



INDUSTRY ANALYST REVIEW

PROCESSING OVEN OPERATIONAL EFFICIENCY

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INTRODUCTION

Today's processors are challenged to maintain or lower costs within fiercely competitive markets while dealing with challenges of efficient energy consumption and responsible environmental impact. Any movement away from the most efficient processing techniques justifies immediate reform, if we are to prosper in business and be good citizens of the planet.

One definition of efficiency explains it as "useful work per quantity of energy". Energy consumption in processing oven operations should directly correlate to the demands of the process and the product. But in too many processing operations energy is wasted powering and maintaining older systems, or even more egregious, in powering new "innovative" but valueless systems.

THE PROBLEM

Over time, in too many facilities, processing efficiency seems more likely to decay than improve, and unfortunately yields and profits decay while precious resources are unnecessarily consumed.

There have been some partial renewal of oven designs but it may be worth questioning how far beyond "innovative" some of these designs reach and whether or not they may actually decrease efficiency while increasing failure rate. In terms of energy consumption there is no doubt that some designs are heading in the wrong direction.

Waste also occurs outside of energy consumption. Maintenance hours are a finite resource within an operating budget. That touted "state-of-the-art" innovation too often turns out to be a maintenance headache. Overly sophisticated designs require special training which is not always conducted as well as it should be. Even minimal turnover in the maintenance staff means trial-and-error attempts at repairs or adjustments, or at the very least, costly hours spent in re-training.

HISTORY

Designs of industrial-sized food processing ovens have evolved among manufacturers, however, not necessarily in ways that improve efficiency. From Europe came multi-fan ovens, some with as many as one fan per product carrier. These naturally consumed more energy than a single-fan oven of the same size and were also a big hit to the maintenance budget.

Single fan ovens, the US standard, must be of an overall efficient design and all single fan ovens are not alike. The efficiency with which process air is circulated varies greatly. The difference lies in the design of the air handling system and in the selection of its main components. Some designs require the recirculated air mass be turned or diverted more than others. Ironically, some very experienced manufacturers offer systems of relatively high, energy-robbing resistance and their main component choices are not high quality. The fan or "air kit" that some of these manufacturers offer is actually a poor selection.

The most commonly selected forward-curve or "squirrel-cage" fan with its directional discharge can only be configured with a power-robbing, high-static duct system necessary to split the fan discharge to the right and left side of the oven.

A further disadvantage is the high horsepower requirement at or near free delivery. Required horsepower continues to increase while delivering required airflow, but at the same time total efficiency is decreasing.

SOLUTION

The backward inclined or “plug” fan is a better choice for operational efficiency as it discharges air all around its perimeter and can be configured to pressurize the same splitter duct without having to collide with a duct-wall first.

Also referred to as “load limiting” or “non-overloading”, the backward inclined fan will require less horsepower to deliver the same volume. With this design, the horsepower requirement increases to a maximum as airflow increases and then drops off again toward free delivery. This means that a motor selected to accommodate the peak horsepower will not overload, despite variations in the system resistance or airflow, as long as the fan speed remains constant.

The manufacturer that has the best understanding of such critical design elements is Marlen. The Marlen oven typically uses 20-25% less horsepower to deliver the same air flow as other single fan ovens and up to 50% less horsepower than multi-fan ovens.

Lower consumption of electrical energy is impressive; however, it is the overall design of the Marlen air handling system that makes their oven impressively efficient in delivering uniform processing conditions without waste of any processing media. Whether ovens are gas-fired or steam heated, the Marlen system captures all the energy of heating and humidification media without any short-circuiting. With Marlen, efficient management of process air ensures that product and process dictate energy consumption.

Efficiency is not fleeting as Marlen ovens do not require any in-the-field adjustment: no re-balancing, no adjustment to any components of their air handling system. While overly sophisticated ovens require adjustment by insufficiently trained personnel, the Marlen oven is producing uniform results day-to-day and batch-to-batch.

Marlen is also known for protecting customers’ valuable product identity while improving processing efficiency. It is highly recommended that processors request a Marlen Cost of Ownership comparison prior to their next oven expansion project. This is an examination of the total impact of operating a new Marlen oven in the processor’s specific facility.

SUMMARY

A recommendation is offered beyond naming a specific equipment manufacturer. It is more important to find a trusted partner with the experience and reputation to deliver all that is promised; a partner who is as reliable as the equipment they install and service. For the author, Marlen sits on top of a very short list.

About Faivre Technical LLC

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About Marlen

Recognized as a global manufacturer of highly engineered food processing equipment and systems, Marlen designs and builds innovative solutions for the food processing industry. Our premium products have long set the standard for quality and performance in vacuum stuffing and pumping, portioning, size reduction, thermal processing, and food handling. Marlen is a Duravant Company.