

EXECUTIVE SUMMARY – SEE REPORT FOR DETAILED FINDINGS & CONCLUSIONS

Pennoni Associates Inc. (Pennoni) conducted a Thermal Efficiency return on investment (ROI) Study of the CoolKeeper™ curtain system (referred to hereafter as the “CoolKeeper”) installed at the above referenced building (referred to hereafter as the “Site” or “Test Facility”).

The purpose of the study was to evaluate: 1) if there is a reduction of heating and cooling demand in the employee and customer occupied spaces of the pizza shop; and 2) if the energy demands for heating the ovens and operating the oven hood ventilation system can be decreased; thereby demonstrating a ROI.

Instrument readings were collected at several locations throughout the interior of the Site customer and kitchen areas, including and especially focusing on areas directly around the ovens and hood space. Readings were collected both with the CoolKeeper curtain system installed and with the CoolKeeper removed.

FIELD MEASUREMENT FINDINGS

The pizza ovens consist of a 240,000 BTU, Bakers Pride Model Y600 – which was in operation during the investigation – and a 160,000 BTU, Bakers Pride Model Y450 – which was not in operation at the time of the investigation. The ovens are orientated side by side and are located under a stainless steel hood exhaust hood with a single speed 2,000 cfm exhaust fan that exhausts to the roof of the structure. The Bakers Pride Model Y600 was operating between 500° F -525°F during the investigation.

To reduce the number of variables that may affect the study findings, final readings collected on March 24th were taken between the hours of midnight and 9:00 AM to ensure minimal interference with testing parameters. The variables controlled by the early morning testing included:

1. Control of the facility customer area HVAC system. The heating systems in the customer and kitchen prep areas were turned off during the testing and any changes in temperature in the kitchen prep area and elsewhere were the result primarily of heat loss into the space from the ovens.
2. Elimination of the influence of outside air ambient air caused by customer and business traffic through the front and back doors of the pizza shop.

Atmospheric readings were collected with the CoolKeeper in place and re-commencement of data collection was approximately two (2) hours after the removal of the CoolKeeper system. This process provided for a comparison of room temperatures throughout the facility while not being influenced by the aforementioned eliminated variables.

CONCLUSIONS

Based upon the results of the evaluation, we offer the following conclusions regarding the efficacy and ROI association with the CoolKeeper system:

1. Temperature readings in the Kitchen/Prep Area demonstrate the influence of the CoolKeeper system and reveal that, even with only one of two ovens operating, temperatures in the work area climbed above preferable levels when the CoolKeeper system is not in-place.

**COOLKEEPER™ THERMAL EFFICIENCY ROI STUDY FOR
TMI INTERNATIONAL LLC
COFFARO'S PIZZA, 152 SOUTH MAIN STREET, SLIPPERY ROCK, PA**

2. Temperatures readings and CO₂ levels increased throughout the occupied space during the testing period when the CoolKeeper system was NOT in-place, indicating the CoolKeeper reduces the dispersion or diffusion of heat energy and CO₂ being generated by the operating ovens.
3. The reduction in CO₂ levels in the work environment will improve the overall working conditions in the restaurant. ASHRAE recommends that indoor CO₂ air concentrations not exceed 700 ppm above outdoor background concentrations, which usually equates to approximately 1,200 ppm. OSHA has a proposed a new standard of 800 ppm for office environments because workers frequently complain of headaches and general malaise in work environments with continuous exposure above 1,200 ppm.
4. Relative humidity (RH) readings within the occupied portions of the Site decreased when the CoolKeeper was NOT in-place. The decrease in RH along with the increase in temperature and CO₂ provides further evidence of heat escaping into the work environment. Warmer air is capable of holding more moisture, thereby causing RH readings to decline as influenced by the warm, dry air generated by the oven.
5. With the CoolKeeper system in-place, the hood capture efficiency is improved. Based on the typical condition, 30%-50% exhaust air can be reduced for the same vent result; thereby allowing for variable speed fans or lower power rating fans and energy savings.
6. Study data indicate that the CoolKeeper system is increasing the efficacy of the oven ventilation hood/fan system, will enhance efficiency of the Test Facility's HVAC system, will improve worker comfort in the kitchen/prep area, and may decrease natural gas consumption for heating the ovens.
7. Based upon collected testing data and calculations performed in this evaluation, Pennoni has determined that the CoolKeeper system will provide for significant energy savings in the Test Facility as a result of the improved oven ventilation hood/fan system efficiency and conservation of energy demands associated with heating and cooling.

Based upon Pittsburgh Pennsylvania weather conditions, and assuming an electricity rate of \$0.1/kWh and a natural gas rate of \$1.5/therm, we calculated the annual electrical utility cost saving is \$251, and gas saving is \$144 for each oven. For two ovens on site, the total savings are \$792 per year. All estimates are approximate based upon field data and assumptions stipulated.

LIMITATIONS

The conclusions presented herein are based upon and subject to the proposed Scope of Services for this evaluation (PRO11-21270) and we have performed our evaluation and generated the conclusions regarding the efficacy and ROI associated with the CoolKeeper system in the limited application described herein. Additionally, the conclusions presented are based upon assumptions referenced herein and the limited information regarding the Site HVAC and other parameters as made available to us by the TMI, the Site Owner, and that which was able to be reasonable determined in the field.