



The Make vs. Buy Scenario: Reducing Total Cost and Improving Time to Market

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Introduction

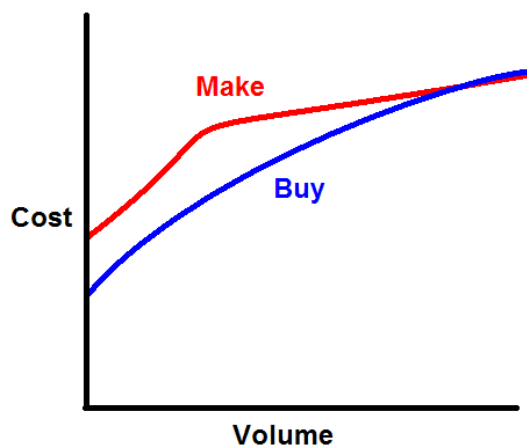
“Should we make our own positioners or should we buy an available solution?” This is the question management poses to engineers and project leaders when looking into a high-volume, single-axis positioning application. The answer involves understanding the true investment and risks behind the process of designing a new linear positioner.

Problem Statement & Overview

Many companies assume that building a linear positioner from scratch and producing the high volume needed for an application (100+ axes per year) is the lowest-priced option. Only after engineers are well into the development process, invested heavily in time and money, will it become apparent whether they made the most efficient and profitable decision.

At the most basic level, designing and building a positioner in-house versus buying an off-the-shelf solution is a function of volume and cost. At high-volume and low-overhead costs, the results when graphed would look something like Figure 1.

Figure 1: Make vs. Buy Cost



This simplistic comparison of volume and cost appears sensible and straightforward, with the initial costs for in-house production higher than buying, but leveling out over volume and time. It would seem that if you have the time, resources, product demand, and money, then in-house production offers the most control. No engineering decision is ever that easy and, realistically, companies must consider many factors, both from a technical and business standpoint, when choosing whether to make or buy.



The Make-vs.-Buy Decision Checklist

1. Materials

The Bill of Materials must be compiled, including hardware, bolts, fasteners, bearings, drive mechanism, motors, etc. You must look at all the materials needed to build the positioner in-house and find the suppliers to deliver the quantity and quality needed. This allows more accurate make versus buy cost comparisons.

2. Volume

The actual volume of positioners needed over a given period of time is another significant factor for cost comparison. At higher volumes, it may be worth the effort to produce the product in-house to ensure integration and quality and the difference in cost may be minimal. On the other hand, time and labor may not be a worthwhile trade-off if it detracts from the company's core competency. If the positioner is being used in a new product, market considerations and projected sales must be analyzed. Demand determines volume. Is your facility equipped to sustain production demands? Or is outsourcing a more efficient option?

3. Labor

Time to market and lead time concerns fit here. Time to market includes processes for designing and developing prototype components, as well as the months of work to build a reliable, validated, and verified positioner. In addition, machining time and assembly labor form obvious hurdles to streamlining production.

4. Support

Support costs could be grouped under labor, but need to be carefully considered and are often difficult to predict. When a unit fails, what will the implications be and how long will it take to repair or replace the unit?

5. Application

Whether the positioner operates in a lab instrument, a small diagnostic device, or a semiconductor application, it needs to integrate seamlessly. Deciding to make or buy can depend on finding a supplier with a solution compatible and customizable to your needs.

6. Expertise

Consider whether your time as an engineer is best spent designing positioners or focusing on your expertise. It is tempting to keep engineering in-house, but in some cases, partnering with a company that specializes in positioners reduces risks, costs, and frustration.

7. Risk of Ownership

This is one of the most important business considerations. When making a product, the company assumes every risk from concept to product launch. If the decision is to buy positioners, choosing a reputable supplier that has already thoroughly tested the product helps reduce this risk.

Some of the most critical considerations are often the most overlooked. Hidden costs can sidetrack in-house projects and delay time to market. Companies often consider design costs, but fail to recognize the increased inventory and higher overhead that may accumulate in order to keep lead time short. Labor costs occur anytime someone has to "touch" the order to expedite, track, or receive it, or to inventory, pick, or inspect. This may not seem significant, but when looking at



positioner assemblies that include up to 30 components, time quickly becomes a production concern.

Business risks are often optimistically estimated, but if not accurately calculated, they can spell disaster. To produce a reliable and safe product, a great deal of time needs to be spent early in the design process with concept feasibility and performance testing. A comprehensive testing method, such as Failure Mode and Effects Analysis (FMEA), helps companies analyze potential problems and anticipate what can go wrong. If such a plan is not used, many business risks are often overlooked.

So how can a company produce a cost-effective product in a timely manner without sacrificing quality while minimizing risk of ownership? Figure 2 shows considerations and levels needed for different aspects in each scenario.

Figure 2: Make vs. Buy Decision Factors

DECISION FACTORS	MAKE	BUY
Materials & Inventory	-	+
High Quantity	-	+
Labor Hours	-	+
Support	+/-	+/-
Time from concept to production	-	+
Development time	-	+
Customization	+	-
Integration	+	-
Expertise	-	+
Exposure to Risk	-	+
Process Control	+	-

(+) Advantage
 (-) Disadvantage

Choosing a Vendor

When weighing the options to go with a vendor, a different set of factors must be considered. By purchasing a positioning system, companies are often locked into a specific design, potentially leaving the overall instrument at the mercy of one component. This results in numerous challenges and headaches if the vendor is not top quality.



Additionally, customization may be limited when buying a standard solution, resulting in a positioner that does not fit seamlessly or match the exact specifications of the instrument, which drives up costs or reduces system value. Before deciding to use a vendor, there are several questions companies should be sure to ask.

1. **What is the vendor's experience in the positioning industry?**
Consider the quality of their product and review the tested performance results. Talk to the engineers, understand their level of expertise, and their ability to work with customers to manufacture a solution.
2. **What is their history with on-time delivery and return rates?**
3. **What level of customer support can they offer (global, regional, local)?**
Examine policies and talk to references about the service.
4. **Do they offer the breadth of products you need?**
Examine the product line. A vendor's solutions should demonstrate an understanding of customer needs and applications.
5. **Do they offer customization?**
A poorly purchased positioning system can cost more in transition hardware (plates, fasteners, alignment, etc.) than expected. If a vendor is capable of customizing the solution, companies can reduce the overall cost of the system even further by eliminating transition plates, custom motor kits, custom hardware, etc.
6. **How quickly can they develop a prototype for testing?**
Fast turnaround for testing early in the development cycle saves time and money.
7. **What presales materials are available?**
Are sizing and selection information available? Are CAD files downloadable?
8. **What post sales materials are available?**
A reliable company will offer a comprehensive list of documentation, as well as additional support and implementation services.

Partnership in Action

In an effort to continually reduce the overall cost of purchasing a solution, companies are designing lower-cost positioners with smaller payload capacities. Choosing a cost-effective, price-friendly positioner with reliability and performance is still a challenge.

Finding the right vendor should satisfy the technical and business needs outlined in the decision making process, particularly when it comes to lowering the total cost of ownership:

- A working partnership with a vendor's engineering staff and support network allows companies to create a system solution specific to their application, using the building blocks in the product portfolio.
- The flexibility of an automation supplier, allows products to be customized with differentiated features and shortens lead times.



- A good customer-vendor relationship can add value to applications, particularly if the vendor chooses to display applications at trade shows and in collateral material for added marketing exposure.

Decision Time

Faced with the make-vs.-buy dilemma and a tight deadline, engineers traditionally work around potential cost inflators or time calculations, since business economics have forced engineers to take on more projects. To help engineers flush out hidden costs, Parker created the Total Value Calculator (<http://www.parkermotion.com/PROmech/>). It provides estimates for overall design lead time and product expenses and allows the user to input engineering rates, labor rates, and time estimates for all associated tasks and calculate total costs, quantifying annual dollars and time. This tool can even include shipping costs, which add up when there are multiple components arriving from overseas or via expedited shipping methods.

Summary

It can be difficult for engineers to decide whether to make or buy an application solution. With the right considerations, the decision becomes easier to calculate and quantify. When choosing to make the product, companies using concept feasibility and performance testing early in the design process find the highest levels of success. When buying is the logical choice, companies must ensure that the vendor has the support network, engineering talent, and vast application experience to greatly reduce the total cost of ownership and decrease the exposure to risk of component failure.