

Western airlines have avoided using MROs in East Europe, India, China, The Asia Pacific & Latin America over concerns of quality, labour productivity and reliability. These maintenance providers are overcoming these perceptions and winning higher volumes of business.

Taking advantage of low-cost maintenance

Western airlines have increased their use of maintenance, repair and overhaul (MRO) facilities based in Eastern Europe, Africa, the Middle East, Latin America and the Asia Pacific. Most facilities in these regions have the advantage of offering lower labour rates than their Western counterparts. Nevertheless, until a few years ago, the perception was that MROs in these parts of the world were offering poorer quality and reliability, and Western airlines avoided using them. Attitudes have changed over the past five years, however, and Western airlines are taking advantage of the savings available to them from lower cost maintenance. The third-party MRO business is becoming a global one. What has brought about this change?

Labour rates vs quality

Airlines have to assess several factors when selecting an MRO provider for the heavier elements of aircraft maintenance. These include C and heavy airframe checks, refurbishment of aircraft interiors, stripping and repainting, engine maintenance, and overhauling heavy components. The attractiveness of the low labour rates offered by MRO facilities outside North America and Western Europe have often been offset, however, by concerns about poorer labour efficiency and quality.

The fully burdened labour rates charged by facilities first vary by geographical region and sub-region. The rates available depend on the market forces of supply and demand. In the period from 2002 to 2005, demand for maintenance was relatively weak because a large portion of the fleet comprised young aircraft, which had been delivered to replace retired ones, and were still in their maintenance 'honeymoon' period.

Since then demand has increased as these aircraft come due for their third and higher C checks or first heavy checks. The fleet has also continued to grow. David Stewart, principal at Aerostrategy, comments that labour rates have firmed by \$3-5 per MH in recent years as a result of increased demand for maintenance. The average rate available from a North American independent or airline-related MRO facility is \$48 per MH, while Western European maintenance providers offer rates of \$60 per MH. These rates are also offered by airlines' maintenance and engineering divisions, but are often lower than their actual in-house fully burdened labour rates.

Given that labour rates of \$35-45 per MH are available in Eastern Europe, Latin America, India, the Middle East and parts of the Asia Pacific, it is clear that airlines can make significant savings on the total cost of a check. A simple comparison between the total cost of labour for the two different labour rates illustrates this. A C8 check on an A320, for example, can consume about 20,000MH. A labour rate that is \$10-20 per MH lower can therefore save an operator \$200,000-400,000. A C8 check on an A340-300 consumes 40,000MH, and so could realise a saving of \$400,000-800,000.

Although it is clear that widebodies will benefit from a substantial theoretical saving, this must be considered against the cost of ferrying an aircraft to and from a facility that is further away.

Western airlines have regarded these potential savings as a false economy, however, because of the poorer quality of work carried out at such facilities. The first measure of quality is labour efficiency, for which non-Western MRO facilities have historically had a poor reputation.

Labour efficiency is basically a

measure of the time a mechanic requires to complete a job or task, as well as the percentage of hours that he or she is paid for that are used in productive work. If a mechanic only achieves six productive hours out of eight hours per day that he or she is paid for, compared to say seven productive hours achieved by a Western mechanic, and the mechanic takes 20-25% longer to perform a task, then labour efficiency can be only 60-70% that of a Western MRO provider. This can simply mean that the same check or workpackage can take 30-40% more MH to complete, thereby overriding any unit labour cost saving that might have been possible if the number of MH used to complete a job were comparable to a Western MRO.

Poorer labour efficiency leads to the second measure of quality: downtime to complete a check. This is an important issue for airlines, since extended downtime has several negative implications for cost. The first is reduced aircraft utilisation. The scope for extended downtime is larger for heavier checks, and it has been known for widebodies to overrun their heavy checks by two to four weeks longer than scheduled. Not only does this reduce the aircraft's utilisation, but the airline also has to acquire short-term capacity at high cost to prevent loss of revenue from missed operations. While extended downtimes do occur with aircraft undergoing checks in Western facilities, the negative consequences of long check times are well understood and several measures have been taken to minimise their occurrence, extent and potential damage. Persuading a Western airline to use an unknown facility will be hard for an MRO provider in Eastern Europe, Latin America, India or other parts of the world. Even when this is achieved an overdue check and serious delay caused by the MRO will damage its reputation



JAT Tehnika is one of several East European MROs that has emerged as a major maintenance provider. It has a wide range of capabilities, approvals from several countries and a long history of maintaining western aircraft.

advantage of the lower labour rates. The main reasons for this are: the major European airlines have their own maintenance and engineering departments; the costs of ferrying the aircraft are prohibitive; and there is a lack of maintenance slots at any particular major maintenance facility in North America. Moreover, airlines have always generally preferred to maintain most of their aircraft in the geographical region where they are located. The MRO market remained largely regional up until five years ago.

Facilities in parts of the world that offer cheaper maintenance have rates that are up to \$22 per MH lower than average European rates. Labour rates in Eastern Europe average \$45 per MH, making them \$15 per MH cheaper than their Western European counterparts. In some cases, labour rates in Europe are as high as \$90 per MH. Rates in the Middle East also average \$45 per MH, while average rates in Latin America, India and China are all lower at \$38 per MH. An average for facilities in the Asia Pacific is \$42 per MH.

The labour cost advantage that an MRO provider has must be maintained and widened. As described, the advantage of a basic lower MH rate can be reduced if labour efficiency and productivity are low. Poor labour efficiency and productivity go in hand with some measures of quality.

An MRO provider with a low basic labour cost can therefore enjoy a major advantage if it is able to raise its standards of labour efficiency, and productivity and quality of workmanship.

Global MRO market

Several MRO facilities have succeeded in winning business from North American and Western European airlines in recent years. These include VEM, Ameco Beijing, Lufthansa Technik Philippines, Aerostar Romania and Aeroman. In addition to this, a large number of facilities in several parts of the world have been bought by Western MROs or independent investors.

Aircraft Canada Technical Services (ACTS) bought 80% of Aeroman Taca, the maintenance and engineering arm of El Salvador carrier TACA.

Aerostar Romania is a long-standing

for a long time.

A third issue of quality is the level of workmanship on, and the reliability of, the aircraft following the maintenance visit. Concerns over this have dissuaded Western airlines for many years from using MROs that offered cheap labour rates.

Labour rates

As well as examining absolute labour rates that are available in the market, it is also prudent to examine the elements that determine the cost of burdened labour.

The first of these is the basic direct cost of labour paid to mechanics. This starts with the basic rate per hour paid, and has higher rates for overtime added, but also includes the employer's overheads for staff insurance, medical costs, meals and refreshments.

The basic rate per MH must be factored for productivity and efficiency of work. While the number of hours a mechanic works each day can easily be monitored using a check-in and check-out card system, it is hard to monitor the number of hours that a mechanic actually uses productively. Various MRO software and hardware products have become available that work with barcoded job cards so that mechanics can record the MH they use to complete each task. These all generally work by mechanics manually inputting the time they have spent performing task cards.

While it is still hard to monitor and record actual MH used for a specific task, MROs in many parts of the world have gained a reputation for using mechanics that take longer to complete the same tasks and workpackages than those working for Western maintenance

providers. Even a 10-15% increase in MH can effectively raise the basic labour rate of \$30 per MH paid to the mechanic up to \$33-35 per MH, which is closer to the labour rates charged by facilities in North America.

This still leaves other factors affecting labour productivity. Mechanics will use some of their time taking breaks, getting new job cards, searching through manuals, getting parts from the stores, and consulting with supervisors. The portion of a mechanic's time used for these functions is minimised at Western facilities, and it is generally regarded as being higher for MROs that have less experience than their Western counterparts.

This will further escalate the effective cost of maintenance. Facilities have to calculate their fully burdened cost of labour, and lower labour productivity will take the full cost of labour higher. A rate of \$35 per MH can be raised to \$38-40 when compared to a provider that achieves higher productivity.

MRO providers' burdened labour rates include the additional elements and overheads of supervisors, maintenance planning engineers, tooling, IT systems, lighting and heating, and the depreciation for facilities.

Labour rates are generally highest in Western Europe. These average \$60 per MH, although there is a lot of regional variation between the Scandinavian countries and Germany, and other parts of Europe such as Ireland, Spain and Portugal.

The North American market is cheaper with rates of \$48-50 per MH. In most cases, this difference does not entice European airlines to bring their aircraft to North American MRO providers to take



MROs in East Europe, Latin America and parts of the Asia Pacific have man-hour rates that are \$15-30 to lower than their western counterparts. The onus is still on non-western MROs to convince western airlines of levels of quality and reliable turnaround times.

Bulgarian Airlines, Hemus Air and Viaggio Air. This new facility will be established to provide base maintenance for A320 family aircraft, 737 Classics and the 737NG.

JAT Tehnika is the maintenance and engineering division of JAT, the national airline of the former Yugoslavia. JAT Tehnika has the advantage of having several decades of experience in the repair and overhaul of Western airframes, engines and components. This comes from JAT's operation of the 727, the DC-10-30 and the 737-300 from the mid-1980s, and of the ATR42/72.

JAT Tehnika's facilities at Belgrade, Serbia include base maintenance hangars, backshops for component repair and overhauls, and an engine and auxiliary power unit (APU) shop plus test cell that has a capability of up to 75,000lbs.

JAT Tehnika has capability for the above-mentioned aircraft types, and will add Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) capability for the 737NG in 2008. Dragan Gocic, director of marketing and contracts for JAT Tehnika explains that its main advantage is that it is geographically close to the European Union (EU), but has lower labour rates. "Our labour rates are 25-50% lower than those offered by the main MROs in Western Europe," claims Gocic. "We also have a long history of capability, expertise and experience on Western aircraft types. These are some of the reasons why we have Jet2.com from the UK and CSA Czech airlines as our customers. Others include CIT Leasing, and we are due to sign long-term agreements for 737 Classics and 737NGs.

"We see clear evidence of a growing trend towards outsourcing maintenance, and we are going deeper into Western Europe, especially targeting the smaller airlines to which we can provide engineering management as well as base maintenance," continues Gocic. "We also have S7 Airlines from Russia as one of our customers, and we will target more airlines in the CIS."

Aerostar Romania is another MRO in Eastern Europe that has a long aviation history. Aerostar Maintenance International Ltd (AMIL) is a joint venture between Aerostar Romania and the Aviation Group from the United Kingdom that provides the sales and marketing process for Aerostar

MRO provider in Romania which was originally a MiG fighter aircraft maintenance facility, but has become a 737 Classic and NG base maintenance provider in recent years.

Lufthansa Technik has acquired several facilities in regions that have attractive labour rates. These include Lufthansa Technik Philippines, Aeroplex Central Europe (ACE) in Hungary, and Ameco Beijing in China. Lufthansa Technik has also recently announced plans to build a new facility in Bulgaria.

ST Aerospace acquired the ex-Howard Air Force base near the Panama Canal for its new maintenance facility. In the meantime TAP Air Portugal acquired 90% of VEM, with bases in Rio de Janeiro and Porto Allegre in 2006.

Air France and KLM have announced plans to build a maintenance facility in India, and several other maintenance providers are considering similar strategies.

Airlines and independent MRO providers are not the only ones investing in large facilities outside North America and West Europe. Snecma Services is an original equipment manufacturer (OEM) related maintenance facility that has invested in facilities in China and the Asia Pacific, and is also investing in facilities in India and Central America. Boeing is also investing in facilities in India and China.

Analysis by Aerostrategy shows how the MRO market is becoming more globalised. First, high growth rates mean the fleet is forecast to continue to expand and increase by 8,000-9,000 units over the next ten years. With this fleet expansion the global MRO market will grow, although the annual growth rate in the heavy airframe maintenance market will not increase at the same annual

compound rates because of the increased check intervals and smaller workscopes that modern aircraft require.

The geographical shares of the MRO market will naturally change as the fleet expands and a higher percentage of it is operated by carriers in the Middle East, China, India and the Asia Pacific in the future. Aerostrategy's prediction, however, is that the percentage of maintenance that is outsourced will increase. While 40% of heavy airframe checks were outsourced in 2006, this is expected to grow to 60% in 2016. Rises of 10 percentage points in the share of maintenance that is outsourced are also expected for components and engines.

Aerostrategy's data shows that in 2006, the North American MRO market was worth \$1.6 billion. Of this, \$153 million was outsourced to China and the Asia Pacific, \$44 million to Latin America, \$33 million to Europe, and \$13 million to the Middle East. These amounts total about 25% of the North American market, indicating that there is a trend towards globalisation.

Eastern Europe

Countries in Eastern Europe and the former Soviet Union or Commonwealth of Independent States (CIS) provide several prime examples of MROs that have won outsourced maintenance business from other parts of the world, and are increasing their share. These include JAT Tehnika in Serbia, Aerostar Romania and ACE in Hungary. Lufthansa Technik's new maintenance operation in Sofia, Bulgaria will be established under a joint venture with the Bulgarian Aviation Group, which is a collection of airlines that includes



VEM is Latin America's biggest MRO. It has two main facilities in Rio de Janeiro and Porto Alegre, and has a total of 18 airframe maintenance bays. VEM has more than 30 approvals and airframe and has capability for all major Boeing types, the DC-10-30, the MD-11, and the A320 family.

and USAirways, and out of our four lines, two are dedicated to A320 base maintenance for USAirways and America West, while a third line is constantly taken up by jetBlue aircraft. The fourth line is used for maintenance on TACA's and Volaris's aircraft," continues Garcia. "We perform about 100 heavy maintenance visits per year, and this volume and our customers speak for themselves. We are adding another two base maintenance bays with a new hangar in 2008 because of the volume of work we are experiencing."

VEM is Latin America's largest MRO provider. Having had 90% of its shares bought from Varig by TAP Air Portugal, VEM is now an independent MRO provider. "We have two large facilities, one at Rio de Janeiro and one at Porto Alegre. We have 15 maintenance lines, comprising four widebody bays and 11 narrowbody bays. The Rio facility has four widebody and three narrowbody bays, while the Porto Alegre facility has eight narrowbody bays," says Nestor Koch, vice president of marketing and sales at VEM. "We have FAA, EASA and Brazilian approvals, as well as certifications from another 30 countries. We have capability for virtually all Boeing types, the DC-10, MD-11, A300 and A310. We are also working to get A330 and A340 approval, which we should get soon. We perform about 120 base checks per year."

VEM not only has the capability for a large number of aircraft types, but it is also a nose-to-tail maintenance provider, since it has an extensive component repair capability for these aircraft types in its backshops. This includes landing gears and APUs.

VEM's wide-ranging capability is matched by its wide customer base of more than 150 different airlines and aircraft lessors, including more than 20 US airlines and about 10 European customers "We have had a large number of customers for a long time, so proving our quality is not an issue for us with most airlines. We also benefit from a competitive labour rate, which is 15% lower than North American rates and 30-35% lower than European rates. [AC](#)

Maintenance.

"Romania is now part of the EU, and Aerostar was previously a MiG fighter aircraft manufacturer and maintenance facility in Romania. Aerostar became established as a civil aircraft maintenance facility about two and a half years ago," explains Steve Cash, sales and marketing director for AMIL. "The process of becoming a civil aircraft maintenance facility included getting the appropriate manuals, training and EASA approvals. We are now applying for FAA approval, which we expect to get by 2008. The facility has five hangar bays, and we are an exclusively 737 maintenance provider, with approvals for the Classics and NG aircraft. We have performed more than 60 C and heavy checks since getting the appropriate approvals.

"Although we had to go through a learning curve, Romania has a strong aviation history and we have attracted several customers from outside Eastern Europe," continues Cash. "These include Sky One from Turkey. Our furthest customer is Bellview from Nigeria. Our labour rates are 25-30% less than North American or Western European MRO rates. While this is an advantage, we still have to overcome customers' concerns over quality and turnaround times. We actually agree fixed prices for the majority of maintenance checks, which is based on an estimate from the workpackage. The downtime is also estimated, and our customers say our actual downtimes are acceptable. Their other main concerns are quality of workmanship and reliability of the aircraft following a maintenance check.

"Our facility has five bays for 737s, and we have about 200 shop floor mechanics," continues Cash. "We sub-

contract component repair and overhauls, but we are gradually building up our backshop capability and we will be building a new strip-and-paint hangar in 2008. Our current facilities allow us to do 30-35 C and D checks per year."

Latin America

Central and South America is another region that is experiencing an increased volume of outsourced MRO. Examples of major MROs that are winning business are Aeroman in El Salvador and VEM in Brazil.

Aeroman was the engineering and maintenance division of TACA Airlines. Air Canada Technical Services (ACTS) acquired 80% of Aeroman in February 2008 and it is now operated as an independent MRO.

Aeroman is a large facility that specialises in A320 family and 737 Classic and NG base maintenance. It has four base maintenance lines at its facility, and has won long-term contracts from jetBlue and USAirways from the US, and from the Mexican carrier Volaris.

Like all other Latin American facilities, Aeroman has a labour rate advantage, but Andres Garcia, commercial director at Aeroman, says that most of its contracts are fixed price agreements. "We were aware that we have to be competitive on the total number of MH for a specific contract, as well as focusing on providing competitive turn times and quality of workmanship," says Garcia. "We have several certificates of airworthiness, and Airbus also conducts surveys of our customers, so we are constantly being scrutinised. On average we get one audit per week.

"We have large contracts with jetBlue

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