The Benefits of Optimized System Design

In today's competitive marketplace, legacy systems continue to dominate. Companies hold on to the belief that traditional skills, practices and equipment are safer and less expensive in the short-term; over the long haul, however, these systems will need to be improved, updated, and eventually replaced.

In this white paper, we will look at why organizations continue to hold on to their legacy systems—and why optimized system design will prove to be a more efficient, cheaper, and safer option in almost every instance.

Holding On to Legacy Systems

For many companies, the primary appeal of legacy systems is cost: they're paid for; they're no longer costing the company money. And, as a capital investment, the company wants to ensure it's getting all the benefit it can from existing equipment before moving on to something new and unproven.

The appeal of this standpoint is obvious. Companies want to use their legacy process systems because it costs less for them to make their products today than when they first invested in their equipment. Over time these processes have been fully amortized and are now on the profit side of the balance sheet.

Combined with this is the idea that legacy systems are the industry standard for how processes should be carried out—they have a proven track record for success. Refineries use steel coke drums that may have been first installed in the 1960s; some refineries are still using emergency isolation valves that were installed in the 1950s! Both of these technologies are effective and efficient, even today. Sometimes, the old ways are indeed still the best, and sometimes an original design is the optimal design.

Legacy Systems Are No Longer Good Enough

In general terms, the problem with almost any legacy system is obsolescence. With some rare exceptions, what was technologically cutting edge in 1965 is not usually up to the task today.

Energy efficiency is now much greater than it was 50 years ago. The expense and regulatory standards for electric power production, jet fuel and gasoline refining today are far greater, as is the effort and expense that go into combating their environmental impact.

Global population growth, diminishing natural resources, along with state and government regulations are causing companies to accept that their legacy systems need to go through an upgrade or replacement process. Nowadays, being a good environmental corporate citizen is all part of doing business.

A car is a relatively simple system. But now, because buyers' requirements and expectations have changed, that system is becoming more complex. People want cars that meet energy-efficiency standards and environmental standards, and come with hi-tech additions such as dashboard screens and Wi-Fi. In the not-too-distant future, there will be self-driving cars. We have the technologies today that can allow us to make that leap.

How are companies going to manage that technology rush? Are they going to have the skills and experience to do it themselves? It seems unlikely. Instead, they will need experts who are always on the edge of technology

looking forward and finding the solutions. In short, they are going to require partners with extensive experience in optimized system design.

What Is Optimized System Design?

In its simplest terms, optimized system design **is a process of defining and developing systems to satisfy specified requirements of the user, either for product development or process control.**

System design is about integration; everything moving together to effectively produce a product that conforms to or exceeds customer expectations.

Too often in the design process, people are focused on only one component. System optimization considers the entire process: what it produces and where the shortcomings are holistically.

If you discuss design requirements with one member of a team, chances are they will have very specific needs. A process engineer looks at things very differently compared to someone working in the facilities section. So, when you ask a system design question, the answer really depends on which lens you're looking through. But in system design, what matters is the big picture of how everything will work together.

When designing a system, it is essential to create something that matches the requirements of all stakeholders. What Person A needs may not match what Person B requires, but in creating a process—say, a system that takes a known input and creates a desired output—it demands an understanding of many different processes. It is also essential to make the most complex processes as simple as they can be.

A good process will bring a higher level of reliability for whichever production process you are going to run. And an **optimized** process will give you higher accuracies of throughput or output that enables a company to maximize spend, sales, or whatever end result is most desirable.

Fundamental system design achieves a specified requirement; an optimized system should do more than that. An optimized system gives improvements in performance but it's also safer, more reliable, and its uptime is competitive to market averages.

Benefits of an Optimized System

An optimized system promises improvements in repeatability, reliability, consistency, and accuracy. Systems designed with a focus on these areas outperform systems designed with only a view to matching the lowest possible cost. It is the difference between offering a cheap system that may work to some level of acceptability for some period of time and a system that is going to provide dependable, long-term, and low-maintenance service.

Not focusing on repeatability, reliability, consistency, and accuracy in your system's design may leave your process unable to match your requirements in the future—and you'll soon find yourself wishing you had invested in something that was designed to truly serve your long-term needs.

Intelligent Systems

Optimized systems should be **intelligent**. In this context, intelligence refers to a degree of interconnectedness. Today's consumers are growing increasingly accustomed to all their devices being connected over an "Internet of things." In industry, we are seeing a similar movement toward automation of processes and self-monitoring.

Intelligent systems are equipped with technologies that allow for self-diagnostics, real-time measurement of process conditions, in-situ measurement of the process as it is taking place, and communication of the system's functionality.

In systems design, the inclusion of intelligent system components or functions makes the end design more capable of producing the desired product or process,

with a reduced need for human interaction in keeping the system on that path. It can also provide immediate recognition of a process that has fallen outside of the range of acceptability and prevent the continued production of product that would fail inspection, reducing waste/scrap and lost productivity.

In the oil and gas industry, intelligent systems allow quicker access to data, which translates to increased safety, accuracy, and revenue. Having an intelligent system means that data can be monitored remotely in real time. Resources can be allocated more efficiently to sites that are down.

Under the old system, workers would have to be physically present at these sites; now, automated equipment can do the work without anyone having to be there. An oil and gas production site is extremely hazardous, and accessing these sites often requires a lot of traveling, usually alone. Intelligent systems are safer and require less monitoring, and less time on the road.

An analog system cannot transmit data back to HQ or an operations facility. New solid-state measurement devices are much more accurate, and provide a great deal more predictability when it comes to anticipating outages or down time, trending downturns in production, or measuring the efficiency of the system as a whole. Finally, higher revenue will be realized due to the ability of the equipment to run longer and more efficiently over time.

Intelligent design also allows for improvements in predictive maintenance. For example, as a filter begins to plug up, pressure measurement on either side of the filter will identify the problem and send a notification. Predictive maintenance helps a system to self-diagnose through relatively simple implementations. It's a process that can be automated very easily, with notifications sent to the customer in a number of ways, including to cell phones or SCADA systems.

In the past, this kind of technology—if it existed at all—would be prohibitively expensive. Businesses looking to implement these systems today may be surprised by how relatively cheap they are and how easy they are to implement.

Safety

Optimized system designs boost safety by taking the best intentions of the originally designed system and converting it to twentieth-century standards.

A major difference between designs and optimized designs relates to the ability of the system to see inside itself. By constantly monitoring its own processes, the system knows before any human could if there's a problem. Compare a Model T Ford to a modern Mercedes. In the old days, you would crank the front of the shaft and get things going, then you would get in, and the Model T would hopefully get you where you're going. There weren't seatbelts or airbags, but most of the time you got there. The Mercedes has many safety features and can self-diagnose and let you know when there is a problem.

A basic level of safety like that is acceptable if you're a mom and pop shop. But if you're working in a refinery, a semiconductor facility, or an oil and gas field, then your system needs much more safety and protection built in from the beginning.

These facilities and plants need their systems to be up to date, safer, cleaner, and better prepared to meet the government standards of workplace and environmental safety. The systems now look inside of themselves to see diagnostics, to check if blends of materials are moving properly, at the right rate, at the right speed, in the right proportions, down to the molecular level.

A safe, optimized system design saves resources because it catches faults before they have a chance to affect production, saves money as people, materials, and facilities are better utilized, and can save lives with its built-in safety systems.

Partnering for Success

Optimized system design is a worthwhile process to go through, but it does present its fair share of challenges. The good news is that you don't have to go through it alone. Often, the most effective way of managing the system design process is to partner with an experienced company who has been through it all before.

If you're looking to find a partner to help implement an optimized system design, your first step should be to carefully review a company's case studies and recommendations. An ideal partner would have a repository of information available through marketing channels that shows their work history and experience.

Case studies demonstrate a company's ability to provide solutions that are valuable to a potential customer's specific needs. In this modern age, a company's online presence should be centered on demonstrating to customers how their history and track record reflects their core competencies.

When you evaluate a supplier to decide if they're the best fit for you, it is beneficial to meet them—have them visit your plant or factory to assess if they understand the needs and requirements of your industry and your business. When your potential partner leaves their meeting with you, they should be clear what your aims and aspirations are.

If you're looking to simply generate more revenue or increase safety or equipment up time, then your optimized system design should reflect those specific aspirations.

A design partner should always be available for a customer's query. Look at how quickly they answer your calls, how long it takes them to get back to you. If something happens on-site, what is their availability? How fast can they provide details and how fast can they put together drawings and designs?

Look at the size of the company—do they have the resources to service your needs whenever you might need them? If you're a large company, you don't want to risk a shutdown because your partner can't provide support in times of emergency.
You don't want to risk a system optimization effort by partnering with a company that doesn't have the resources or the wherewithal to fulfill what they're trying to do.

At Valin, we ensure we check all those boxes and go above and beyond to support our customers. From the initial design phase, to installation and beyond, our customers are supported by our dedicated account managers, engineers and by our internal support network. Our customers choose us because of our track record in doing exactly what they need to be done. Through our 40 years of experience and accumulated industry knowledge, we ensure that our customers get the information and support they need, when they need it.

Valin is the leading technical solutions provider for the energy and technology industries. For 40 years, Valin has offered personalized order management, onsite field support, comprehensive training, and applied expert engineering services utilizing automation, fluid management, precision measurement, process heating, filtration, and fluid power products.

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