

Thermcraft CoilCraft Element System (CCES) Conversion

In mid 2006, Perryman Company (a Western PA metals producer) issued an order to Thermcraft Inc to produce a series of drying ovens for processing metal scraps as part of a proprietary process developed by Perryman. Based on the specifications developed during the initial discussions, Thermcraft supplied units that employed its standard PH-C series heavy-duty cast plate heaters mounted under the client supplied process unit.

The units worked quite satisfactorily for a couple of years. At that time, Perryman added process air to assist in removal of volatiles given off during processing. The process air added an additional loading factor to the heaters and contributed to metals fines contaminating the heater compartment. Both issues contributed to heater failure at both ends of the chamber where contamination was the greatest. A new set of replacement heaters was installed but the end heaters failed again in approximately six months. A second set of heaters suffered a similar fate. Since the top of the furnace and the rotating drum had to be removed to enable heater replacement, a considerable amount of expense and downtime was involved in addition to the cost of replacement heaters.



**Original Thermcraft Drying Oven
Terminal Compartment Open**



**Heating Element Compartment
Showing Product Contamination
at Both Ends of Furnace**

At this point, Perryman called Thermcraft to discuss possible solutions to this problem. As part of these discussions, the following series of requirements for potential solutions were developed:

- The new heater system had to be designed so replacement of failed elements would not entail disassembly of the furnace.
- It proved highly desirable not to modify the existing power supply for the furnace.
- Provisions had to be incorporated to protect elements from product contamination
- The conversion had to involve a minimum of production downtime.
- Above all, the conversion had to be cost effective.

After reviewing several options, it was decided that Thermcraft's CoilCraft Element System (CCES) was the most practical option to solve the above problems. This system is essentially a heavy gauge wire element combined with a ceramic support structure. For this particular application, leads were designed so that both would exit the same side element end, allowing for insertion or removal of each individual heater without any disassembly of the furnace other than to open the terminal compartment and disconnect the power leads to that heater. Thermcraft was also able to develop a design having a slightly lower watt loading on each element, which typically translates into a longer element life. The design would ensure balanced three phase power would be maintained and provide interlocking shields to protect against contamination of the element due to product dust escaping from the process unit.

Finally, the only wiring changes required were in the terminal compartment of the furnace, leaving the power supply as originally manufactured.

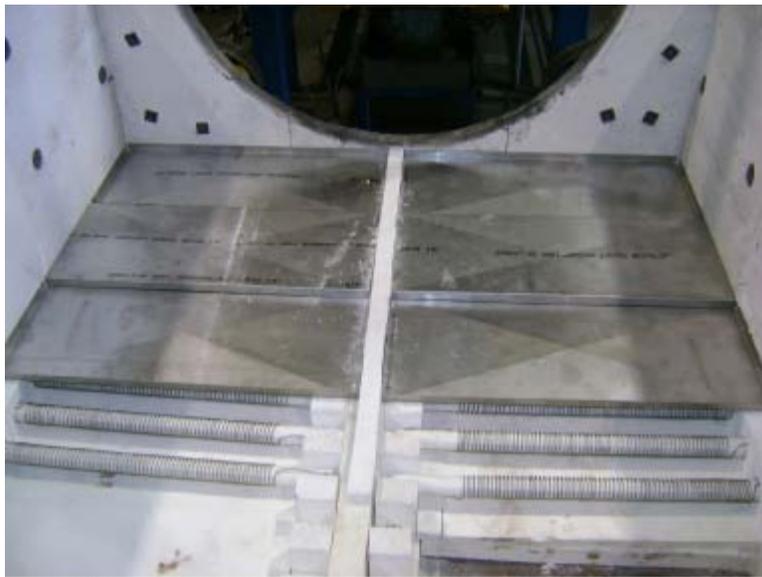
It was further agreed that Thermcraft would supply the heaters, support system, and engineering and construction drawings along with detailed instructions while Perryman would do the actual conversion. Upon receiving the materials, Perryman started disassembly during which an additional problem was discovered. Due to the nature of some heater failures, the underlying insulation had been damaged and required replacement.



**Damage to Insulation From Plasma Flash
During Certain Element Failures**

Once damaged insulation was replaced in the base of the furnace, the actual conversion process began. One of the first changes was to cut away sections of the steel furnace shell in the terminal compartment, without damaging structural integrity of the furnace, so passage holes for the new element system could be drilled through the sidewall insulation. The locations and cutout areas were part of the information package provided by Thermcraft to insure proper alignment and strength.

Once all the passage holes were drilled, it was possible to start installing the CoilCraft Element System (CCES). Basically a support structure was installed in the center of the furnace to both support and hold the elements in place to prevent electrical shorts and mechanical damage during assembly and for future element replacement operations. The elements were then slid in from both sidewalls into their respective niches. As the work progressed from one end of the furnace to the other, metal pans were installed to act as shields against product contamination.



Element Support System Installed, Elements Being Installed Through Sidewalls, Floor Insulation and Interlocking Contamination Shields Being Installed.

Once all the internal work was completed, a new power distribution block was added to one terminal compartment for ease of connecting the incoming three phase power lines from the power supply. A series of jumpers then had to be installed between various heaters. Those heaters were then connected via additional “bank” wiring to the power block, all in accordance with Thermcraft’s supplied drawings and instructions.



Power Distribution Block, Jumpers, and Bank Wiring Installed.

Once the above wiring was complete, the power supply was reconnected, all wiring checked again, and the system buttoned up.



Conversion Complete and Ready to Button UP

According to the Material Process Manager at Perryman Company, it was a rather easy conversion, without any problems. Drawings, supplied instructions, and other information accurately reflected the degree and scope of work required and all parts fit as shown. The supervisor of the area indicated the entire conversion only took three days and had they not been waiting on floor insulation, they would have finished sooner. It should be noted that the Perryman Employees did an outstanding job with respect to accuracy, workmanship, and speed in performing the conversion with the results looking very professional.

Temperature uniformity of the rebuilt unit is excellent and it also has a quicker heat-up cycle. One reason for the quicker heating is the lower thermal mass of the CoilCraft Element System (CCES). In comparison, the existing Thermcraft Cast Plate Heaters are rather massive, very dense, and once at temperature, will hold heat for quite some time. The material costs of the CoilCraft Element System (CCES) elements are on par with the Cast Plate Heaters. Perryman did some test change outs before the conversion was complete and found the elements were as easy to replace as originally indicated, whether replacing one or several. This ease of replacement will greatly reduce maintenance costs and lost production when it becomes necessary to replace a burned-out heater. Based on the outcome of this conversion, Perryman plans to retrofit the other units as production requirements allow.

We certainly hope this information is helpful and we realize that it does not answer all questions that arise. Thus for additional assistance, contact your nearest Thermcraft representative or [contact us](#) directly.

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