



Topic: System integrators: When to automate

Automation is sexy, and the allure is only growing as it becomes more attainable and affordable. In the past, owning a sleek robot to assemble widgets at high speeds was as likely as having a Lamborghini. Today, automated solutions are as numerous and dependable as family sedans. Automation can provide a practical, robust and long-term solution. But how do you know when and where to upgrade?

A good process for determining this will include the following six steps:

1. Start with the Pie-in-the-sky

Start by making a list of ways you would automate if you had unlimited funds. The answer "everything" is not detailed enough. Really consider why you would automate, and what benefits the automation would bring. The "why" is especially important to the specification. Sometimes automation is viewed as the "easy" fix to problems that can and should be addressed other ways.

Think of the process like you would when specifying your dream car. Your wish list would be long and detailed. You would pick out everything from the custom intake to the finish on the dash. Treat your automation project the same way.

2. Find The How

System integrators and automation engineers are experts in what can be accomplished *reliably*, using today's technology and control systems. They can help guide you through the next step, which involves determining the actual monetary costs and benefits of automated solutions. You know what you need to automate; they know what the automation process requires.

3. Prove it

The third step is to take the most important pieces of your dream automation plan, and prove or disprove the long-term financial benefits. Make sure that you can justify the costs of each automation need. For example, does the speed and production volume of your packaging line justify an automated packing station? Will manual packing operations be more financially suitable and better matched to your production needs?

Another consideration is the complexity of what you are trying to automate. A large percentage of the automation costs are based on the number of tasks the system must perform. Conveying product and cases, for example, is one task that is easy and cheap to automate. Assembling and printing a multi-part package where the machine must: measure, rotate, count, index and assemble is going to be complex (and much more expensive to automate).

Machines are not human beings and must be programmed and designed. Anytime there is raw material variability, multi-axis coordination and placement involved, the machine must consistently handle these tasks with a high degree of reliability. How many moving parts are involved? How quickly must the task be performed? How many different packages or SKU's is the machine required to run? The answers to these questions can drive up the cost of automation.

When proving the value, use actual numbers. Try to assign a monetary amount to how much you can save vs. how much you will spend to automate. What is my ROI and does it meet my company's requirements? A big cost factor will be speed of the line or process – does the increase in the output (or products you can sell) justify the automation expense?

Factor in as many differences as you can determine: cost of interruptions to existing operations for automated upgrades, manual labor expenses, differences

in up-keep costs, spare part costs, operator/maintenance training costs, and scrap costs, for example. Use a long-term view when trying to measure these costs, and determine your automation “break-even” point. How long will your automated line have to run to pay for the automation upgrade?

A practical example

Always look for the greatest impact at the lowest cost when prioritizing when and where to automate. Determine the functions to automate, how difficult automation would be, and the costs vs. benefits. An example set of considerations for a packaging line is below:

Packaging Function	Average number of workers required for manual function	Degree of difficulty to automate?	Relative cost to automate?
Case Erection	2	Easy	Inexpensive
Bottle Orientation/Feed	4	Moderate	Expensive
Sprayer Insertion	6-8	Difficult	Expensive
Bundle Packing/Multipacks/Promotional Packaging	4-6	Difficult	Expensive
Case Packing	4	Moderate	Moderate
Taping	2	Easy	Inexpensive
Palletizing and Stretch Wrapping	4	Moderate	Expensive

You can prioritize automation tasks based on this chart. A few observations you might make:

- There are several low cost-to-automate functions that could quickly improve line speed. Case erection and case sealing are good examples. These options might be good first stage improvements.
- Consider where in the line these opportunities exist. Palletizing is an end-of-the-line function. It will not have much effect on product output in a given day. Do you need to automate it?
- Some of the more complicated tasks might not be worth automating yet. Bundle packing is a good example. Bundle packing involves bringing multiple products together, orienting the product, and shrinking a sleeve around the entire arrangement. This is going to be a complicated process to automate. Conversely, do you have the space required for a hand-pack station? Are workers able to hand-pack at a pace that meets your output requirements? Bundle packing is a mid-stream operation and could become the rate-limiter for the line.

- Some things are worth automating because of the increase in line-speed they afford. For example, filling or case packing can greatly increase speed. Does the increase in the number of products justify the expense of automating these pieces?

4. Determine your backbone

For anyone looking at an automated solution, there is an essential base level of controls that must exist to make the rest possible. What is the essential base of automation for your project? Determine the basic automated structures that must exist and consider those your backbone. An experienced integrator will determine these needs and provide room for future growth at a reasonable cost.

Many automation projects move forward in stages. The backbone automation is the first stage – and maybe the only automation work you do in year one. You can spread the costs of automation by establishing this base and adding on as you move forward. Assembly could stay manual while the controls backbone is installed and the conveying is automated. Develop a timeline for the major pieces, planning future upgrades.

5. Safety and Compliance

Automation is a great way to improve overall safety and compliance and generally brings a greater measure of reliability than human beings. Lock/Out tag/out systems, machine guards, light curtains and other safety measures can be easily added. Safety practices and compliance measures must be a part of your plan.

Depending on the safety measures you will be using, the financial implications of safety systems vary. This is an area where an automation consultant can help. Automation constantly changes, and your process might change your required safety standards.

Enzyme use in consumer products manufacturing is an example of how safety can impact an automation project. Enzymes used in manufacturing can become a problem when used in high amounts. Increasing the volume of your production with automation might mean that you must account for these elevated levels of enzymes. Is an HVAC system necessary? Do workers need to wear PPE? Are room modifications required?

Will automation make your process inherently more dangerous? Are there points on the line where automation is not safe? Strategically choosing to require an

operator to manually shut-off a valve is an example. This feature ensures that the line operator must physically check the production line in specified intervals. This is an additional check for safety.

Sometimes compliance is a reason to automate. Your industry may suddenly require companies to ensure the absence of metal or foreign objects present in products. Costs of compliance would be an operational cost, as you must comply to stay in business. In many cases, automation can often provide superior reliability and speed over manual solutions.

6. Reduce, review, revise

Go back over your entire plan. Automation is not a stand-alone element. Usually, there are: civil upgrades, logistical requirements, ergonomic considerations, equipment purchases and labor costs associated with it.

Are there areas outside of automation where costs can be reduced? For example, are stainless tanks required, or will plastic tanks meet your needs? Do your civil and mechanical upgrades match your automation stages in terms of scope and timing? Consider the whole project, not just the automation part. Reducing your civil and mechanical scope may allow more automation up-front.

Going through this entire thought process will help you develop a comprehensive automation strategy that considers costs, timeline and benefits. Much like car shopping, first separate the wants from the needs and take a practical look at what's possible. Once you decide to automate, it is a long-term commitment that will positively impact your business for years to come. Time invested up-front will result in a much better automation solution for you, and peace-of-mind moving forward.