

OVENS

Batch vs. Conveyor: Which Oven Is Best?

It's time to look for a new oven when you have bottlenecks in your production line or you're ready to start a new product line. Should the oven be batch or automated conveyor?

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Curing, pre-heating, drying, bonding or any other host of applications, all require one element — uniform and controlled heat. Both batch and automated conveyorized ovens can provide those heating requirements, but which type is right for your operation? The pros and cons, coupled with practical guidelines, will help you with your selection.

To begin with, let's operate under the following two assumptions:

- Business is good, work volume is increasing and there are bottlenecks forming in your heat processing areas of production.
- A market niche exists that you want to access and start a new product line.

In either case, you are faced with the prospect of spending thousands possibly tens of thousands — of dollars on new heat process oven equipment to clear the blockages or begin production. The question near the top of your list is: Do I batch the heating process, or do I purchase an automated conveyor oven?

A wrong decision could be very costly and time-consuming to correct, therefore, it is important to be aware of and understand the nine basic issues at hand.

- Cost
- Application
- Allocation of labor
- Dedication of space
- Cycle time
- Quality control
- Multiple temperatures
- Product flow
- Up-time

Cost is one of the most important issues a person can ponder before allocating funds to a capital equipment purchase. If you don't have the proper financial backing, or if you are experiencing a temporary cash shortfall, "batching" your product can be a production lifesaver and keep you in the game until other business and/or production opportunities present themselves. Also, in terms of product or process, batch ovens represent a comparatively inexpensive and economical means by which to enter or experiment in a new venture.

Conveyor ovens, though, can be much more expensive to purchase initially. Consequently, they are not as ideal for small-to-medium size start-up operations in which one may want to experiment with a new method of processing product.

The oven's *application* or usage should be considered. Are you to produce a wide variety of shapes and sizes, as well as multiple rates of production? If the answer is yes, then again, a batch unit may be the more appropriate oven to purchase. This is simply due to the fact that batch ovens are more versatile in what they can be "tuned" to accomplish, and they can process as much, or as little, as is placed on the cart, shelf or hook at one time.

However, if you have large volumes of work with smaller pieces that only pose minimal differences in physical size, shape and physical composition, then the conveyor unit starts to look like the better choice, provided the funding is available.

The *allocation of labor* also can't be overlooked, because it plays an important part in your decision. A batch unit, because of the racks and staging of those racks, almost always takes more manpower. Moving, loading, unloading, placing the rack in the oven and pushing

it to the next operation are all activities that take time, space and precious manpower. Loading thousands of small parts, or a few larger parts, on a rack and moving them through production takes time.

With conveyor units it is quite possible to automate the entire line, or at least large sections of it, to minimize the amount of time your workforce spends loading and unloading product. Your response to this factor will depend entirely upon business priorities and the labor situation.

Take a hard look at the *dedicated floor space* available at the equipment's location. Batch ovens tend to have a smaller physical footprint than conveyor units, which is especially true when the batch oven is in a cabinet or bench-top/stand configuration. However, larger batch ovens, such as truck and walk-in units, can occupy the same, if not more, physical space than conveyor units. This is due to the presence of carts, shelves and other special attachments that may be required to process product successfully.

The area occupied by the conveyor unit, however, needs just enough space to hold the oven itself and possibly a cart at the loading and unloading area. That is, of course, if the unit is not integrated with other automated equipment, which would eliminate the need for peripheral components, such as carts and shelving.

As you analyze the factors, don't forget *cycle time*. If the process takes several hours or more, processing via a batch unit becomes much more attractive because the operator just leaves the parts in the oven for a longer amount of time.

However, with a conveyor unit, the longer the process or cycle time, then the longer the unit must be, taking even more physical space, or the slower the conveyor belt must run to meet the heat-up requirements. Some conveyors must run so slowly that they appear immobile except upon close scrutiny. Using part size, production rates per hour and time factors, you can get a decent idea of what approach you ought to consider.

With the development and increasing prevalence of international quality standards, it is clear that mandates for ever-improving quality are here to stay. To meet *quality control* requirements at your operation, it is important for processes to be controlled for minimal production variance. An automated line, once appropriately balanced, is more uniform on a daily basis due to the near elimination of the human element. Operators have less loading freedom and fewer timing decisions with an automated line.

Batch units can be loaded differently depending on the operator, and the actual cycle time may vary unless a ramp/soak programmer is used, which will reduce — not eliminate — this type of variance. However, in a majority of batch oven applications, any number of outcomes are possible with a human operator in control of the variables.

Batch Oven	
Pro	Con
Less expensive to purchase	Labor intensive
More flexible in handling variable-sized product	Comparatively, product flow is not as "neat"
Lower maintenance	Products quality is increasingly susceptible to the human element
Smaller space for unit	Potentially large area for support equipment — racks, carts, shelving
Good for low-to-medium volume production rates as well as for larger items	Not always as good as for production of smaller, higher volume items

Conveyor Oven	
Pro	Con
Less labor intensive	More expensive
Quality variables are not dependent on operator	Potentially higher maintenance
Good product flow	Limited in the flexibility of parts it can process
Good for high production	Shorter process time is desirable, or else the oven can become quite large

In the process of completing your products, you may need to ramp up with different temperatures and with different times. Once again, batch ovens can be upgraded for this type of duty with the addition of a ramp/soak programmer, which can be a small investment in comparison to the cost of a total unit.

A continuous oven usually accomplishes *multiple temperature* and soak times via the integration of separate heating zones. This is also a very effective method of achieving the proper production end; however, such additions do add cost and size to the oven and do result in a more expensive endeavor.

Product flow should be another consideration as you answer the question of “How clean does my production flow have to be?”

A batch unit does not always lend itself to extremely “neat” product flow. Usually, product is inserted at one end of the unit and retrieved from the same location. Of course, this scenario can be altered with the selection of a single or double door at each end of the oven.

A flow-through conveyor oven is a cleaner type of unit because product is loaded at one end and can come out anywhere you wish, which facilitates operation flow. For example, an operator may load product and unload product at the same location, with the conveyor oven formed in a horseshoe configuration.

Finally, there is an issue of paramount importance: maintenance. Certainly “gremlins” tend to appear after some length of operation, but continuous *up-time* is critical. Batch ovens have fewer moving parts and are not as complex; hence, there is less to go wrong with the unit.

However, unless the process places a great deal of stress and is very hard on the heat treat equipment, the maintenance difference may not be significant enough to impact your decision. In this case, you would be better off giving more weight to the previous eight factors.

Remember, the nine considerations are general guidelines, representing the starting point in your decision-making process as you explore the issue of whether a batch or a conveyor unit is appropriate for your operation. Naturally, the best support you can have is that of a high quality oven manufacturer where an experienced sales engineer can assess your production situation, assist you with layout ideas and improve what will be your final production line.

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For more information about Precision Quincy's line of ovens, contact Precision Quincy at 815-338-2675, or pqsales@precisionquincy.com