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A Process of Improvement: Transcending Tradeoffs in Process Manufacturing

Process manufacturing is an impressively diverse branch of the industry. It covers everything from cupcakes to advanced pharmaceuticals, but every type of process manufacturing share certain characteristics—and challenges.

Denver, Colo. (November 1, 2021) – You can divide all of manufacturing into two parts, says Andrew Ahrendt, PCL’s national director of manufacturing. There’s discrete manufacturing, which produces things that can be disassembled back into their parts such as cars or electronics.

“If the final product can’t be broken down into parts, it’s process manufacturing,” Ahrendt explains, whether the result is tubes of toothpaste or pharmaceutical products.

All types of process manufacturing also follow the same high-level workflow, Ahrendt says.

“The raw ingredients move out of storage and into production, where there’s mixing and chemical and/or thermal reaction— heating or cooling,” he says. “Then after it’s processed, it’s packaged, usually by pumping/ filling or extrusion, and shipped.” Extrusion is the process by which base metal is forced through a shaped die to create objects of a specific shape and size. All this is done under strict cGMP practices and to governmental regulations such as FDA or Health Canada.

While the details vary a great deal, this basic production flow covers the manufacture of everything from pharmaceuticals to lipstick—which can create efficiencies for forward-thinking manufacturers.

Where Flexibility Starts with Open Designs

Many manufacturing facilities of a certain age are full of custom floors, curbs, and equipment bays. These are designed to accommodate very specific process needs, says Ahrendt, but this can present a problem if a manufacturer ever needs to change their process for any reason.

“Say your customer line changes or you want to grow due to expansion, or you figure out a more efficient production method,” says Ahrendt. “Those custom plant designs make it difficult to flex and swap equipment out.”

To help clients futureproof their facilities and offer the most flexibility after construction, PCL builds facility flexibility into the original designs – open, wide-bay column spacing with flat floors facilitates easier equipment changeouts or updates needed when the market changes.



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"The key features are a flat, heavy slab of concrete in the middle of the plant, high receiving bays and wide columns," says Ahrendt. "These are supported by big utility loops like hot water, steam, domestic water, and compressed air. By adding valving and blank-offs into the original utility service loops, this facilitates easier equipment install and hook-ups without costly shutdowns."

"Then within that production area, if changes are needed, swapping the equipment is much easier. Basically, it's plug-and-play as the process changes as long as the central plant has the capacity."

Value By Design

The world of process manufacturing is a capital-intensive one, says Ahrendt, with strong pressure on margins and budgets. That can make it ill-suited to conventional building design practices, which usually finalize a building's design before aligning with the budget for construction.

"The building is designed, then priced—if it's too high, it goes back to design. Many-times late drastic changes are made to meet the budget at the risk of the process...soon it doesn't meet the technical requirements or what your wanted in the first place," he says.

"This legacy approach to design and construction is a fundamentally reactive process."

PCL can help clients take a more proactive approach to this problem through target value design.

"This turns the old process on its head," says Ahrendt. "We start by finalizing the budget, the schedule and the cost. Then we manage the design and construction to hit that target."

While target value design doesn't remove all budgetary pressure on a project, it can provide more certainty and less risk for clients early in the project to allow clients to make decisions and changes, which is also useful in other areas of process manufacturing. PCL calls this '*art of the start*' cost modeling—how to get really smart early in the project to guide decision-making and meet ROI.

Plant Construction & Production Start-up Success

Process manufacturing is also intensely competitive.

"Once somebody develops an innovation or improvement, it's not long before someone else knows about it," says Ahrendt. "Clients want to capture that initial market and keep their competitive advantage."

PCL's strongest asset to address this problem, he says, is also PCL's biggest asset across the organization — it's our people.

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"Our people make a huge difference here," he says. "Our teams have the knowledge, experience and discretion to help process manufacturing clients move forward with confidence and security trusting we hold your trade secrets as our own."

Whether it's a new way to process life science foundational materials, or a new extrusion head or cooling process, our teams guard your trade secrets intensely.

Once we identify and detail designs, construction execution begins with alignment across all stakeholders. From early site mobilization and onboarding sub-trade partners, our construction teams work across disciplines, reducing silos and increasing collaboration. From permitting, entitlements, underground utility installations, equipment foundations, facility, piping and E&IC, construction is an inherently fluid process. Our construction teams take the uncertainty out of the process through transparency and risk mitigation.

Additionally, we adopt your preferred client delivery or production start-up and build project plans, schedules, and procurement strategies you can bank on.

Each start-up is different, dependent upon the process. Our engineers, superintendents and coordinators have the knowledge and dedication to assure your production lines are commissioned and validated to meet your goals.

"Our people know what it takes for process manufacturing success," says Ahrendt.

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About PCL Construction

PCL is a group of independent construction companies that carries out work across the United States, Canada, the Caribbean, and in Australia. These diverse operations in the civil infrastructure, heavy industrial, and buildings markets are supported by a strategic presence in more than 30 major centers. Together, these companies have an annual construction volume of more than \$6 billion, making PCL one of the largest contracting organizations in North America. Watch us build at [PCL.com](https://www.pcl.com).

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