Sustainability Attitude & Stewardship

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Summarized from his presentation at AIB International Sustainability Seminar

Part 2 of 2

Historically energy, not a major cost factor and waste heat recovery was not an attractive ROI. However, going forward, energy costs are rising; environmental awareness is increasing; and with this comes increased accountability with possible energy allocation. This potential reality should be shared with your employees.

Direct Fired Gas Ovens (DFG):

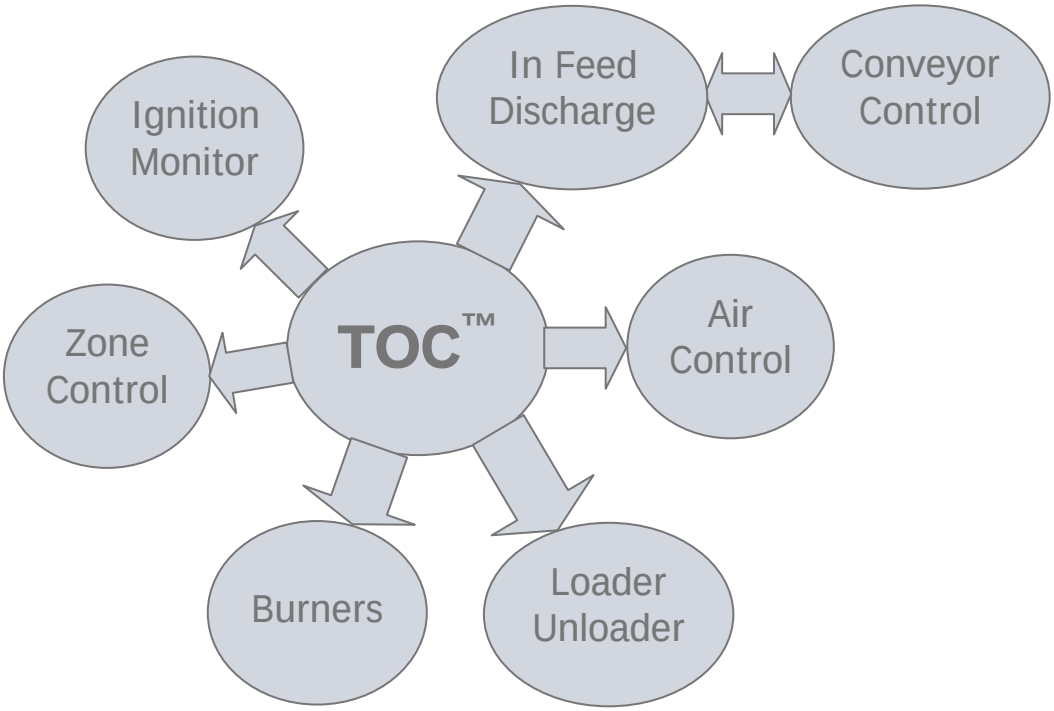
As the largest user of natural gas in commercial-wholesale bakeries, let's focus on direct fired gas ovens. A typical high production oven operated with gas costing $8.00/MCF will use $200K to $300K annually. For a single DFG oven, a 20% reduction in gas usage will result in an annual savings of $40k to $50K. In addition, there is an expectation that the evolving emphasis on global warming will eventually lead to future environmental requirements that will impact the baker. At this point the translation of reduced energy use to favorable environmental impact is unclear; however, it is expected to have financial implications.

The reality is that many existing ovens are still manually operated. They were built for single, or very similar products, and have limited flexibility for today's demanding consumer who wants variety in the products they purchase. These manually operated ovens are typically constant spark ignition systems requiring constant maintenance to keep burners operating. In these circumstances it is not uncommon to find 10-15% of the burners out, consequently, venting unburned gas through the oven to the atmosphere. This represents a significant opportunity to reduce fuel use and positively impact the environment and reduce green house gases.

This brings us to the opportunity to re-think and re-evaluate oven control and transition from out dated and often times obsolete manual oven operation to automated operation. We have an opportunity to evaluate the oven and how we operate it. Of the total Btu's consumed in the oven how many go into the Product? Where do the others go?

In order to answer these questions we must understand and gain control of the oven operation. To do this the following items need to be considered:

- Integrate all elements of the oven
- Understand and document variables associated with product recipes
- Minimize product transitions to maximize production
    - Empty oven trays or hearth space is lost forever
- Reduction of gross fuel consumption per unit of product

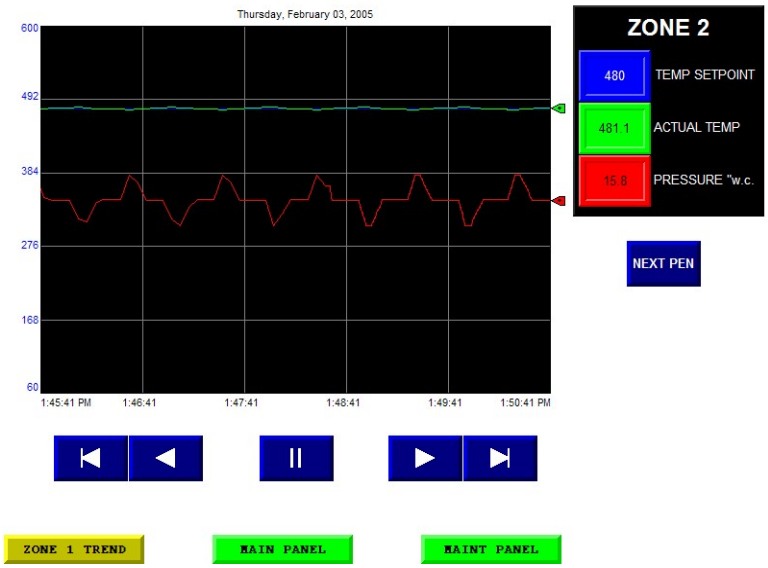


Above: An integrated system.

Above: A typical automated oven control panel and touch screen with energy tracking for management's use.

For more information, see the article "Oven Performance – What Makes the Difference?".

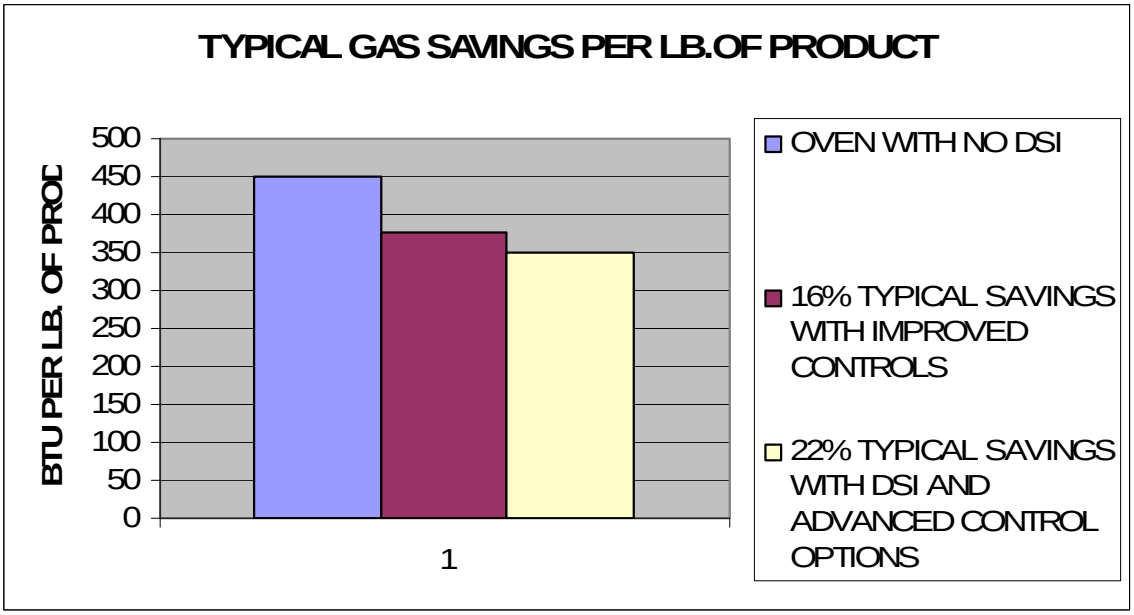
Thermal Control:
Our experience is that a high percentage of direct fired gas ovens have 20% more burners than required for baking. Historically this was necessary when burners were out and additional heat was required. With today's advanced controls, tight temperature control in any zone can be maintained by managing the number of burners and the heat needed to match the recipe and the current load – full, empty or in between to achieve the quality standard required. With the sophisticated controls available today it is realistic to control zones within ±2°F.



The above graphic is an example of a trend screen illustrating variations in zone temperatures and firing rates. The Blue line represents the temperature set point with the Green line actual temperature. You'll find it important to note the proximity of the actual temperature line to the set point. In addition, the Red line shows the variations in firing rate necessary to maintain zone temperature. In this set-up the data is retained for 72 hours to be used for diagnosing production issues, should there be any. The panel also has the capability to add gas consumption should the bakery want to track that as well.

Generally speaking oven automation has produced an average of 22% reduction in gas consumption; and electrical savings of 100 watts per burner per hour.
It's important to note here that these are typical, but they are not a given; there are many factors, as you can see in this article, that impact gas consumption; and each oven must be given a close assessment to determine its potential for savings.

For more information, see article "Banner-Day Systems Save Energy"



The above graph illustrates typical gas savings. The Blue bar represents a typical constant spark oven at 450Btu/# gas usage. The Red bar represents a 16% reduction due to the elimination of unburned gas venting through the oven to atmosphere and the Yellow bar shows the additional savings resulting from tighter temperature control and better operational practices.

Air Management:
When addressing overall performance of the oven you don't want to overlook air management. A number of key points to consider are:

- Manage the rate of oven exhaust
- Maintain a slight negative bake chamber pressure
  - Relative to the bakery atmosphere
- Control and minimize random air infiltration
  - Burner observation ports
- Recognize bakery atmospheric pressure varies
- Oven exhaust must be adjusted accordingly
- Emphasizes the need for proper plant air supply or make-up -air