

Financial Management & Planning, Business Report

A-FRAME OEM PROJECT

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Background

Currently Reflexallen’s ADEV division produce A-frames and sell them primarily to the aftermarket. A-frames are fitted onto the back of HGV cab/tractor units, their function is to aid connection of the cab to the trailer. The A-frames are a welded steel frame, powder-coated and assembled with various sub components including; plugs, sockets, air coils and electrical cables. Volumes in the aftermarket division total around 200 hundred-unit sales per year.



Figure 1, A typical ADEV aftermarket A-frame including sub components.

There is an opportunity to supply directly to a major European based Original Equipment Manufacturer (OEM) at the vehicle build/assembly stage, volumes would be much higher (estimated 50,000 units per year). The OEM A-frame is also a bespoke design, therefore Reflexallen will need to manufacture to the customer specification rather than proposing the usual universal A-frame used in the aftermarket.

The new design plus the increase in volume will require significant changes and investment into the A-frame assembly area in order to meet the demand. This project will explore the options available to Reflexallen and the profitability of each option. Once the business case is assessed a proposal can be tabled internally and also to the OEM. At this initial stage broad assumptions will be made in terms of tooling, material and labour costs.



Figure 2, OEM A-frame without sub components fitted.

The Reflexallen proposal would remove activities 2 to 5 for the OEM (see figure 3), saving the OEM trackside space and reducing the number of operators required. Therefore, RA will be proposing an assembled A-frame at a competitive price with the advantages of labour cost reduction for the OEM.

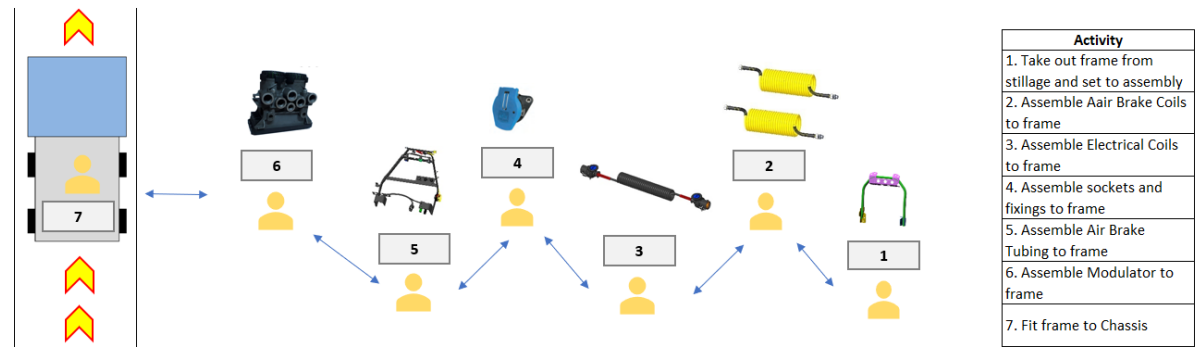


Figure 3, Process Flow at OEM factory (simplified).

Projects to be Assessed.

This project will review the following 2 options in order to determine the best business decision. The workings below will assume volume production from day 1, ignoring any ramp up or limited production run periods.

Option 1, Internal production of the A-frame and internal assembly of the sub components.

This option looks to produce the frame of the A-frame internally, for this significant investment is needed in machinery that can cut, fold, form, punch and drill tubular steel, CNC machinery will also be required to cut and form the steel plates that make up the leg bracketry and socket face plates. Welding equipment, operators and machinery would then be required to attach the weld nuts onto the brackets and the brackets then onto the tubular frame. Finally, a powder coating area would be required to spray the A-frame to the customers specification to avoid corrosion.

Once the A-frame is produced a separate investment would be required for the assembly line, this line will focus on assembling the various Reflexallen sub components, such as air lines, electrical lines, plugs, sockets and fixings onto the frame.

Option 2, External production of frame and internal assembly of sub-components.

This option more closely follows the current process in ADEV. The frame would be produced by an external supplier and delivered into Reflexallen (avoiding the significant floor space, expertise and machinery investment). An investment would still be required to for the sub component assembly line.

Analysis

The following will review the profitability of each option using financial analysis tools. The pros, cons and limitations of each tool will also be assessed. As (Fields, 2016) states; *“The emphasis is less on learning how to calculate the numbers and more on understanding how they impact business decisions”*. From this, the most suitable option from a business perspective can be determined.

Due to the nature of the project, tools such as capital rationing would not be viable in this instance. Both options will sell the A-frame at a similar target sales price (€170) in order for a fair side by side comparison and assumes consistent order of 50,000 units per annum.

Please also note that the following factors have also been included in the calculations (see attached file in the Appendix).

1. The customer expects price reductions based on productivity values adjustment, this means a Year on Year reduction in piece price for 5 years. Productivity reduction to follow 0% year 1, 1% year 2, 1.5% year 3, 2% years 4 & 5.
2. Although payback can be achieved within 1 year, the company would prefer it to be amortised over 3 years, the affects of this have been included in the yearly profitability calculations.
3. Raw Material clause, for option 1 the raw material costs will be excluded from the productivity adjustment calculation due to the volatility of the current market. The material costs will be reviewed bi-annually and prices adjusted accordingly, (these price adjustments will not be included in this analysis).

Payback Period

The Payback period for Option 1 is 3.38 months whereas for Option 2 it is 1.01 months. Based on this calculation alone Option 2 offer the fastest return to profit. However, this calculation does not consider the amount of investment or overall profitability over the 5-year period, it also ignores the future value of money. As (McLaney & Atrill, 2019) note, the payback period assumes payments and expenses come in and go out linearly however the reality tends to be much more fragmented, these assumptions are made to make the equations more straightforward. Overall, payback period offers a quick overview of the liquidity of the projects but ignores future trends and values.

Margin Per Unit

When looking at the margin per unit, “the selling price of one unit of goods minus the variable costs of making that unit” (UWorld, n.d.), the additional investment required for option 1 presents a compelling case. If both products are sold for the same price (€170), the profit margin for option 1 is 35% per unit whereas for option 2 it is 17% due to the costs of using external suppliers. Over the 5 years this leaves an average profit per unit of €42.8 for option 1 compared to €21.47 for option 2. Per year (assumed 50,000 unit sold) this results in a rounded margin of €2.1m for option 1 compared to €1.1m for option 2.

Accounting Rate of Return (ARR)

In terms of accounting rate of return (ARR) Option 2 offers the greatest % (3215% compared to 623%) thanks to its relatively low investment cost. As the margin per unit shows, option 1 offers almost double the profitability per unit, however its investment requires 620% more capital than option 2. ARR is based on the accounting profits and not the cash flow, it is also a relatively simple calculation that ignores cash flows and the future value of money (Davies, 2011). The salvage or residual value can also be difficult to gauge accurately.

Net Present Value (NPV)

When not accounting for the value of money over time, option 1 returns ~€10m whereas option 2 returns ~€5.25m. When the NPV over 5 years is taken into consideration it shows that option 1 would still return the greatest amount of cash flow and profitability, approx. €7.5m compared to €4.0m for option 2. The value of the returns does however reduce more over time with option 1 (25%) compared to option 2 (23.8%). As (Davies, 2011) notes, whilst NPV considers the value of money over time and can display the liquidity of projects its weaknesses are in that it is difficult to calculate or predict company cost of capital WACC over this period. NPV also does not consider the sizes of projects, however as this is looking at the same project deliverables from 2 different options for execution it is not as relevant in this instance.

Profitability Index (PI)

The Profitability Index takes the NPV of cash flows and divides it by the investment. If the value is greater than 1, then the project is profitable and should proceed (Wall Street Prep, 2022). When following this calculation, the PI for option 2 (41) is greater than option 1 (13). Like NPV, PI can be difficult to accurately define as it is based on WACC, however as a comparative tool it can show which project offers the greatest amount of profitability. Although option 2 returns roughly half the revenue of option 1, its investment costs are 6.2 times lower than option 1.

Internal Rate of Return (IRR)

The internal rate of return shows option 2 as most viable, 1178% compared to 353%. IRR reviews the liquidity of projects and considers the NPV, it doesn't allow clear comparison of differently sized projects, however that is not relevant in this instance. As (McLaney & Atrill, 2019) state, "ARR and IRR both suffer from the same problem. It is because both produce relative rates of return".

Therefore, comparisons should be taken with the relative project sizes taken into account if they do differ by a relatively large margin.

Summary	Option 1	Option 2
	Internal	External + Internal
Investment	€ 620,000.00	€ 100,000.00
Units P/A	50,000	50,000
Margin per unit (average over 5 years)	€ 42.80	€ 21.47
Gross Margin P/A (average over 5 years)	€ 2,140,111.38	€ 1,073,711.46
Payback Period (years)	0.28	0.08
Payback Period (months)	3.38	1.01
ARR	623%	3215%
NPV (5 years)	€ 7,509,069.03	€ 4,000,731.36
PI	13.11	41.01
IRR	353%	1178%

Table 1, Summary of Options 1 and 2.

Conclusion

Overall both options will prove to be profitable and beneficial to the business. Whereas option 1 offer more return there is also the greater risk involved with the initial investment. There are no guarantees that the lines including new machinery and new operators would be immediately up to speed to turn over the required number of frames at the expected quality and rate.

Option 2 offers good profitability whilst keeping some processes external and initial investment outlay lower. This reduces risk by using companies with previous expertise in the required areas. Option 2 also more closely follows the current process where the frame is produced externally and then assembled with Reflexallen products. As an initial starting point, its advantageous to follow this tried and tested route, albeit upscaled to meet the new demand. Investment requirements are minimised whilst profitability is still achieved, the Payback period is also shorter and the ARR, PO and IRR are all greater for option 2 than for option 1.

Once the assembly line for option 2 is successfully set up the company can re-review option 1 to decide if the investment and resources required are adequately compensated by the increase profitability per frame. The company could choose to bring processes in gradually, for instance buying forming equipment but still welding and powder coating externally. This would allow ADEV to gradually gain the competencies required to achieve option 1 whilst still spreading risk and cost over several months/years and having the contingency of the supply chain of option 2 in case of breakdown or unscheduled maintenance.

Its worth recognising that these figures are based on customer forecasts and current assumptions in terms of costs, as (Fridson, 2011) state *"the analyst cannot know with certainty what a company's future financial statements will look like. Neither are financial projection mere guesswork"*.

Therefore, as with any business decision the risk of future unknowns may affect the overall profitability. These figures should be used as a reasonably accurate assumption based on past trends and costs in order to act as a guide for decision making.

References

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Appendix

Excel below with the workings for the analysis in this report. Please note that the formulas could not be copied from one excel sheet to another, the attached sheets shows the workings but a separate excel sheet with the active formulas can also be shared.



Microsoft Excel
Macro-Enabled Wor