5 TIPS TO DESIGN LIKE AN OPERATOR

GET THE MOST OUT OF YOUR FACILITY WHEN YOU APPROACH DESIGN FROM AN OPERATOR'S PERSPECTIVE

Imagine you've just finished the first months running your company's newly operational $100+ million industrial facility. The facility is located in a very competitive market and your team spent countless days calculating demand and designing a facility with the capacity to capture your fair share of that demand.

You're just about to head to lunch when a report crosses your desk that shows your closest competitor is moving four times the volume through their facility. After doing a bit of research, you discover, to your dismay, they also invested only one-third the capital your company invested! What's going on?

While the story is fictional, the volume and capital differences are real and are more common in other situations than they should be. What makes the difference?

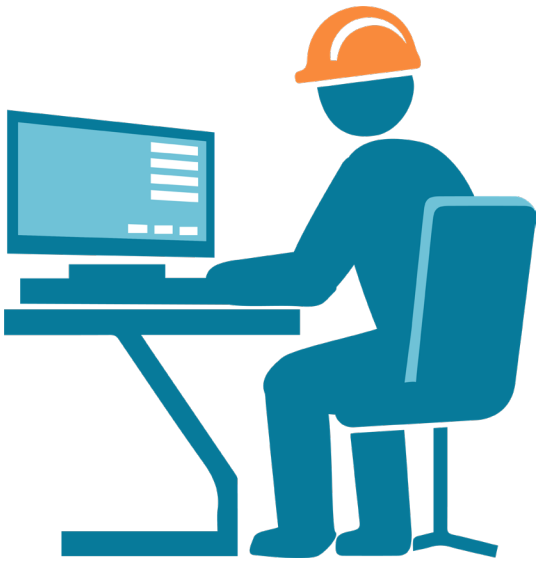
EXPERIENCE IS PARAMOUNT TO FACILITY SUCCESS

For site logistics and product movement facilities, experience is paramount to success. You may have a strong manufacturer and an experienced engineering firm, but if they have limited practical operational logistics experience, all too often you far exceed your original budget for a facility that fails to meet its intended output. Unfortunately, **simply throwing more money at the problem will not resolve its limitations**.

These challenges are not limited to any single industry and can manifest in various forms, but they generally produce similar results. And if you're in a hurry to "ride the wave" of an upcoming growth cycle, making quick decisions with limited information can have unintended consequences. **Challenges become critical stumbling blocks when we do not involve teams with the necessary expertise in critical fields to help make the project successful**.

CONSIDER THE OPERATOR'S PERSPECTIVE

A good starting point is simply considering the operator's perspective. Imagine you'll be the one working at the facility every day, possibly doing repetitive work around equipment that has the potential to harm and that relies not only on the systems at the facility to function as intended, but also for the outside supply chain to work efficiently. There are a lot of things that can complicate that situation, and many of them can be alleviated with good design—operational design.



THINK LIKE AN OPERATOR IN ALL PHASES

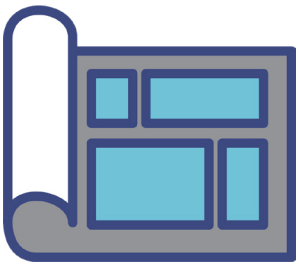
GET IT RIGHT—THE FIRST TIME

You'll get the most out of your facility when you approach design from an operator's perspective. Below are 5 tips to consider throughout the process.

1. Begin with the end in mind

What inputs are needed? What are the current and future production volumes? What design and infrastructure will support those volumes? Can you phase growth? What size of a team will this facility require, and are there seasonality or other production variability requirements to consider?

Whatever the considerations, **determine the desired output, then work to support that output**. In doing so, remember:



- Safety is critical! Some might argue safety is understood to be a requirement. For an operator, it must be an explicit goal.
- Many operational tasks are repetitive and can become routine. **Account for those routines**.
- Solutions that haven't worked in the past may work now if technology or simple physical tools have advanced.
- "Outside the fence" is just as critical as "inside the fence." Ensure your team has an "outside the fence" expert who understands the supply chain and what could go wrong to slow things down.

2. Consider modes of transportation

Your facility will operate optimally if you **select a location that provides easy access to what you'll utilize most frequently**, both inbound and outbound.

Consider the needs of each mode of transportation, including:

- Rail – Which railroad will service the location? Could it be dual served? How much track will you need for working capacity given the production levels?
- Truck – How do you maximize the load? What is the most efficient truck route? What is the best equipment to make loading and unloading most efficient?
- Pipe – Are there batching requirements downstream? What's the nomination process to get product on the pipeline? Where should you place pigging

stations to allow for maintenance? What additional automation can be installed by PLC or DCS systems?

- Barge/Vessel – What's the turn time on the vessel? How frequently will tides or currents impact turn time or the ability for vessels to depart your facility? How will that impact inventory levels? What size of berth is needed? What is the depth at the berth?

At times, selecting a prime location will suffice for balancing inbound and outbound transportation needs. Other times, upfront capital investment may improve access
to transportation and significantly reduce long-term operating expenses. Either way, accounting for logistics pitfalls (e.g. truck or rail delays) will help ensure operational success.

"It takes less time to do it right than it does to explain why you did it wrong." – Henry Wadsworth Longfellow

3. Focus on the needs of the facility

Oftentimes facility requirements can be met either by investing more capital or by increasing operating expenses. It's critical to understand the tradeoffs of each. **You'll maximize the use of your people and the efficiency of your facility if you consider both current and future needs and how the changes over time will impact your people on the ground**:

1. What are the facility's immediate needs? Will those needs change over time?
2. How can you maximize throughput capabilities long term?
3. Are there "safety stock" infrastructure and equipment needs to be accounted for?
4. What are the long-term implications of your team performing repetitive tasks vs. capital investment to minimize repetitive tasks?
5. Is it better to have a set of eyes on the process at regular intervals?

Weigh these considerations carefully and avoid a common pitfall: **Do not over (or under!) design or build**.

4. Balance production with logistics

Efficiencies don't always require a capital investment. In fact, sometimes a process change can enable throughput improvements. **Leverage the people who perform the type of work that will be happening at the facility as they may have some of the best ideas for improvements**. They've dealt with bad order railcars and inefficient supply chains, and likely have ideas on how to improve processes. They may also have seen ways to avoid these issues altogether.

Whatever you do, **don't overthink the solution**. Sometimes the easiest solution really is the best option!

5. Select the right partners

Very few companies are able to finance, design, build, and operate facilities and terminals. Finding a partner that is well-versed in all four areas will ensure you reach your desired results. Partners who understands all four areas will understand the trade-offs and be able to advise you well along the way.

Look for:

- Experts in facility design, construction, and operation
- Partners that provide the greatest delivered value—not just the lowest direct cost

Avoid:

- Companies that lack hands-on experience
- Companies that wash their hands of projects when construction is complete

SAVAGE: 75 YEARS OF PARTNERSHIP

With 75 years of experience, Savage has the knowledge, skills, and team to finance, design, build, and operate facilities the right way. Our work and our ability to **Design Like an Operator** speaks for itself.

Savage Vision & Legacy

SAVAGE BAKKEN TERMINAL: TRENTON, NORTH DAKOTA

In the oil and gas industry, crude oil recovery improvements made over the last decade through advancements in hydraulic fracturing processes unlocked significant new reserves. Most people in the industry are familiar with this technology, but fewer may be familiar with the details behind the logistics which facilitated growth, particularly in logistically-disconnected regions, such as North Dakota.

Savage's role in North Dakota's Bakken crude oil play was not unique. In fact, there were more than a dozen other companies that participated in the rapid development of more than a dozen crude-by-rail (CBR) terminals. In addition to developing a terminal in the Bakken, Savage operated numerous terminals in other regions. As we became more familiar with these facilitates across the United States and Canada, **it was clear which companies enlisted the help of operators and engineers that had direct experience with bulk liquid handling, and which companies had not**.

The facilities that had not leveraged that expertise often lacked critical operational design considerations and in a few cases, these oversights resulted in terminals being developed that could not handle the throughput volumes their ownership required.

For example, one terminal in the Bakken was designed to handle the same volume as Savage's Trenton, North Dakota terminal. But when it was brought online, it was only capable of delivering **less than one fourth of the daily throughput at nearly three times the project cost of Savage's investment**.

LESSONS LEARNED

Why was there such a discrepancy between the two terminals performance and cost? Many of the same contractors worked on both facilities. What could have been done differently? The answer is that the company and the engineering firm both knew their respective businesses and lines of engineering well, but they failed to enlist operational industry experts to provide information and guidance into their design process.

We can learn from the past and develop solutions to avoid similar pitfalls in the future.

HANDS-ON EXPERIENCE IS KEY

Savage looks at design through the experienced lens of someone who has been on the ground turning a wrench, operating a locomotive, driving a truck, switching a railcar, and loading a vessel. Those are the individuals with decades of collective experience working in both well-designed operations and perhaps more importantly in poorly-designed operations. Our experience provides the greatest knowledgebase of what works and what doesn't.

And while formal education is critical in many professions, **nothing can replace accompanying practical, hands-on experience**.

DESIGN LIKE AN OPERATOR WITH SAVAGE

Savage understands the challenges operators face because we operate facilities. We've provided transportation, logistics, and materials handling since 1946, and our experience means we can finance, design, build, and operate your facility to provide peak efficiency and maximum safety.

If you're planning to construct or retrofit a facility for improvement, talk to Savage—and **Design Like an Operator.**

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