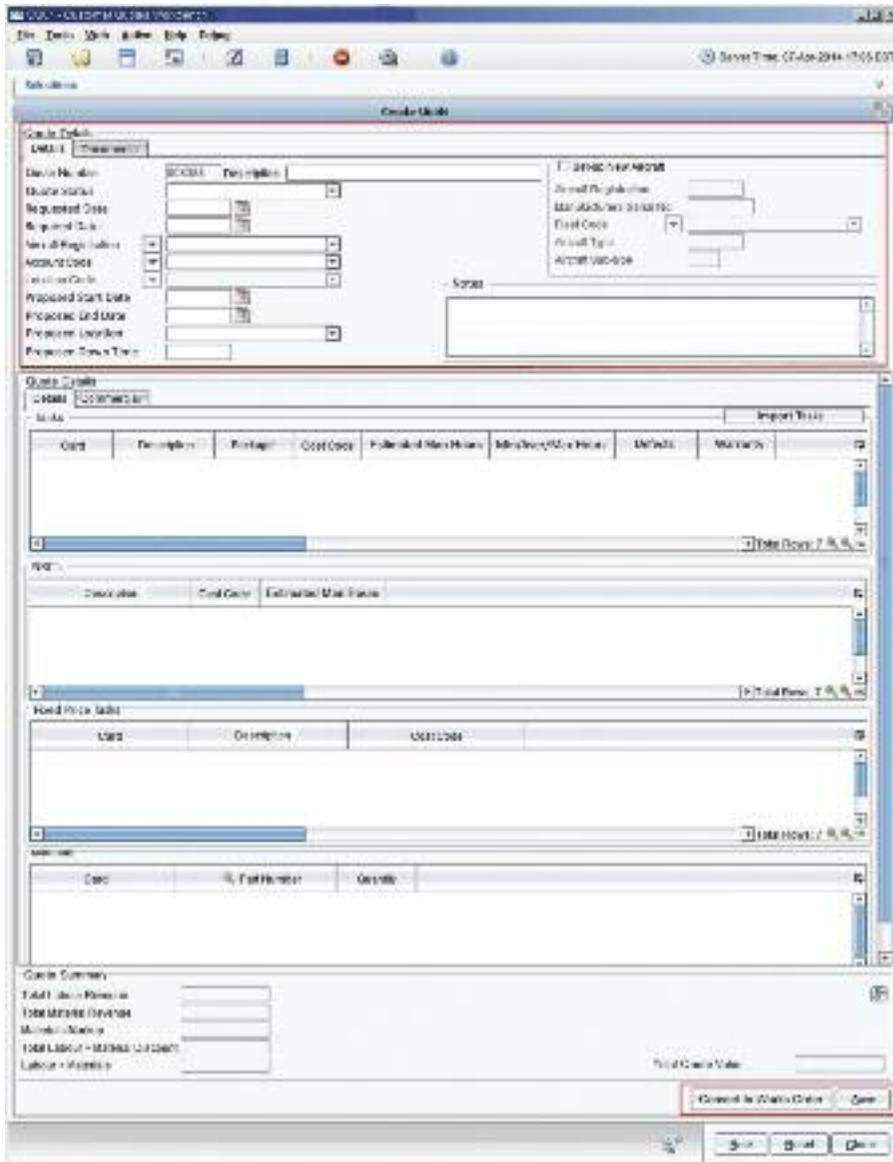
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In addition to labour and materials costs, quoting modules like Commsoft's OASES CQ01 display includes additional information within tabs, such as the manufacturer's warranty coverage.

Contract types

The contract type to formalise the terms and condition of any quote and resultant maintenance agreement can vary. Contracts can be time- and material-based, FH/FC-based, fixed price, or a combination of all.

Time and material contracts are agreements where the customer is charged for a specific maintenance visit, based on the actual labour and material used. This type of arrangement provides a risk-free pricing format, since all work undertaken is billed per actual time and material bookings.

Fixed-price contracts cover all aspects of a maintenance input. Many will have various exclusions, however, like defects and material costs over a certain amount that would be considered an additional cost to the customer.

Maintenance per FH/FC contracts suit airlines that use one main provider for MRO requirements. This type of contract results in the invoicing of a predetermined rate per FH. The benefit for this type of arrangement is that it provides predictable maintenance costs.

40 defects have been found to have exceeded the cap could result in a total recharge of 600MH post-release of the aircraft. It depends on how far over the cap each defect goes. This can be a cause for concern for MROs awaiting payment.

Using a 'cap 50' for defect coverage would mean that a higher fixed price would be paid up front to cover the estimated defects up to and including 50MH. On the same check with the same 40 defects, if only two went over 50MH equating to 25MH to be re-charged, there are only a smaller number of MH to be reclaimed post-check.

It is a balancing act for MROs to get right. Too high a ratio may lose the bid, too low a ratio and a defect-heavy aircraft will result in a check financial loss. If all works out well for the MRO, then at the end of the check there will be spare defect MH in the budget that have not been used, and therefore profited.

Reed explains: "A cap can be entered for automatic authorisation of non-routine (defects) in TRAX. 30MH of non-routine work, for example, can be completed per item prior to further customer approval being sought. If

TRAX has the historical data from that aircraft or that customer, then the MROs using TRAX can bring it in from the system to be evaluated to pre-determine the potential safe defect cap or allowance for any given work scope."

Schaeuffele adds: "To establish the potential risk for findings for a workscope, AMOS would be used to locate a similar workscope, while searching for results relating to aircraft that have had the same 'time since new' or manufacture date. This would generate the finding ratio.

"If you have to send the aircraft on a regular basis to a certain MRO then data would be available," continues Schaeuffele. "But if you send the aircraft to multiple different MRO providers then the foundation for making this kind of decision is not available."

One alternative to using a defect cap is having one cumulative set allowance of, for example, 800MH per input, that the MRO cannot go over without customer approval. Both methods of handling the defect allowance will assist in determining the predicted downtime needed for the aircraft.

Production of quotes

TRAX Software Solutions

Trax MRO maintenance and engineering software solutions provide the means to manage and maintain all information generated by a maintenance organisation. An overhaul of the MH planning and quoting system has recently been undertaken to produce a lot more functionality in the software for the users.

"If the MRO using TRAX receives a workscope in XML format it can be imported it into quoting system contained within the Trax Production module," explains Reed. "The software will take the XL standard columns and lines of inspection requirements, usually MPD or task card numbers, and create a single task per line on a bid sheet. By referencing known time and material information, the bid sheet will be able to generate check costings. The way these costings are used is based on the varying customer contracts set up within the technology to include all of the MH rates,



material mark-up rates, handling charges, and non-routine labour predictions.”

“The MH rate, for example, can be set up to match the trade undertaking the task,” Reed further explains. “If the internal cost at the MRO per MH for a fitter is \$30 then you can set the contract up to sell it to the customer at \$45. For avionics, it could be an internal cost of \$70 per hour that is sold at \$80 per hour.”

When it comes to materials costs, TRAX recognises through historical information the tasks that require standard materials and can bring those into the calculation. The same can be said for non-routine information (defects).

“Now, if it is the first time you have seen that aircraft or that customer, you are working from scratch,” adds Reed. “But if you have worked on the same or similar aircraft then you can bring the system’s history into the bidding and actually copy it into the current quote. If an MPD number or inspection task comes in that is not recognised it will still need to be a manually evaluated. So there are tasks you have to catch and you have to have people with experience looking into cards the same way. Verifying that historical information is correct is still a manual process.”

Once the contract is set up in the system it is then available to create a quote at the push of a button. This will produce a bid that will list every task, every MH, every material cost, and any associated function related to those tasks and tooling requirements. A system work order will be created that can be flagged on hold pending the customer’s go-ahead. Once the bid is won or approved, all that is required is to go back into the system and ‘unflag’ the customer quote and it

becomes a live work order.

“The live work order used for the quote can now assist the production team. There is an image generating bid sheet that can produce a project plan in a graphical format to define and show the check’s critical tasks built into TRAX’s production module,” explains Reed. “Alternatively you have a function to export the information to Microsoft Project to manipulate it. So if you have a check that takes 20 days and the customer wants it in 14 you can see what you need to do to accomplish this via manpower planning adjustments.”

At the end of the check, all the actual data accumulated from the work order can be used by the commercial department to modify the final invoice prices and the times in line with their procedures for that customer.

AMOS

Swiss AviationSoftware Ltd. (Swiss-AS) is a 100% subsidiary of Swiss International Air Lines and thereby embedded in the Lufthansa Group. Swiss-AS software solution AMOS provides users with the ability to manage maintenance, engineering and logistics needs. It also manages their compliance within a complex system of aviation regulations with a high degree functionality, coupled with ease of use.

“We have a module called Quotation Manager to assist the quoting process,” Schaeuffele explains. “The contract for the input will be defined in chapters in this Quotation Manager. This works by every chapter representing a package of work. For instance, chapter one would be the ‘C’ check or the pure scheduled maintenance check. Then chapter two

For the production teams the big picture that maintenance inputs are the result of a bidding process is often forgotten. Historical data of the man-hours required to undertake is now being closely scrutinised to help improve future bids.

would be used for findings, chapter three would be used for component exchanges, chapter 4 would be used for additional work, and so on.”

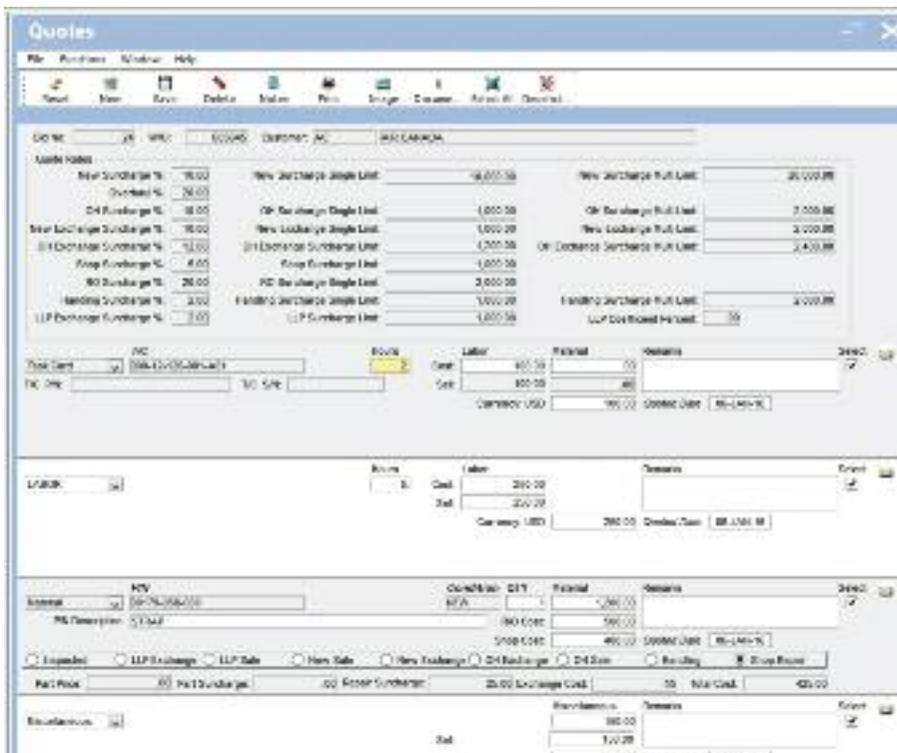
“The chapters keep inside the details of the contract,” continues Schaeuffele. “So when talking about the scheduled work pack we would define in the chapter the lump sum, and what is included and excluded. We would also define the consumables that will be charged, for example, a lump sum of €550,000. This would include every consumable with a value of less than \$2. We can break down these rates even down to skill or type of work.”

AMOS can make an evaluation of defect prediction for an airplane that is relatively new versus one that is relatively old for the evaluation of defect MH requirements. “Assessment of the defects coverage will affect potential downtime,” continues Schaeuffele. “Although some organisations will mention that the inspection time will not be affected by age, the finding ratio might of course be very different.”

When a quote is accepted the information can be used to form a complete graphical view of the input. Announced by AMOS at a user conference in November 2015, a planned release of additional software targeted for use by the larger pure play MRO of activities, is now aimed for Q4 2016/Q1 2017 release.

“The new functionality of AMOS will include the details of quotes, especially for the real-time, cross-checking functionality of the data entered by the mechanics,” Schaeuffele adds. “A real-time evaluation of any activity by the mechanics versus the quote will take the weight of commercial post-check invoicing difficulties. It will provide a monitor for the actual ground time progress highlighting any critical path items that may affect this. We will see how many remaining MH there are in different types of work classifications and the number of findings. Real-time verification of what has been quoted versus what has been done, is not currently being carried out by that many MROs.”

“One of the high-level specifications of the initial phase of the new AMOS MRO Edition will be the incorporation of graphs to form a flightdeck view of the base and the ‘packages’ inside to display



the progress of each individual project (aircraft) in work,” continues Schaeuffele. “On a high level, this information will be displayed like a clock face that shows the input is in the green, the yellow or the red zone. When you click on the clock you can see more information about progress being made, such as remaining MH, materials limits, and all shift handover comments. If you click on the project itself you see a complete breakdown of the tasks, including graphical displays for the monitoring of critical path items and any influence on the check from the back shop activities.”

Commsoft/OASES

Commsoft’s OASES (Open Aviation Strategic Engineering System) is an aviation engineering and maintenance system with users including national carriers and third-party maintainers. The OASES MRO Quotes module brings together all elements of the RFP. The customer requirements (the workscope) can be created from a combination of packages, OOP items, and component changes. It can also be imported from a file containing a list of required task references.

“OASES holds details of each task, including skill, estimated MH, and required materials,” explains Godwin. “This is cross-referred to a commercial database within OASES containing contract terms and conditions, customer MH rates, material mark-ups, and other information. This is all bought together in a PDF quote document that details the full scope and cost of the maintenance input.”

“In addition, labour and materials

covered by a manufacturer’s warranty, can be identified,” continues Godwin. “These appear as zero or reduced value items on the quote, and if the quote is accepted, then separate warranty invoices are generated by OASES as required.”

To do this OASES analyses the MRO’s previous experience of carrying out each task in the quotation to establish the average MH taken to complete this historically against this aircraft type. The system will also identify the defect rate. The MH estimate and quote value can be adjusted up or down as required by the MRO. For quoting purposes, OASES allows both maintenance tasks and materials to be defined as fixed-price items or on a ‘time and material’ basis.

Godwin adds: “Upon acceptance of the quotation, OASES converts the quote into a live works order at the click of a button, which builds a work pack and raises requisitions for all required materials. The work pack and supporting documentation, such as check lists and panel charts, can be printed or emailed to the production team.”

The works order is then worked using the OASES SFDC module (MH bookings & NRC generation). The Resource Planning (RP) module allocates the works order to the appropriate hangar and bay. The daily MH are calculated based on what work is remaining (scheduled and non-routine), and when the aircraft needs to be released back to service. These daily totals are compared against the available MH from the OASES shift pattern definitions and any shortfalls are shown clearly on a Gantt chart.

“The result for the MRO is that OASES can produce a financial analysis of maintenance in progress, and a history

The TRAX workshop quoting screens for hangar support shop labour and material pricing will have handling and surcharge costs included in each bid.

of maintenance that compare expenditure and revenue,” explains Godwin.

IFS Applications

IFS Applications provides a full ERP suite to support all functions of an MRO. This includes the need to address an RFP response by producing ‘Service Quotations’. The software also includes a fully integrated ‘Business Opportunity Register’ for the monitoring of potential maintenance services required.

Louw explains the process. “Once the opportunity has been clarified and verified, a Service Quotation can be generated. RFP requirements in various formats, such as Microsoft Word or Excel, can be stored as document connections against both the Business Opportunity Register and the Service Quotation. The Service Quotation then allows for the download and import of the required work-scope directly from third-party Maintenance Planning tools.”

“On manual or electronic importation of the required workscope, reliance is then made on the contents of the internal system maintenance programmes, maintenance plans and task card libraries to generate the full scope of the workpackage,” continues Louw. “This includes all relevant resources required to perform the maintenance input, such as a bill of materials for rotatable and consumables, and importantly any special tools and facilities requirements.”

For pricing purposes each of these logistic elements can in turn either be related directly to a sales part, a price agreement, or could be associated with a fixed price value. Maintenance planners have the ability to also adjust the prices quoted for various tasks and to address specific unknown factors or emergent work or risk. These include warranty requirements or unknown conditions of the airframe structures.

For operators using IFS Applications, it is possible to create a service contract related to each customer. This can either be for time and materials or fixed price/special agreements. Louw explains: “Distinct service lines can be connected to allow for different service level agreements, invoice parameters and periodic prices to be associated with the service lines for each customer. Once the workpackage is generated it is connected

The screenshot displays a software interface for managing maintenance quotes. It features a sidebar with navigation options like 'Task Card View', 'MRO Quotes', and 'MRO Inventory'. The main window shows a table with columns for 'Task ID', 'Task Name', 'Status', 'Cost', 'Q. Card', 'Q. Description', 'Q. Unit', 'Q. Rate', and 'Q. Total'. The table lists various tasks such as 'CHECK ENGINE OIL', 'CHECK BRAKE PADS', and 'CHECK TIRE PRESSURE', each with associated numerical values.

Man-hours from the OASES MRO Quotes module can be referenced in additional modules to assist in the monitoring of budgeted labour costs.

to the service contract in this way, allowing for effective management and control of the cost aspects of quoted worked versus actual consumption.”

“On verification of the work content the quotation is sent to the customer for approval,” continues Louw. “This can be either via electronic means or printed quotation letters. If the customer rejects some of the work from the workscope, this can then be recorded against the quotation and excluded from the agreed scope when the quotation is marked as approved.”

Once the quotation has been approved and the workpackage has been created, standard functions available within IFS Applications around hangar slot and resource planning are used to determine the loading against both the hangar and the resources available.

“IFS Applications uses functions around an Execution Logic Structure (ELS) to arrange and group the contents of a workpackage according to user-defined criteria,” explains Louw. “This ELS also allows for the determination of the critical path to ensure that the workpackage can be executed in the most efficient manner. Users have the option of viewing the scope of the work graphically according to the grouping criteria and also to calculate or re-calculate the critical path as required.”

Bid evaluation

For companies analysing returned tender bids, it will often be possible to reverse-engineer the monetary values into MH figures to see how realistic the bid is against their own predictions.

The greater the detail that can be provided by the MRO’s quotes via the

M&E system, the deeper the understanding demonstrated of the workscope to hand.

“Commsoft understands that its customers wish to evaluate each scheduled workscope for its labour costs, broken down by skills categories, materials costs and sources, allied to preferential discounts,” explains Godwin. “The airlines compare MROs’ bid responses to assess labour efficiencies on specific tasks, and they will attempt to assess marks-up and margins. The typical M&E IT systems, such as OASES, provide critical information to allow these factors to be assessed. These, together with other key decision factors of turnaround time (TRT), location/ferry costs, and work standard history at the MRO, will inform each decision. Typically, our 737 and A320 customers will look for three to five bids from MRO organisations to evaluate for the factors noted above. The airlines will also want to understand how out-of-scope, non-routine tasks will be identified and charged, and they want the ability to challenge these.”

Production’s role

MH booked during an input are in the hands of the engineer and the internal system used to monitor these inputs. This makes evaluating any time-recording history complicated. Although barcoded time-recording functionality is progressively moving throughout the industry, in the past it would be common that in a work pack with 50 cards, a disproportionate amount of MH would be booked to card number one or the card most visible in the card rack. Additionally, there may be typing errors

and periods of learning for unskilled workers, which affect average figures. This creates problems going forward. If you have inaccurate historical time booking, how do you estimate for future bids?

“To be honest, if the mechanics or the engineers are not booking their MH correctly, you are already lost,” Schaeuffele continues. “This is except where the invoice matches one-to-one the quote, and the actual MH bookings that have taken place on the hangar floor have no influence on the invoice. Even if this sounds low-tech at many of the MROs, this is the way things are still done. It is, therefore, a manual approach to verify the content of quoted material versus what has in the end been delivered to the customer. The MRO internally has to live with what the mechanics have booked. The level of success of this method depends heavily on what kind of experience the commercial team has in order to make a profit or a loss.”

Commercial’s role

Commercial departments have to be creative to get the work in. To standardise all maintenance contracts would be difficult, since every client is treated differently. Extracting usable historical information from the M&E IT system to form bid responses will more often than not come under some area of refinement and alteration during the negotiation stage.

What cannot be underestimated is the usefulness of accurate information stored in M&E systems as a tool for commercial for ‘C’ check analysis on a larger scale than just per task card. M&E IT systems can provide a monitor, combining several selected events to get the facts for use on large scale contract re-negotiations. An example is to be able to look at all the ‘C’ checks the facility has carried out within the previous contract term. Then it would be established whether through hangar-floor improved efficiency and production-planning optimisation the quotations offered by the MROs can be reduced to secure a new deal.

There are arguments going on, however, on how much energy the users want to put into the quoting process among MROs, especially with respect to the size of the aircraft. Schaeuffele explains: “We have had preliminary

discussions with our AMOS MRO user group that is primarily dealing with the majority of customers as an MRO. Even with the Quotation Manager, when quoting third-party activities, many of the customers are giving us hundreds of reasons why they consider this to be something that should be managed outside the M&E IT system. It is such a complicated process that planners are not in a position where they can manage it with just the M&E IT system. It is a very controversial topic.”

“We need to have the quote inside the system for AMOS, otherwise we would never get to the point that during the execution of the check we could evaluate what is in or outside of the workscope, or if we are within or outside of the budget,” continues Schaeuffele. “Things like that would not be possible if the quoting process were not part of the system.”

The CMS input - Flatirons

Additional IT system software, such as Flatirons Solutions CORENA Suite, comes in the form of a content management system (CMS) that interfaces with the MRO's software to generate work packs via controlling any modifications of the manufacturer's MPDs.

Paul Saunders, solutions manager at

Flatirons explains: “The Flatirons system incorporates a CMS and an interactive electronic technical publication (IETP) service. New revisions come out for the manufacturer's MPDs on a regular basis. The Flatirons MRO Solutions IT software has the tools for the reconciliation of updates against existing programmes, providing support within MRO systems for dealing with predictable and accurate quotations.”

“What a large part of the industry is still using for the quotation process consists of a legacy system of loads of spreadsheets, with dirty fingerprint documents still being swapped for manual records entry,” continues Saunders. “Although the process still works, it can be very difficult for MROs to change their ways and to invest in a product that can solve all of their problems. You, as a provider of M&E IT software, end up having to work in system ‘fixes’ of which the airline/MRO has to then build a business case for. The process needs to move forward and there is a lot of work going on within the standards bodies to assist in the standardisation of electronic information for easier information exchange.” (See *Connectivity applications in MRO, Aircraft Commerce, August/September 2015, page 76*).

“Any attempt to increase visibility and predictability of MH figures needs to

be seen as not just aiding production, but also assisting getting the next work in,” explains Saunders. “The big picture -- that maintenance inputs are the result of a bidding process -- is often forgotten. It can often be left to the commercial team to ‘cut and paste’ their way around the issues of the past when constructing the new quotes.”

Summary

In a sector of the aviation industry that is run on a mix of legacy systems, spreadsheets, and ERP software, the MRO's chosen M&E IT system and its use in the MRO tender process at the quoting stage can set up the foundation for invaluable information-gathering during the input.

In turn, the potential for building on digital interfaces for information exchange via the M&E IT systems in use between the airlines and MROs may even add value to the tender bid to be considered alongside bid price. This may assist the crafting of business cases for the modification and integration of legacy systems into more advanced M&E IT programmes. **AC**

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