Securing Capital Equipment for Engineers
How to write a winning business case
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Abstract

Machines desired by engineers and technical managers are seen by financial decision makers as investments with inherent risk. By writing an effective business case which details how a desired piece of equipment will save the company money, the chance of purchase approval skyrockets.

Capital equipment

Capital equipment is a business term given to high cost, long term machinery that produces or increases production of goods, services, or products. Specifically, capital equipment exceeds $5,000 in cost and is planned for use longer than the span of one year.

Examples of capital equipment vary by industry. For a hospital, a new x-ray machine would be considered capital equipment. For engineers, capital equipment could range from rapid PCB prototyping machines to powerful semiconductor test equipment.

Oftentimes, potential users of a capital equipment unit understand the profound impact it would have on everyday operations. Unfortunately, convincing financial decision-makers to purchase capital equipment requires more than a “Gee whiz, this sure would be great!”

Due to the nature of the investment, capital equipment is considered a fixed asset and is not measured or accounted for in the same way as consumables or other short-term assets. Acquiring capital equipment generally requires budgetary consideration and purchase approval from upper-level management. Securing such approval can be a challenge.

Oftentimes, management needs a formal statement, built on financial data, which illustrates the value the capital equipment would have on the company’s bottom line. This is called a business case.

Writing a business case can be daunting. What to put in? What to leave out? What even is a business case? That’s where this paper comes in.

Outlined in the following pages is a step-by-step guide for crafting a winning business case to secure the capital equipment you know can assist daily operations and up productivity. From nailing the executive summary to compiling the right data for the financial analysis, all steps are important and require careful planning and due prudence. Let’s get right into it.

So what is a business case?

A business case is, at its most basic state, an appeal. Taking the form of a written proposal, it is an appeal that financially justifies any proposed plan, project, or in our case, purchase. In other words, if a project plan outlines how you are going to do something, a business case tells management why this is a road worth traveling.

A good business case must speak the approver’s language, and take into consideration management’s concerns about the purchase. These concerns are value driven, which is
understandable. After all, if a business is run financially amuck there will be no need to purchase capital equipment, as there will be no business.

For financial decision makers, the decision to purchase capital equipment is all about cost avoidance. In other words, a company will spend money to save money.

Therefore, your goal with the business case is to detail how the capital equipment can save your company money. The best way to do this is to write a business case with four main parts: the executive summary, the opportunity overview, the financial analysis, and the peripheral benefits.

Think of the business case as a four course meal. First served is an appetizer (executive summary), which is followed by a supplemental soup or salad (opportunity overview) that leads into the main course (financial analysis). The main course is the center of the meal and contains the “meat” of what will be consumed.

Finally, there may be a dessert (peripheral benefits). While not always necessary, the dessert is like an added bonus- something to leave a sweet taste in the diner’s mouth on their way out the door.

Any of the courses can make or break the eating experience. Lead with a flat appetizer, and you could lose the diner’s interest early on. Follow the world’s greatest soup with a weak main course, and the patron may wonder if he was better off going someplace else. However, if you build a complete, satisfying meal at all stages, then you will have won your audience over.

Likewise, building an effective business case will woo management, helping secure the capital equipment you desire. What follows is an analysis of the four “courses” that are the key elements in writing a thorough, winning business case.

The Executive Summary: The Appetizer

The first part of a business case is the executive summary. As an introduction, its purpose is greater than just previewing more substantial items later on in your case. Let me explain.

Using financial data as its backbone, the executive summary needs to present a problem, propose a solution (the capital equipment), and project the results of purchase in terms of value.

In the span of two short paragraphs much like the size of mine in this paper, you should be able to accomplish this.

Because it is the first item of your business case anyone will read, the executive summary can make or break your proposal. Like an appetizer to a meal or a cover letter to a résumé, an executive summary can either lose your audience or hook them.

Also like an appetizer or cover letter, you don’t want to overwhelm your reader with too much right off the bat. Above all, the executive summary needs to be concise. Stick to macro-level issues- there is plenty of room for details in the coming sections.

Try breaking down your executive summary into bullet points. There should be 3-5, which could look something like this:
• We are spending/losing ($X amount of $) on (proposed problem) per year
• Purchasing (proposed capital equipment) will solve this problem by reducing costs by ($X amount of $) per year
• Due to these and other factors outlined in this proposal, purchasing (proposed capital equipment) is a vital necessity for (name of your company)

It’s that simple. After you do this, flesh out your bullet points into two clear, well written paragraphs. Do this, and your executive summary will speak right to the minds of management.

Since you need to collect and analyze the financial data used to back up these claims before you present them, writing the complete executive summary will have to wait until the rest of your business case has been compiled.

As all portions of a meal are crafted around the main course, all aspects of your business case will be built around the financial analysis.

After the appetizer comes the second course of the meal, usually a soup or salad which complements the appetizer and sets the stage for the main course. In our case, it’s the opportunity overview.

The Opportunity Overview: The Soup/Salad

The underlying purpose of the opportunity overview is to assess your company’s status quo. In addition to expanding on the concerns outlined in the executive summary, the opportunity overview needs to show that the solution you are proposing is the right solution.

To do this, you need to include four elements in the opportunity overview. They are: the problem analysis, the recommended solution, alternatives explored, and potential risks.

Put together, these elements break down different levels of the decision-making process and provide a thorough, accessible look into what is hampering your company and what can be done to correct the situation. Let’s break them down.

• Problem analysis: Work with your financial department to find numbers that can easily be associated with current actions (or misactions, as they may be). Respectfully critique the status quo of your company’s operations to reinforce the point made in the executive summary that reads “We are spending/losing ($X amount of $) on (proposed problem) per year.”

• Recommended solution: This is the “opportunity” of the opportunity overview. Speaking in financial terms, here is where you identify the capital equipment as the solution to the problem you’ve outlined above. Going back to the executive summary, this is related to the bullet point, “Purchasing (proposed capital equipment) will solve this problem by reducing costs by ($X amount of $) per year.”

Develop themes between the problem overview and the recommended solution to really drive your points home.

• Alternatives explored: List other options considered in the research phase, and then briefly mention why they aren’t acceptable. In all cases, continuing with the status quo is the most obvious alternative. It is also therefore the easiest to dispel, since the first
section of the opportunity overview is aimed directly at doing so.

By listing alternatives, you show that you’ve done your homework, and that the capital equipment you are proposing is, without a doubt, the right solution to the problem.

- **Risks considered**: Every investment, capital equipment or otherwise, has at least some element of risk. The financial decision makers are aware of the presence of such risks- it’s part of their job. By acknowledging you have also taken risk into consideration, it shows foresight and improves the chances of purchase approval.

  The key here is to alleviate concerns about the risks associated with the investment by explaining why the risk is minimal when compared to the benefits the capital equipment will provide.

Remaining a concise synopsis, limit each section of the opportunity overview to a paragraph or two. This will leave plenty of room for our main course, the financial analysis.

**The Financial Analysis: The Main Course**

The financial analysis is all about detailing the value of the proposed capital equipment. Here you will compile the hard financial figures that back up the claims made in your executive summary and opportunity overview. However, it will take more than just acquiring arbitrary facts and figures- you need to find the right data and know what to do with it.

**In this section, financial examples will center on the value of shifting outsourced prototyping in-house.**

As the “main course,” putting together the financial analysis will take more work than any other section of your business case, but with a little determination, you will be able to gather all the proof needed to support your claims.

No matter the measure or machine, there are three components which determine the value of a capital equipment unit. They are: the financial benefit gained, the initial investment, and the operating costs of the machinery. The best way to understand these terms is by viewing them through the lens of inflow and outflow.

The financial benefit gained from the capital equipment is *inflow*- money coming into the company. In our case, this figure will represent the amount of money a company spends annually on outsourced prototyping.

Outsourced expenditures include any product costs, engineering charges, shipping and expediting fees, material costs, or taxes from services previously outsourced and now slated for production on the capital equipment.

The initial investment and operating costs of the machine are *outflow*- money leaving the company. The initial investment includes the price of the unit, shipping costs, and any other startup expenses involved with getting the machine operational.

The operating costs of the machine are also outflow expenditures, and include everything from maintenance contracts to the materials and consumables needed to produce the previously outsourced goods in-house.

Inflow and outflow numbers are key to the financial analysis in that they are the basic figures used to measure the value of the capital equipment. As the data directly associated with purchase approval, your goal is to show inflow exceeding outflow, resulting in a quick payback period and/or high return on investment (ROI).
For years, ROI was the most prevalent financial measure used, but recent economic conditions have vaulted the popularity of gauging value in terms of payback period. Work with your financial department to learn your company’s preferred measure of value.

So how do you go about gathering the inflow and outflow numbers? Let’s begin with inflow.

Again, make the members of the financial department your best friends throughout this process. They are keepers of all the data you need and can assist you in collecting and analyzing it.

You’ll need to go back 12 months to gain insight into how much your company is spending on outsourced products and services. From there, you’ll want to create cost categories to help you organize your data.

For example, sum each and every individual shipping cost and expediting fee into a total that includes all outsourced shipping and expediting expenses from your selected time period. This can be your “shipping” category.

Next, repeat this process for other cost categories such as product costs, engineering charges, and taxes. After finding the yearly averages for each category, add each average together into a total yearly sum for outsourced costs (Fig. 1).

This number represents how much your company spends on outsourcing each year, value now gained by switching to the proposed capital equipment.

From here, you must now determine the outflow expenses of the capital equipment, which include the initial investment of the unit and its operating costs.

The initial investment is the easiest of the inflow and outflow measures to calculate, since it is a one lump sum total and not an accumulated, yearly average.

To begin, total the price of the unit, the cost to ship it, and any associated startup charges. This could include training, tooling, or software costs involved with getting the machine operational (ancillary expenses). Work with the company selling the machine to acquire a quote on these costs and report them in your findings (Fig. 2).

You are almost done gathering data. All that’s left is to calculate the ongoing costs of keeping the machine in operation.

A capital equipment unit can have a variety of operating costs. To calculate these expenses, you will again need to work with the supplier of the unit, even more so than when putting together the components of the initial investment.

Operating costs can include everything from maintenance to the materials and consumables
needed to make the products previously outsourced. Working with the capital equipment supplier, estimate these costs in proportion with the numbers you found for the inflow savings.

As with the inflow savings, create annual average cost categories for each expense and then sum a yearly total (Fig. 3).

With the meat of your data now collected, it is time to put it all together in a comprehensive report that visualizes your findings and calculates the value of the machine.

The best way to do this is by charting your numbers in a table that brings that black and white data to life. Here’s what such a table could look like (Fig. 4).

<table>
<thead>
<tr>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial capital expense</td>
<td>-25,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outsourced expenses</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>In-house operating costs</td>
<td>-4,000</td>
<td>-4,000</td>
<td>-4,000</td>
<td>-4,000</td>
<td>-4,000</td>
</tr>
<tr>
<td>Yearly net savings</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
<td>11,000</td>
</tr>
<tr>
<td>Cumulative total</td>
<td>-25,000</td>
<td>-14,000</td>
<td>-3,000</td>
<td>8,000</td>
<td>19,000</td>
</tr>
</tbody>
</table>

The table has two purposes: it visualizes your findings to those reviewing them, and it organizes your data so you may easier calculate the measures that determine the value of the capital equipment. Once in this form, all it takes to calculate value is a little easy math.

Before you do anything, as seen in the table, project both the inflow savings and operating costs averages 5 years into the future.

As stated, the most basic measures of calculating value for a capital equipment investment are payback period and return on investment.

Payback period is a measure of time that calculates how long it will take before the value of the initial investment will be reached. At this point you have broken even and are, financially speaking, at the same spot you were before the purchase.

Return on investment, on the other hand, is a percentage that reflects how much financial value the equipment has returned on in relation to its initial value. In other words, has the machine paid for itself yet? If the initial investment is $25,000 you will reach 100% ROI once the machine has generated $50,000 in value.
To determine the payback period of your machine, divide the initial capital expense figure, in this case $25,000, by the yearly net value of the machine. The yearly net value is the annual savings less the yearly operating costs. In this case, the yearly net is $11,000. Dividing 25,000 by 11,000 reveals a payback period of 2.27 years, or 27 months. This is a solid number.

To calculate ROI, subtract the initial capital expense from the total net value for the 5 projected years, or in this case, $55,000. Divide this number by the same initial investment, and you have the 5 year ROI percentage for the capital equipment. In this case, it is 120%, an outstanding number.

As you’ll likely see from your own totals, adding capital equipment may require a significant initial investment, but before long it can pay for itself and save your company money.

How do you know if the financial results you have are good financial results? Well, a 5 year ROI of 100% is a winning number, and payback period around 24 months is solid. Therefore, the numbers as seen in our example provide good, if not great, justification for a capital equipment purchase.

It’s very possible your results will be better than in our example. However, don’t panic if they are not. Ideally, you will want to show a payback period of 12-24 months, but many companies accept payback up to 36 months so long as the annual return on investment is a good number.

As far as ROI goes, 10% annual ROI is usually the floor value accepted for capital equipment return. Therefore, if your results are at 15% or higher, feel confident about what you’re presenting.

It is important to understand that purchase approval can hinge on a variety of factors: the size of your company, its financial standing and overall culture, national and international economic conditions, and/or a host of other seen or unforeseen considerations.

It’s up to you to present your data in such an accessible, convincing manner that your business case becomes one of the deciding factors as well. Back up the statements made in your executive summary and opportunity overview and you’ll do this, emerging one step closer to securing the machine you desire.

To learn how much you could save by switching to in-house prototyping, contact sales@lpkfusa.com.

Note: It is vital to keep record of all your data and calculations. However, don’t include every single expense in the financial analysis: showing the results is enough. In addition to a value table, include the “category” totals similar to what is seen in Figures 1-3.

If you are good with charts, feel free to include a graph. While not necessary, graphs are visually appealing supporting materials that speak financial decision makers’ language.

After compiling the numbers, it’s possible you feel the payback period and/or ROI are not strong enough to win approval. In a sense, you feel your meal (business case) will leave the patron (management) wanting a little more. Fortunately, there are other means to present value than just showing the savings from shifting outsourced prototyping in-house.

The Peripheral Benefits: The Dessert

Like dessert, the peripheral benefits section is not always necessary. If your first go around on the financials reveals outstanding value, you may...
feel satisfied standing pat. However, if you feel your numbers aren’t quite up to snuff, what follows are some useful suggestions to strengthen your business case in a “cherry on top” sort of way.

Start by brainstorming ways the capital equipment can save your company money beyond shifting outsourced work in-house.

Perhaps the most beneficial aspect of in-house prototyping difficult to assign hard value to is the ability to test boards and make revisions before errors end up costing far more than they should. In other words, in-house prototyping not only saves money but prevents unforeseen losses.

Often times, certain components of an assembly, such as a chip or sensor, need to be tested in preparation for launch or to discover the source of errors. The ability to create a wide number of test fixtures to qualify components at a minutes notice not only prevents unnecessary expenditures of time and money, but is just not feasible when outsourcing PCB work.

If you feel it is important to augment your financial results with this type of information, when value is clear but difficult to quantify, then go ahead and add a peripheral benefits section following the financial analysis to do so.

Detail these additional benefits in a way that stresses value, even if you don’t have a precise figure to quote. Emphasize the end result of the benefit, whether it is loss prevention, increased productivity, or time saved.

Keep the peripheral benefits section succinct—your reader(s) have already digested a lot. Any benefits here are meant to supplement your case, not overwhelm it. Focus on value, and you will leave a sweet taste in management’s mind as your case is deliberated.

**Conclusion**

Writing a winning business case is similar to crafting a four course meal. Each of the four “courses” complements the others and adds something unique to the business case.

Define and solve a problem in the executive summary and opportunity overview, and you will seize management’s attention. Back up your claims up with measures of value in the financial analysis and peripheral benefits sections, and decision makers will see your case was not built on sand. Together, all four elements provide a basis as to “why” an investment is worth the risk.

Finally, while a well written business case does not guarantee purchase approval, a hastily thrown together report almost always guarantees purchase denial. Therefore, if you work diligently to present the right data in an organized, thoughtful manner, you will be much closer to the former than the latter.

Now get out there and do it. Before long, you will be unpacking the machine you worked so hard to secure!
Appendix

LPKF applications to the business case model

Now that you know how to build a winning business case, it is time to apply some of the advantages of prototyping PCBs with LPKF to the case model. With this valuable information, it will be easier to secure purchase approval for the LPKF machine that is right for you.

Opportunity Overview

Alternatives: The main alternative to prototyping with LPKF is to outsource prototyping to a board house. You already know the technical advantages of prototyping in-house, but again, let’s speak in financial terms.

If your workload is such that prototyping in-house would financially trounce outsourced prototyping, then you have already won this argument in the best way possible.

High custom design prices, expediting fees, and board revisions can all make prototyping via board house a costly habit. Feel free to point out one or two such costs if you know they hamper your company in a significant way.

Beyond numbers, if time is a big issue for your department, with deadlines frequently pushed back and progress stymied waiting on the board house, briefly mention here the speed advantage of prototyping in-house.

If your company outsources prototyping, a counter to the status quo could read something like this:

“While we could continue with outsourcing, prototyping PCBs in-house would not only reduce costs by (X amount of dollars) per year, but the time saved by prototyping in-house would allow for more efficient operations where time saved means increased productivity.”

Another alternative to prototyping with LPKF is to fabricate prototypes on another make of PCB milling machine. If management inquires about this, what follows is some useful information to know about LPKF.

As the in-house PCB prototyping leader who pioneered the technology, LPKF offers unmatched speed, precision, and accuracy, generating production quality prototypes with ease.

In addition, LPKF is the only company to offer a complete line of prototyping equipment so that you can go from bare board to fully assembled PCB in just one day. LPKF’s 90% retention rate reflects unparalleled customer satisfaction, especially given the volatile economic conditions of today.

Risks: The number one concern for management is, “When will the equipment pay for itself?” If your annual ROI is a high number then you can confidently ease management’s concerns about the financial investment by quoting that number here.

Because capital equipment is intended to be a long-term investment, product life is another common concern. Fortunately for you, LPKF prototyping machines are noted for their longevity. Many LPKF customers have used their machine(s) for well over a decade.

Additionally, LPKF machines require minimal upkeep. Many LPKF users perform their own maintenance, and LPKF’s lifetime product support quells any usage concerns.
Peripheral Benefits

The value of an LPKF machine goes beyond the savings from shifting outsourced prototyping in-house. One of the advantages of in-house prototyping is the speed factor, as having the ability to prototype PCBs in mere hours reaps more than just ticks off the clock. Here are a few key ways you can quantify the value of speed in your “dessert.”

In a recent survey distributed amongst all LPKF prototyping users, 86.5% stated their LPKF machine saves them 4 days or more per project. Of these, 58% reported 1 week or more saved per project.

That’s a lot of time, exemplified by a quote from Paul Clark of Honeywell C&K Systems, “Thanks to our LPKF [milling machine] we took a project that should have taken 10 weeks and did it in only week.”

If you know you can save a similar amount of time with any of your projects, mention it in the peripheral benefits section. This type of productivity is value any executive will appreciate.

If you bring this up to a response of, “Well, what are we going to do with all that extra time?” here is some more useful information to pass around. From the same survey, the top three returning factors of time saved reported by in-house prototyping users were greater project momentum, increased productivity, and quicker time-to-market results.

These advantages, while they may not be easy to link to a specific dollar amount, represent actual value gained from acquiring an LPKF machine. They also show why 82% of Microwave Journal readers named “PCB Prototype Milling Machine” as the most important tool to the design arsenal (and no, LPKF did not sponsor the poll).