

# Maintenance is a critical part of any airline operation business essay

[Environment](#), [Air](#)



Maintenance is a critical part of any airline operation. As an Air Operator Certificate (AOC) holder, an airline must be a Part M Continuing Airworthiness Management Organisation (CAMO) under European Aviation Safety Agency (EASA) regulations. Under these regulations, the airline is ultimately responsible for the maintenance and airworthiness of all its aircraft, therefore the decision to outsource such a task must be carefully considered in order to assess all the associated risk. An airline must not only decide what type of maintenance activities, if any, it may want to conduct in-house, but also decide between different maintenance providers for the activities it wishes to outsource. Different organisations will have different values and cultures, and an airline must pick an organisation it can trust with such responsibility.

When starting up a new airline, there is a large emphasis on cost. A lot of capital and resources will be needed to set up a maintenance facility, and a new start-up airline will need to focus its attention and resources on acquiring aircraft and developing routes. “ Airlines that outsource are able to focus on their core businesses and can reduce their fixed costs related to facilities, training and manpower”, says ST Aerospace president Chang Cheow Teck’ [1]. One can argue that maintenance is a core activity of an airline as a Part M organisation; however outsourcing of many activities is common for many airlines, particularly the low cost carriers and new start-up airlines. Generally it would be costly for an airline to set up its own maintenance centre; hence outsourcing it to an outside organisation that specialises in such activities is more economically viable.

When considering the task to be outsourced, the airline must evaluate whether it can develop the capabilities of conducting some task itself, or whether all activities will be provided by an external organisation. When analysing the maintenance of an aircraft, the airline must consider both line and base maintenance. Line maintenance includes general checks which may be carried out after each flight, daily or weekly. They do not generally pull the aircraft out of service for large amounts of time and can be carried out at the gate. Base maintenance is generally considered for much larger task, and involves the aircraft being out of operation for a larger length of time, in a hanger, whilst the maintenance is conducted.

The decision to outsource base, line or both types of maintenance activities must be carefully considered. In order to carry out any maintenance activity, the airline would need to be a Part 145 approved maintenance organisation for the type of aircraft they wish to operate. To carry out maintenance activities, investment will be needed for tools, equipment, labour, hanger and other overheads. Generally base maintenance would require much more investment in larger hangers, more labour, and more tools and equipment in order to carry out larger maintenance task, whereas line maintenance will require relatively less investment. Therefore it is far more common for airlines to outsource base maintenance to specialist repair centres, but keep line maintenance in-house.

In a report published by the American Federal Aviation Administration (FAA) on the decision of airlines to outsource their maintenance, it found that ' Cost savings was the motivating factor in the decision to outsource, a

decision which takes into consideration the personnel, training, and tools and test equipment necessary to complete the maintenance task.’ [2]

Figure 1: Typical Outsourced Activities. [2]

Figure 1 shows typical activities outsourced by airlines. It shows that large maintenance tasks are more commonly outsourced by airlines, most likely due to the high cost and expertise in labour required. Where line maintenance was outsourced, it was noted in the report that this was generally conducted at airports where the airline did not have a base. Airlines have tried to keep line maintenance in house where possible; however some external assistance is still required at times.

As a new start-up airline, however, will have limited capital when starting up, therefore these resources must be prioritised during the start up. Careful consideration must be made as to the cost benefit analysis and cash flow of the airline during its start up in order to assess whether the investment in a maintenance facility would be worthwhile, or whether outsourcing all activities would be more beneficial to this new carrier.

As well as considering the cost of outsourcing maintenance activities, careful consideration should also be given to the regulation surrounding the industry. Ultimately the airline, as the AOC holder, is responsible for the maintenance and airworthiness of all its aircraft as a Part M registered organisation. Despite the activity being outsourced, the airline is responsible for its aircraft; therefore serious trust is being placed on the maintenance

organisation. Such maintenance organisation must be Part 145 registered, with Part 66 licence personnel to certify any work carried out.

The maintenance industry is heavily regulated, as with the aviation industry as a whole. There are many barriers to overcome in order to become a certified company to ensure that the operations of the organisation comply with safety regulations. A maintenance organisation must prove to the appropriate authority that it meets such regulations, and the company procedures are in line with the required expectations.

To become a certified Part 145 organisation, the organisation must have suitable hangers to carry out the specified work, with appropriate tools and facilities. It must ensure its working environment is controlled to ensure that work is carried out in satisfactory conditions. It must specify approved management, and ensure appropriate levels of certified staff. It must plan production before carrying out work, ensuring that all the required staff, tools, equipment and facilities are in place in order to meet a required order.

The regulations specify careful control over the equipment and tools used in the organisation. It must be appropriately stocked at all times for its scheduled work, and used the specified tools and equipment unless permission is granted by the appropriate authority. All equipment should be calibrated as necessary, and records kept accordingly. All components used must be approved components, and recorded accordingly before used. The organisation must also keep accurate data of all maintenance activity which

will be fed back to the manufacturer in order to improve the overall safety of the world fleet.

The organisation is also responsible for insuring the company has a quality system in place. It must provide the appropriate authority with a Maintenance Organisation Exposition (MOE) outlining the company's structure, staffing, facilities, work scope, and quality systems [3]. It has become commonplace for all organisations in the aviation industry to be an ISO 9001 (International Standards Organisation) certified organisation, and many organisation will not work with non ISO 9001 certified company. This ensures that the company has a firm Quality Management System (QMS). QMS aims to ensure that the procedures of an organisation are efficient and effective, and the structures and framework of the organisation is well defined. An organisation ' needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system.' [4].

Although the airline may have outsourced its maintenance, it will still have responsibilities as a Part M certified company. The airline will be responsible for developing a maintenance program, based on the maintenance review board's report from the aircraft manufacturer. The maintenance program will detail all maintenance tasks for the aircraft, and the interval between such tasks. It will also be responsible for producing a reliability report based on the maintenance program in order to assess the reliability of various components. This data can then be fed back into the maintenance review

board report to improve the reliability of the entire world fleet. The airline will also be responsible for flight checks, as well as ensuring that the aircraft complies with any airworthiness directives issued by the relevant authorities. All work must be recorded appropriately as well as information regarding flights, technical faults, repairs, and maintenance activities. As the responsibility of the aircraft safety lies with the airline, they will be responsible to certify the aircraft is fit for purpose after any maintenance is carried out.

Another issue raised by the FAA was the complexity of communication channels between the regulators, airlines and maintenance providers.

Figure 2: Communication channels with in-house maintenance. [2]

Figure 3: Communication channels with outsourced maintenance. [2]

From figures 2 and 3, it can be seen that the communication channels are far more complicated with outsourced maintenance. There is a higher level of management required with outsourced maintenance, which can lead to higher levels of errors between organisations. The FAA is particularly concerned with the increased likelihood of errors. 'Introducing any interface between those who operate the aircraft and those who perform the maintenance must introduce an error potential, which is absent in in-house operations.' [2].

When outsourcing maintenance, safety is the most important factor for airline when deciding which organisation to trust. Airlines will also be looking

at cost and performance of the organisation. The airline will be looking at performance indicators such as Key Performance Indicators (KPI) and Safety Performance Indicators (SPI). KPI measure how well the organisation is running, and the on-time performance of the organisations. SPI measure the safety of the organisation and ' are defined as any measurement that is causally related to crashes or injuries, used in addition to a count of crashes or injuries, in order to indicate safety performance or understand the process that leads to accidents.' [5]. It measures how many incidences are related to the maintenance organisation, and is used as a way of assessing the safety of an organisation.

A key issue in the industry is the trade-off between conducting work safely, and timely. Maintenance organisations are under mass pressure from airlines to produce work quickly in order to increase the availability of the aircraft. There are financial penalties for the organisation for late deliveries; therefore the temptation is there for workers to cut corners. This is a large safety risk, and this must be managed by the organisation. Airlines will also be looking at SPI's as a way to ensure corners are not being cut, and there is not a poor safety record of the repair station. Therefore maintenance organisations are also under pressure to keep their safety record as high as possible.

A major issue arises between maintaining high KPI's and SPI's. Maintenance organisations have become a major industry within the aviation sector. Increasingly as airlines outsource, repair station are constantly competing for business. It becomes much more tempting for organisation to put ever more pressure on workers to work faster and safer, however rushing work will



adversely affect safety. The two generally cannot be achieved together. In today's money driven society, it is ever more tempting to hide the mistakes of the company, artificially improving the SPI of the company, making it look like a better organisation above its competitors. Although the practice is illegal, increase pressure for business will no doubt tempt managers to artificially improving the company's standings.

Figure 4: Methods used to identify potential maintenance providers. [2]

Figure 4 shows how airlines decide upon maintenance providers. It shows that airlines will generally look carefully at the organisation to understand the values and cultures of the organisation to see how the organisation operates. More commonly airlines are conducting on site visits and interviews with workers to understand how the organisation operates in order to assess if such an organisation is worthy of its business. "The first thing we look at is the culture of the company. And obviously when I talk about quality, it is what is the safety culture and can they do the job well. Quality, safety and experience is important." says JetBlue vice-president technical operations Dave Ramage' [1].

Figure 5: Workforce considerations for maintenance providers. [2]

Figure 5 shows what airlines look at when assessing the workforce of the maintenance provider. Generally the airlines look at all factors when looking at the workforce, however the numbers of certifying staff was the most important. This is due to the safety implications of non-certified technical

staff conducting work, and the lack of certifying staff having enough time to certify work conducted by non-certified technicians.

Another key factor is the location of such organisation. Increasingly, maintenance centres are being developed in countries with more relaxed laws, and cheaper wages. This makes these organisations more cost effective; however there is a major concern in today's society about outsourcing to foreign organisations. Many argue that, even though the organisation may be fully certified, the level of safety may not be as high as organisations in the homeland. Many fear that the authorities cannot monitor overseas companies as effectively, and the constant drive to compete with other organisations makes it easier for standards to slip. ' The problem with outsourcing, particularly to maintenance and repair shops located overseas, is that these shops are difficult to monitor. The FAA is required to inspect and monitor all of these on a regular basis through a system of checks and balances. According to the DOT's Inspector General, this system is flawed.'

[6]

Although most airlines choose to outsource part, if not all, of their maintenance, many of the large carriers have overtime developed their own maintenance facilities, and are now selling their services to other airlines. Lufthansa has developed a profitable maintenance centre in Lufthansa Technik, Lufthansa in-house MRO division, which receives 55% of its work from other airlines [1]. However Lufthansa has developed these facilities over several decades, and the industry has developed significantly since. “ We would not decide to do it again today. We are only able to deliver this

service for commercial airplanes due to the fact that we've done it over 50 years," says Lufthansa Technik's chairman [1]. It can be argued that innovative airlines can make a success of their maintenance facilities like Lufthansa has done, however it would require a brave airline with enough resources to take on the risk, and emerge into the market, which is hard to find in this money driven society.

The decision to outsource must be weighed based on several factors. Setting up a maintenance facility in-house requires a lot of investment, although it may be cheaper in the long run. Often it is more beneficial to the limited capital and poor cash flow of a start-up airline to outsource such activities to a specialist organisation. This does not mean the airline can outsource its responsibilities, and as such still needs specialist within its own organisation to develop coherent maintenance programs. Deciding on an organisation to trust with such activities entails extensive research into the workings, cultures, and policies of such organisations to ensure that not only is this organisation prompt in meeting deadlines, but can hand the aircraft back in a safe, airworthy condition. An airline can never neglect the importance of maintaining its aircraft, but it must ensure whatever decision is made, safety is never compromised.