

Small Modular Production Plants: The Zeton Advantage

Going Small

Small is beautiful! And for many production plants, it makes good business sense to think small because small often means safer and more cost efficient than larger, more rigid designs.

Environmental Advantages

HAZARDOUS CHEMICALS:

The production, transportation, and storage of hazardous chemicals is an expensive business with onerous governmental safety protocols and regulatory standards that must be met. But even with these regulations in place, it is impossible to guarantee compliance, and a single accident can have tremendous and ongoing costs—both human and monetary. The 2013 Lac-Mégantic disaster, for example, where a freight train carrying crude oil derailed and exploded in a small Québec town, continues to be in the news years after the event.¹ Because of these risks, companies have been considering the benefits of small-scale production plants scaled to meet demand that can be

located at the point of use with a substantial reduction in costs and storage and transportation safety risks. Zeton designed and fabricated just such a small-scale, in-situ fluorine production plant for Solvay in South Korea. The plant was designed to produce chemicals at the end-user's site, but also have the capacity to relocate with ease and minimal cost. Produced on a smart-scale model, the satellite plant was a self-contained unit with production equipment, provisions for operator, control, and electrical rooms, and space for an expansion to include a small laboratory.

¹"Lac-Mégantic Residents Still Suffering 2 Years After Deadly Derailment." CBC.ca, February 6, 2016.



STRANDED RESERVES:

Much of the world's supply of valuable energy resources have remained untouched because of the economic and environmental challenges associated with processing and transporting material to the point of use. It is estimated, for example, that 30% to 60% of the world's natural gas reserves are "stranded," meaning they are located away from processing infrastructure or remote from market demand.

However, as low-cost gas reserves produced by conventional methods become depleted, these smaller reserves have become of greater interest to business. Using small-

scale production plants installed at the source, stranded gas can be converted into synthetic crude. Once liquefied, this high-value product can then be transported using existing pipelines and infrastructure, eliminating the high costs associated with gas transportation. As an added value, the small-scale plant can be relocated to another site once a reserve is depleted.

Similarly, associated gas, a by-product of oil production, can benefit from flexible, dedicated, small-scale plants. Associate gas is defined by its creation in facilities where there is no infrastructure nearby to develop it. Typically, it is flared, vented, or re-

injected back into the gas reserve at a high cost and with significant impact on the environment. Zeton worked with Compact GTL to tackle this issue and developed a plant that was a step towards a commercial solution for low-cost, small-scale, associated gas-to-synthetic oil plants to be located at the well. The technology featured a compact, modular plant that incorporated multiple reactors connected in parallel, providing a flexible and robust solution for varying gas feed applications. In this way, an opportunity was met to monetize associated gases into high-value end products while also addressing the environmental concerns of conventional practices.

Economic Advantages

REDUCING RISKS:

Small production plants have several advantages over large production facilities in new or developing markets. There is reduced commercial risk because although the cost-per-unit output of the first small-scale plant may be high, it will have a much lower investment entry point than a full-scale plant and a reduced lag between investment and revenue generation. Further, if the market volume is seen to have potential but also some level of uncertainty, small-scale units help mitigate the risk.

Smaller units have the ability to pivot in the direction of market change, either adding additional modules to meet increased demand or modifying an existing facility in response to new technology or market initiatives.

ECONOMIES OF SCALE:

In business, unit costs of production are usually expected to decrease with an increase in facility size. While this may hold true for the creation of the latest widget in the marketplace, it does not always hold true for chemical production plants. If the

technology is not mature, the process will need ongoing modifications and advancements. If the marketplace is volatile, there will need to be operational flexibility. If the feedstock is limited or isolated, there will need to be creative solutions to continue to meet demand. With these considerations, there may not be an economy of scale upward but, instead, one that favours smaller conversion plants that offer the flexibility to keep ahead of the market.

Going Modular

More than ever before, modularization is becoming the optimum choice for projects that are looking for an increase in schedule efficiency and tighter control of costs and quality.

WORKSITE SAFETY:

Modularization means that process plants can be fabricated at an off-site location with controlled, indoor conditions where materials can be

delivered and securely stored to prevent damage or deterioration from moisture and the elements. An indoor environment also means a more stable schedule and safer worksite,

as final site locations not only have weather-related delays but are often classified as hazardous, requiring permits and shut-downs for electrical wiring and welding. These locations

also tend to be crowded and have existing infrastructure and process units in operation, increasing the potential for damage and disruption to existing equipment and pipelines during onsite construction work. For a hazardous chemical site or a gas reserve, any potential leakage of toxic or flammable material could be catastrophic.

SCHEDULE EFFICIENCY:

Modular plants provide a schedule advantage over site constructions where civil upgrade work is completed alongside the fabrication of the process plant. A swift turnaround period from concept to the finished product can be critical for emerging new markets or for customers who have time-to-market pressures. And building multiple small-scale production units in a modularized construction allows plants to be rolled out quickly to meet growing output requirements without sacrificing quality and consistency. The Hydrodec Group was able to benefit from Zeton's ability to rapidly replicate their processing plants to the standards they needed. After successfully designing Hydrodec's initial system for a two-train transformer oil processing plant, Zeton was able to fulfil a subsequent

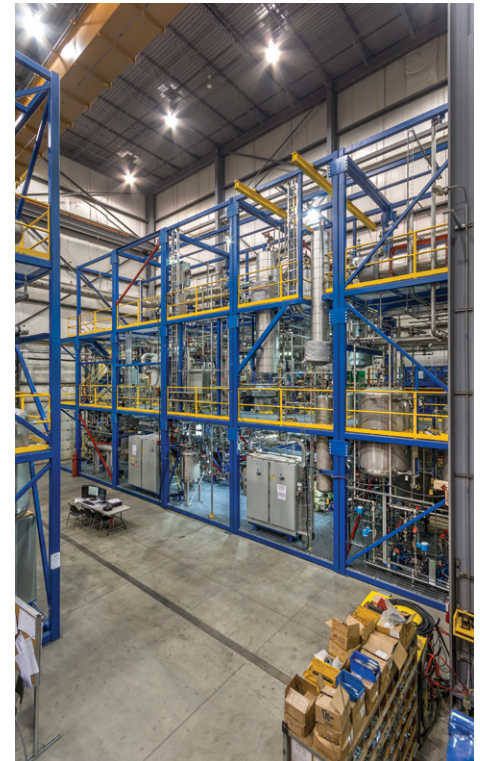
order for four additional reactor train modules in a timely manner by building from the initial design and fabricating multiple units in parallel. The order came in under budget and on time, and because of the benefits of repeat production, there were significant savings for Hydrodec in both the schedule and the engineering costs compared to the first plant.

PLUG-AND-PLAY DESIGN:

With significant operation and maintenance activities now automated, the labour requirement for multiple, modular, small-scale units operating in parallel located in a centralized facility is essentially equal to operating one large-scale facility. And where small-scale plants operate in a network of geographically dispersed units, information technology allows data to be shared via the Internet through a centralized control centre.

OPTIMAL LOCATIONS:

Skid-mounted process units mean that plants can be located near the source of supply or at the point of use with the ability to be relocated as needed. These discreet units also mean that production can be limited to demand requirements, mitigating



or even eliminating many of the risks associated with the production, storage, and transportation of hazardous chemicals. Notably, distributed plants can be built with slight variations between them to account for the characteristics of the feed or end-product requirements, making modular, small-scale production plants a flexible partner for unique and underutilized production opportunities.

The Zeton Advantage

Since 1986, Zeton has performed as a premiere design-build supplier of modular plants, helping to bring to life new ideas for small-scale production applications.

DESIGN-BUILD:

Detailed designs as well as the fabrication of process modules are all completed in-house, which means a high degree of control over plant cost, quality, and delivery schedule, as well as increased communication efficiency.

QUALITY ASSURANCE:

Every small-scale build is subject to stringent quality assurance and control programs, in strict accordance with ISO 9001:2008, to deliver high quality and reliable end products. From prototype to production, Zeton's experienced

engineers and fabrication team help clients bring their process technology to market with lower costs, faster schedules, and an unrivaled standard of quality.



Contact Zeton to find out how our proven design build approach to small-scale modular production plants can transform your business.
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