



Oven Performance – What Makes the Difference?

We realize that there are any number of manufacturers out there that can provide you with a DSI system for your oven, be it new, used or a retrofit of existing equipment. All of these systems have a number of things in common – burners, ignitors, DSI modules. What sets one manufacturer apart from another is the attention paid to the details. Note worthy and little known is that Banner-Day pioneered and developed DSI in the 1970's and their continued research lead to some of the advancements that are discussed in this article.

Ignitor

Banner-Day learned long ago that ignitors originally designed to function well with constant spark ignition systems were poorly suited for use with today's DSI Ignition Systems. Today, burners are turned off to help control the heat in the oven. Where the properly designed ignitor enhances oven performance is when it is time to turn the burners back on. Banner-Day has patented a stainless steel rectification ignitor specifically designed to provide the baker with the highest degree of reliable burner ignition. This ignitor works much like the spark plug in your car; it sparks to itself, has no critical gapping requirements and only requires fuel to be present in close proximity for the burner to light.

This is in contrast to other available ignitors that require special tools and critical settings. Because of the fine tuning necessary, these ignitors require regular and frequent adjustments to maintain desired firing performance. So rather than setting the ignitor (as is the case with the Banner-Day ignitor) and leaving it alone to do its job, the conventional ignitor needs regular, costly maintenance to keep it calibrated and when not calibrated correctly the bake quality and consistency suffers.

The Banner-Day ignitor is a direct fit replacement for a Baker Perkins/APV flag ignitor and can fit many other burner types with minor modification. This ignitor is always used as one component of a successfully operating Banner-Day DSI System.



Continued on Page 2

Banner-Day

1840 NORTH MICHIGAN AVENUE - SAGINAW, MI 48602
WWW.BANNER-DAY.COM • PHONE: 877.837.0584 • FAX: 989.755.1309

DSI Ignition Module

With a 24VAC “safe” voltage power design the wiring is simplified and the modules can essentially be mounted anywhere on the oven. This contrasts to standard 120VAC ignition modules which when used, must be enclosed because of concerns with the “hazardous” voltages. As a result of the concern for safety, one of the traditional mounting locations for 120VAC modules is in a wiring duct along the top of the oven. This mounting location runs counter to the recommendations of virtually all ignition module manufacturers that specifically limit the ignition lead length for proper and optimum operation to 36”.

Banner-Day H6-E modules are equipped with a maintenance unit attached to the top of the ignition module. This unit enables maintenance personnel to attach a small external 24VAC transformer to the module, and place the module in test mode. In this mode, the maintenance person has full control over the lighting of the burner, fully separate from the master control system. This facilitates testing and adjustment of the burner and ignitor without either waiting for the control system to activate the burner or making repeated trips to the control panel to place the burner in a manual mode.



Temperature Control Strategy

The Banner-Day temperature control system has unique features that allow it to control the temperature in a zone with a precision of typically +/- 2° F. The zone heating capacity is controlled via a cutback/staging strategy that turns on/off a portion of the burners to prevent excessive temperature under/over-rides.

“Typical” cutback/staging schemes are based on temperature deviation only. For example, a system may turn off 25% of the burners at 5° F above setpoint, an additional 25% at 10° F above setpoint, a third 25% at 15° F above setpoint, with the remaining burners being turned off at 20° F above setpoint. As can be seen by this example, the “typical” scheme **REQUIRES** a temperature override to operate properly.

Continued on Page 3

Banner-Day

1840 NORTH MICHIGAN AVENUE - SAGINAW, MI 48602

WWW.BANNER-DAY.COM • PHONE: 877.837.0584 • FAX: 989.755.1309

Because the “typical” cutback/staging scheme is based on temperature, the burners will modulate down to absolute minimum firing rate before cutback/staging occurs. Depending on modulation motor adjustment, this can cause a number of undesirable effects, including poor lateral heat control and failed burners due to extremely low firing rates.

The Banner-Day scheme uniquely utilizes the zone air header pressure as the controlling factor for the cutback/staging strategy. As the temperature rises near the setpoint, the air header pressure will begin to drop as controlled by standard PID control loops. As the pressure drops, burners are staged off in 25% groups in order to maintain the proper heating capacity required. Inversely, as the temperature falls closer to the setpoint, the air header pressure will rise as controlled by the standard PID control loops. As the pressure rises, burners are staged back on to maintain the proper heating capacity required.

Since the Banner-Day system is based on air header pressure for cutback/staging, burners are turned off at higher firing rates, allowing the remaining burners to carry the load at a higher firing rate with very even lateral heat and no burner failures. An optimum combination of firing rate and number of active burners is maintained at all times resulting in consistent lateral heat providing better product color and extending the life of the burners reducing replacement and maintenance costs. Another benefit of this control scheme is the ability to recover desired temperatures rapidly without temperature override. Undesired conditions of flash heat caused by breaks in the oven, and the temperature sag created when the product load returns are virtually eliminated.

Summary – What makes the difference with Oven Performance?

This article discusses key components in the baker’s oven and their use, however, underlining these discussions is the theory that integrating the right components correctly, with a full understanding of the technology and its use will ultimately provide the best oven and bake performance. This happens through research and development of the application and operation of the overall DSI system.

Therefore by understanding the differences in available components and being proactive with your controls strategy and selection of your oven components (for upgrade and new equipment) you can increase the reliability of your bake process, improve the consistency and quality of your products and reduce your maintenance and operational costs.

Banner-Day

Banner-Day is the premier designer and manufacturer of industrial bakery oven temperature control and automation systems. While Banner-Day has experience, knowledge and expertise in many different types of ovens and oven controls, our focus is on systems that utilize DSI (Direct Spark Ignition) as the means of igniting and controlling the burners on the oven.

We don’t make the ovens, we just make them better.

Banner-Day

1840 NORTH MICHIGAN AVENUE - SAGINAW, MI 48602

WWW.BANNER-DAY.COM • PHONE: 877.837.0584 • FAX: 989.755.1309