



Combustion Air Flow

As we listen to bakers, they regularly express challenges and concerns with their oven performance. Frequently, in conjunction with direct fired gas ovens, a topic of concern is combustion air flow, the impact it has on zone temperature and heat control and its impact on the quality of the bake. So, what do you consider when evaluating combustion air flow on your oven to improve its performance?

Combustion Air Blower

All large direct fired tray and tunnel ovens configured with two pipe combustion systems utilize a fan to supply air for combustion to the oven heating system. This fan is referred to as the combustion air blower, or CAB. It is also frequently referred to as the "turbine". With new ovens, the oven manufacturer should be sizing the CAB based on not only the size of the oven but your specified baking conditions as well. If properly understood, the sizing and operation of the oven's combustion system will meet your oven and bake performance requirements.

Challenges often arise when you are dealing with older ovens (greater than 10 years old). Such ovens worked well based on the original specified performance conditions at the time of purchase but are challenged to meet the current oven performance and baking conditions demanded by today's bakery market. In the past, ovens required few changes to handle the small variety of products. Today, these same ovens are tasked with baking a much greater variety of products with more stringent and demanding baking performance requirements. Today's market conditions demand the oven of yesterday produce a wider and greater variety of products. Your older oven as originally configured may not be up to this task. As a result, productivity is reduced, oven related scrap is increased and energy costs are increased. A good place to start an oven performance assessment is reviewing the combustion air requirements for your current baking requirements.

An under sized CAB can significantly contribute to poor oven performance. An undersized CAB prevents proper zone temperature control and burner function. These conditions lead to poor control oven control and negatively impact throughput, bake times, quality and oven related scrap.

Banner-Day

1840 N. Michigan Avenue - Saginaw, MI 48602
www.banner-day.com • Toll Free: 877-837-0584 • Fax: 989-755-1309

Here are the signs of a potential CAB problem:

- Poor zone control resulting in flash heat during oven breaks
- Inability to maintain lateral heat across the oven
- High energy usage caused by overheating flash heat
- Inconsistent or increased product color problems

Potential causes to look for:

- Undersized CAB: CFM capacity and/or pressure
- Undersized combustion air headers and piping
- Clogged or dirty CAB filters
- Clogged or dirty combustion air distribution or header piping
- Combustion air butterfly valve / mod-motor linkage adjustment

What can you do to improve performance?

- Evaluate CAB performance
- Check zone air header pressures
- Clean CAB filters
- Check CAB for dirt and flour buildup
- Check air distribution for dirt or flour buildup
- Check air/gas mixer orifices for dirt or flour buildup

If after confirming that the CAB and the air distribution system are clean and operating at specification and performance is still questionable, consider resizing and replacing the blower.

This becomes particularly important with older ovens or used ovens that have been purchased and relocated from another bakery. When purchasing used ovens it is not unheard of for the baker to invest \$600 - \$700K. This is certainly less than a new oven (easily over \$1MM) but with it come any existing issues with the oven plus challenges resulting from the move; this also applies to the combustion air blower.

Another situation resulting in an undersized CAB is when the burner capacities have been increased. Due to the demands of today's ovens to bake a wider variety of product, often heavier than the oven was originally designed for, burner heating capacities are increased in order to provide the additional BTUs necessary. This increase is usually accomplished by changing out the air/gas mixers at each burner. Unfortunately, an increase in heating capacity equals an increase in combustion air requirements. If the original CAB was sized closely to match the original oven BTU capacity, it may now be undersized and require upgrading.

For a modest investment (under \$10K) you can upgrade your combustion air system based on the new conditions of operation and improve the oven's bake performance and product quality that will pay off with significant dividends and high value for the baker.

Combustion Air Blower Filters

In addition to having the correct CAB, it is important to maintain a regular cleaning schedule and be aware of the style of air filter used, replaceable or reusable.

Replaceable filters should be regularly inspected and replaced to avoid allowing build up that can reduce air flow and negatively impact the performance of the oven. In the case of the reusable filters, they need to be cleaned thoroughly. Many filters, especially the screen mesh type, are designed to be lightly coated with oil and reinstalled. The oil coating is important as it is the oil film that traps the fine flour dust and removes it from the air flow. Flour dust is the primary contaminant of oven combustion air distribution systems, burner air/gas mixers and burners.

Another consideration is the source of the combustion air: from the inside the bakery or from outside. In most instances the best choice is from outside with a proper inlet screen and provisions for weather. There are significant benefits: reduced combustion air system exposure to flour dust contamination, reduced demand on plant makeup air systems and reduced maintenance frequency to maintain the oven combustion air system.

Summary

In a real example where these suggestions were applied and the blower was changed and properly sized, consistent heat was provided where previously heat in the oven could not be controlled. The result was that the baker was able to take a frustrating, costly situation and stabilize the zone heat to achieve all quality standards specific to multiple individual recipes. The baker commenting after the changes and while bake in progress said, "Best loaf I have ever seen, right out of the book". Today, these changes to combustion air flow along with the incorporation of a Banner-Day Total Oven Control - TOC™ system, the baker has taken a pre-owned oven from a fundamental day to day challenge to a reliable and dependable asset to the baking operation.

If we haven't covered a topic that is of interest to you, please e-mail us at info@banner-day.com with your suggested topic or question and we will consider it for a future newsletter.

Copyright© 2010 Banner-Day. All rights reserved.