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Efficiency Included

Good facility design and plant layout can incorporate flexibility, room for growth and streamlined production into a new bakery.

by Charlotte Atchley

Bakers strive to make their production lines as efficient and flexible as possible. Efficient and flexible production lines mean more capacity, a variety of products and more opportunity for growth. And growth means expansion will eventually be necessary. To accommodate these needs, bakers need facility design that can cultivate those goals, all while saving money, of course.

“They’re always looking at cost,” said Greg Carr, director of project planning for baking and snack, The Austin Co. “They’re looking at trying to maximize or optimize the production of the facility. They want to look at the aspects of the design that will help optimize the throughput while considering the lowest cost.”

Incorporating automation often hits all of these points. “Our consensus is when possible, moving toward automation to reduce cost and increase efficiencies is the first step,” said Todd Allsup, vice-president, Stellar.

Working with facility design engineers, bakers can make the most of their automated or semi-automated lines for streamlined and efficient production, built-in flexibility, and prepped for future expansions.

As straight as possible

First things first, a project charter provides bakers and their engineering team with a clear overhead picture of the facility, its needs and its future.

“You’re taking an integrated view of the overall project,”

Mr. Allsup said. “Project charter is the specific objective the project, and it would be supported by a manufacturing strategy.” Without a project charter, bakers can miss key information such as the downstream and upstream impacts of particular equipment. “It also opens potential for misaligned line speeds and throughputs and bottlenecks,” he said. These are the enemies of efficient bakeries.

Avoiding bottlenecks is key to improving efficiencies, and employing facility engineers can help. “When you get a little bit further, it’s important you look at your mass balance equations for your SKUs, understand the process diagrams, and understand the flow of people through a plant,” Mr. Allsup said. “If they aren’t considered, they can create bottlenecks.”

Preventing backups from happening in the first place would be ideal, and the layout of the building and production floor is a key way to do that. “Straight line flow is the best way for eliminating bottlenecks,” Mr. Carr said. “When you have flow in existing buildings or non-linear flow, they end up creating U-shape or L-shape flows, and bottlenecks happen. The straighter you can keep it, the fewer bottlenecks you can have.”

Linear production lines also have other benefits such as improved maintenance, flexibility and worker safety. “Bakers like lines of sight so they can see down the lines because the newer bakeries are so automated that there are very few people that need to be there,” said Stuart Jernigan, director of pre-construction, AM King.

Sometimes bottlenecks can’t be prevented; however, once they happen, it’s important to identify them and truly understand the issues before a baker can determine the best course of action to correct them. “Questions need to be asked in reference to space for replacing the piece of equipment or what size footprint you have to work with,” said Mike Salazar, chief engineer, Epstein. “This is when a good design of your process is important, allowing you enough room for expanding or re-

A new bakery has many things to consider in the planning: capacity, flexibility, future expansions, maintenance and sanitation, transfer points. Proper planning can help ensure a bakery fulfills all these needs.

Vito Palmisano

PROCESS FLEXIBILITY

placing or updating equipment. When ‘boxing’ your equipment in a limited space, it must be understood that instances like this will eventually happen.”

Certain areas of the bakery just seem made for bottlenecks, the packaging department for instance. “If it’s a bakery doing multiple types of products, packaging is going to be complicated,” Mr. Jernigan said.

With this area’s proclivity for changeovers and breakdowns, bottlenecks are a serious challenge. AM King has found that adding redundancy in this department helps alleviate them. By adding an extra set of equipment, breakdowns no longer cause much of a problem, as the equipment can be swapped to keep production moving while repairs are made.

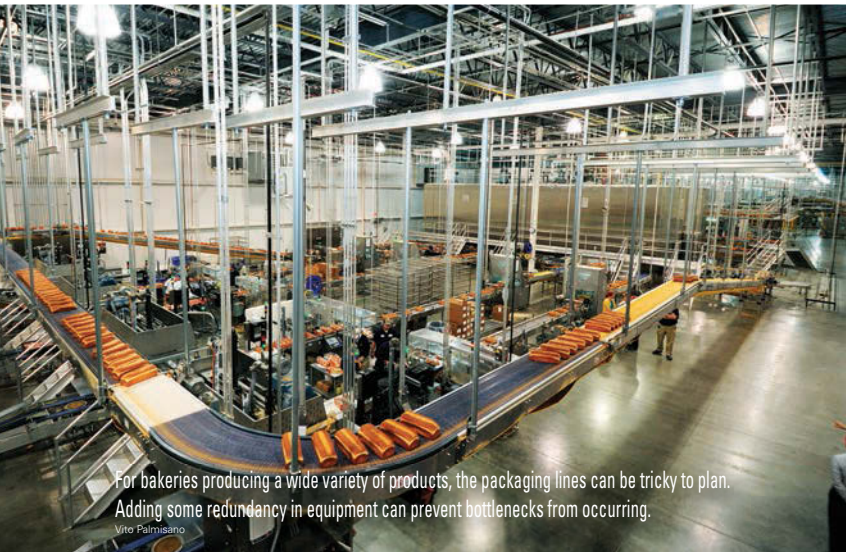
Also simple storage can be done more efficiently to streamline packaging. This is an area that also experiences a lot of changeovers between materials for differ-

ent products. “A lot of times in these plants, everything is on the floor and low racks,” said John Koury, architect, consultant for AM King. “Packaging materials themselves end up being stored inefficiently. If they are being organized and stored, then you’re just dealing with the machines and the feet on the ground.”

This idea of efficient storage applies to every aspect of the bakery. Addressing transitions and the materials needed at each point in production is key to ensuring that a line runs smoothly. For example, something as simple as storing bagged ingredients so they are easily accessible to the scaling station improves efficiency. Looking for ways to improve at each transition helps the whole line.

Built-in flexibility

For bakeries to grow their business, it’s imperative that their production lines are as flexible as possible. That means



For bakeries producing a wide variety of products, the packaging lines can be tricky to plan. Adding some redundancy in equipment can prevent bottlenecks from occurring.

Vito Palmisano



Lining up like-equipment helps operators easily spot issues and aids in utility planning.

Adapting to brownfield

Efficient, flexible bakeries are easy to design with a greenfield facility. Things get a bit trickier in a brownfield operation.

“Greenfield is like a blank canvas for a painter and can be an opportunity to design the ideal solution,” said Todd Allsup, vice-president, Stellar. “Certainly there are considerations to be mindful of — the location, the site. Typically, the greenfield site will give the most flexibility and, ultimately, highly efficient solution.”

With a brownfield facility, bakers will be limited by the walls of the existing building and need to get creative with layout. Linear production isn’t necessarily an option in all brownfield plants. “The basic infrastructure is going to be the same [as a greenfield facility], but you have to arrange it differently,” said Stuart Jernigan, director of pre-construction, AM King.

Greg Carr, director of project planning for baking and snack, The Austin Co., suggested bakers employ a strong team of engineers to help design an efficient bakery layout with a brownfield facility to ensure that all angles are considered: loads, utilities, floors and layout. “There’s so much to look at and think about, and if you don’t have the time to focus on it, you’re going to run into a lot of issues you didn’t think about when you come to do the installations,” he said.

PROCESS FLEXIBILITY

quick changeovers and plenty of room for modular equipment. Design aspects of a bakery can encourage flexibility.

“Bakery equipment and processes need to be flexible enough to cope with a variety of modes of operation that match a continually changing marketplace, reducing energy usage, minimizing waste and conforming to the appropriate regulatory requirements,” Mr. Salazar said. Investments in technology, automation and infrastructure can ensure all aspects of the process are optimized, including flexibility.

Fast changeovers are the critical component of flexible production lines. This can be as simple as changing a die on a divider or a setting on a sheeter, or changeovers can mean removing an entire modular piece of equipment and replacing it with something else. Lines with breathing room, or plenty of surrounding clear space, make this process easier. “Don’t underestimate the periphery areas around the conveyor and equipment, even if it means making the building a little bigger,” Mr. Koury said. By making space between each production line, bakers ensure enough space for operators to work and make adjustments for equipment to move in and out of the line quickly.

This accessibility also helps with utilities. Straight-line production lines with plenty of space make switching utilities between equipment simpler. “As [operators] make changes, they can just reach up overhead and tap into the utility lines and connect to all the new equipment as they want,” Mr. Carr said. He also suggested a walkable ceiling for utilities work to improve safety and flexibility. “You can

do a lot of overhead work without interfering with anything on the floor,” he said.

Built-in expansion

A bakery’s ultimate goal is always growth, but eventually growth means new lines. There are a few things a baker can do during initial facility design to make expansion easier for the future.

Preparation is a little difficult without a plan, so Mr. Allsup encouraged bakers to develop a one-, three- and five-year plan for their business. “That can be a road map so with that mindset, you can be forward-thinking,” he said. “With future thinking today, it can make that realization a lot easier as we lead down a path to success.”

The obvious point is choosing a site and designing enough space so that when it’s time to expand, the square footage is already there to handle it. It’s also important to anticipate when that expansion will happen so space doesn’t waste money. “Not allowing or designing enough room for expansion will be a costly mistake, especially if your expansion will require additional equipment, human resources, larger utilities and upgrades,” Mr. Salazar said. “When adding too much too fast in the designing stage and if not planned or timed correctly, someone will be held paying for the unused space in heating and cooling, resulting in a costly lack of planning.”

Another benefit of straight-line production is easier expansions. “Designing a linear bakery makes the future expansion easily doable because you’re just replicating what you built the first time,” Mr. Jernigan said.

When it comes to space available, Mr. Carr warned against forgetting the outside of the bakery as well. Employee parking, added trucks and receiving space all come into play with an expansion.

Utilities are another aspect bakers need to consider when designing a bakery for future expansion. The best thing for utilities is to be oversized. Limiting the bakery to its current energy needs means more costs later to boost the utilities during the expansion. Bakers can save time and money by oversizing the utilities at the start. “It doesn’t cost much to oversize at the beginning,” Mr. Carr said. “It’s certainly less expensive than going back and running lines later on.”

Good planning and design upfront can take a new bakery from rough waters to smooth sailing. The hallmarks of a streamlined operation — flexibility, efficiency, safety and growing room — can all be built into the facility at the outset with a good team of facility engineers and a willingness to plan ahead. With these principles in place, bakers can set their new bakeries up for success. ●

Breathing room between lines makes changeovers, sanitation, maintenance and future expansions easier.

Vito Palmisano



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