Case 1 – Business Aircraft: Maintenance, Repair and Overhaul

NOTE: Text in italics represents the interviewer’s questions/comments and plain text represents the interviewee’s responses.

Introduction

You are working on a project for a European flagship carrier in the aviation sector, EuroCarrier. Their current business model is purely focused on passengers, offering Economy, Business and First class travel. They have been relatively successful in recent years and have funds available to invest. The company’s CEO has asked you to investigate entering the global MRO (Maintenance, Repair and Overhaul) market for business aircraft.

Question 1 – How would you go about structuring your analysis to this question?

First, I would need to understand what the MRO business is about and establish the size of the market and its potential growth. To do this, I would a) identify the different segments within the market, and b) use price/volume analysis to determine their relative size. Then, knowing the dominant segment, or segments, I would investigate what the market growth drivers are.

Second, I would want to investigate the intensity of competition in the market as this would indicate what the likely market shares and margins for EuroCarrier would be. From this, I would also get a good understanding of some of the potential risks.

Analysis of market size, growth and competitiveness will help me assess the attractiveness of the market. If it is an attractive market, then I would need to think of potential means to enter the market. If the market is not attractive, I would want to offer the CEO some alternative options for consideration.

Okay, this structure makes sense. What kind of products do you imagine are offered in the MRO segment?

Well, in terms of maintenance, I imagine they have to do an inspection of the plane before each flight, to check everything is okay. They would then have some kind of planned maintenance checks where they do a more detailed inspection. On the inside, they must maintain the seats and carpets pretty regularly. That's the “M” covered. “R” for repairs would be when the plane has been damaged or has suffered wear and tear and needs fixing, and I guess “O” for overhaul has something to do with a complete refit of the aircraft.

Yes, that’s most of the services offered. In industry terminology, there are three types of maintenance.

a) Line maintenance, which involves pre-flight checks
b) Light checks, which are inspections of major components every 4 months and
c) Heavy checks, in-depth inspections of all components and systems, which happen every three years

The next major revenue stream within maintenance is called interiors. One product is deep-cleans, which is cleaning and repair of carpets, seats and so on. The second product is similar to what you described as overhaul, which involves reconfiguring the interior layout of the aircraft. How frequently do you think they would do these interiors operations?

I imagine a good proxy to use is that they would conduct a deep clean whenever a plane undergoes a light check, and likewise they would undertake a modification while the plane was having a heavy
Example interview case study

check. Since they would have to take the plane out of service to conduct these checks, they would want to do as much as possible concurrently, to minimise overall down-time.

*That's a sensible assumption.*

The next thing to consider is the different market segments. The size of the aircraft would be the major driver in determining the price of these services. So I would use three segments: large, medium and small.

*The large and medium aircraft are called widebody and narrowbody business liners respectively, while the small aircraft are called business jets. This table summarises the current numbers of these aircraft flying, together with the manufacturer (A, B, C…):*

<table>
<thead>
<tr>
<th>Number of aircraft in service</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Liner - Widebody</td>
<td>9</td>
<td>47</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56</td>
</tr>
<tr>
<td>Business Liner - Narrowbody</td>
<td>23</td>
<td>171</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>194</td>
</tr>
<tr>
<td>Business Jet</td>
<td>0</td>
<td>0</td>
<td>1,548</td>
<td>1,124</td>
<td>96</td>
<td>1,174</td>
<td>3,942</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>218</td>
<td>1,548</td>
<td>1,124</td>
<td>96</td>
<td>1,174</td>
<td>4,192</td>
</tr>
</tbody>
</table>

The first thing that strikes me here is how numerically dominant the business jet is compared with the business liners. Assuming that you get four times as much revenue from the larger business liners, 80% of the market will still be from business jets. For that reason, I am going to focus on sizing the market for business jets.

Considering the maintenance and interiors services we discussed earlier, there are two drivers that I can think of. One is the labour charge and the second is the cost of materials. Are there any others?

*Well, there are obviously overhead costs to consider, but generally the client is billed for materials and labour, so these are good revenue drivers to assume. Before going further, let's just consider line maintenance, which is conducted before each flight. If I said this isn't likely to be a significant revenue stream, why might this be?*

If it's conducted before flight, then it will be done at whichever airport the aircraft is departing. Which means we'll only ever get "line maintenance" revenue when an aircraft comes to the airport where our business is based.

*In fact, many business jets actually have an onboard engineer, who conducts the line maintenance himself, so there's no need for an external provider.*

So that means the market consists of "light checks" and "deep cleans" happening every four months, together with "heavy checks" and "modifications" happening every three years.

Starting with labour prices, I would imagine you have to pay around USD 25 an hour for a trained aircraft engineer, then on top of this you'll have to incorporate things like training costs, indirect staff costs, utilities, etc. into the charge out rate. Overall, you would bill about USD 100 per hour. Actually, thinking of the services we're offering, for the deep clean you could probably use cheaper, lower skilled staff, so they would have a lower hourly rate.

*That's true. Deep cleaning labour has a fully-burdened cost of USD 60 per hour, whereas it's USD 120 for the other services. A light check requires 150 man-hours, a heavy check takes 1,200 man-hours, a deep clean is 100 man-hours and a modification needs 1,000 man-hours.*
Example interview case study

A quick set of calculations will now work out the labour revenue for each of them:

- **Light check:** Labour rate x man-hours = 120 x 150 = USD 18,000
- **Heavy check:** Labour rate x man-hours = 120 x 1,200 = USD 144,000
- **Deep clean:** Labour rate x man-hours = 60 x 100 = USD 6,000
- **Modification:** Labour rate x man-hours = 120 x 1,000 = USD 120,000

Of course there is also the materials to consider. I imagine they're a much more significant proportion of the revenue for heavy checks and modifications, where there would be lots of replacement parts. Whereas if you are doing a deep clean, the material needed are pretty insignificant.

*Okay, let's ignore the material cost for deep cleaning. As an industry benchmark, material revenues are only a tenth of the overall revenue for light checks but half of the overall revenue for heavy checks and modifications.*

So that means the materials represent USD 2,000 for a light check, USD 144,000 for each heavy check and USD 120,000 for every modification.

Hence the overall revenue for each type of service is:

- **Light check:** Labour revenue + materials revenue = 18,000 + 2,000 = USD 20,000
- **Heavy check:** Labour revenue + materials revenue = 144,000 + 144,000 = USD 288,000
- **Deep clean:** Labour revenue + materials revenue = 6,000 + 0 = USD 6,000
- **Modification:** Labour revenue + materials revenue = 120,000 + 120,000 = USD 240,000

There are three light checks and deep cleans each year, and a third of a heavy check and modification in the average business jets year. Therefore the average annual MRO revenue is:

$$[3 \times (20,000 + 6,000)] + [1/3 \times (288,000 + 240,000)] = USD 254,000$$

Okay, so rounding the numbers, if we have 4,000 business jets, each with an annual MRO bill of USD 0.25 m, then the annual value of the business jet MRO market is around USD 1 bn.

Very roughly speaking, if I use the previous assumption that a business liner generates 4 times as much revenue as a business jet given its larger size, that's USD 1 m spent on MRO each per year, or USD 0.25 bn for all 250 aircraft. Hence the overall market for MRO on business aircraft is USD 1.25 bn.

**Question 2 – Now that we’ve established the market size, let’s consider its growth potential. What would you use as a proxy for business jet MRO demand growth?**

Well, obviously demand growth for business jet MRO is going to be directly correlated to the demand for business jets. As business jets are generally used by senior individuals in companies and heads of state, I would imagine that GDP growth is a sensible proxy. This would indicate that demand will grow most strongly in regions such as Asia and the Middle East. However, I’ve also read that the number of high net worth individuals is increasing very rapidly. So maybe you need to put a multiplier on GDP to reflect this and get an accurate growth rate. Say somewhere between 1.5 and 2.5 times GDP.

*The actual forecast growth for business jet MRO demand is about 7%, so taking something in the middle at twice GDP growth will be equivalent to this. What specific factors might impact steady demand development?*

In times of recession, you would expect there would be a lot more pressure on demand, particularly for corporate users who need to control costs. So demand would follow a more cyclical pattern over
the periods of recession and growth. Of course, this is all volume demand. Price development will be affected by the competitive intensity of the market.

**Question 3 – Now seems a sensible time to assess the competitive intensity of the market then. There are currently five major MRO providers, each with a 20% market share.**

The industry seems pretty fragmented, with no real dominant company. This implies that the market place will be relatively competitive, putting some pressure on prices and therefore margins.

As for the customers, I imagine there are some companies that have a fleet of business jets that they charter out. If this is a sizeable operation, then they may already have internal MRO operations. Of course some business jets may be tied to long term contracts with existing MRO providers. However, I think the majority of customers would be open to using any MRO provider that offers the correct level of service, reliability and quality at the necessary pricing point.

Within the market, I can’t really imagine any direct substitutes and suppliers are likely to offer parts at a fixed aftermarket price. In addition, there are pretty high barriers to entry. You would need hanger facilities at an airport, highly trained personnel and a significant pool of spare parts, which would collectively require a lot of investment. So all these factors make this an attractive market to be established in, if you are able to overcome these barriers to entry.

To conclude, at an annual value of USD 1.25 bn and 7% volume growth rate, the business jet MRO market seems worthy of entry. The competitive situation indicates there will be no dominant player. However, with the high volume growth, you could rapidly improve market share organically. I would therefore recommend entering this market to the CEO.

**Question 4 – So, we’ve decided that this is a good market to enter. What are the potential entry methods available?**

Well, they could use the funds to set up their own business from scratch, or they could acquire an existing business. They could also form some kind of joint venture.

**What kind of companies might they form a joint venture with?**

The obvious choice would be with an existing MRO provider. They could use the funds to expand existing operations, product offering or geographic location. However, another option would be to form a joint venture with a business jet operator that already has a maintenance facility and is looking to expand. This would provide an initial captive market base for the business, guaranteeing an initial source of revenues. The downside of this is that margins are likely to be lower with the JV partner, due to the greater transparency they have on your costs.

Previously you mentioned either setting up or acquiring a business. What are the advantages and disadvantages of these options?

Setting up a business offers the highest risks and returns. You start with no technical skills in the sector, need to establish a base of operations and acquire market share from competitors. But you do get to keep 100% of your profits. If EuroCarrier has existing maintenance facilities, these could be used.

With acquiring, you already have an existing operation with existing customers. However here the issue is that there might not be any suitable companies available for acquisition, and even if there are, you need to ensure that you are not overpaying for them.
Example interview case study

*So if you had to recommend one of these options to the CEO, which would it be?*

I think I would go with one of the joint venture options – the one with an existing business jet operator. Here there is already an existing customer and skill base, so that right from the beginning the focus can be on expansion, rather than worrying about things such as gaining technical skills and setting up a base of operations. Unlike acquiring a company, there will be fewer issues with valuation, loss of senior management and integration. In addition, from the perspective of mitigating risk, a JV offers an easier exit route from the market, if and when required.