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EnviroMont Case Study

Introduction.

The first installation of EnviroMont burners has now been in successful operation for over four years. To date over 1200 burners have been installed in 12 production lines at a major European baked-goods manufacturer.

In this time there have been no burner failures or replacements required. However this is not really a surprise for Mont Selas as the EnviroMont burner is based on a design principle which they have been using for over 10 years with great success and an excellent reliability record.

This case study is based on a typical example of the benefits of replacing existing ribbon type burners with EnviroMont burners which have produced energy savings of 22 %. Over the 12 lines converted the savings have varied from 15 % to 28 %, as the benefits are dependent upon the exact configuration and operating profile of the oven.

Another significant benefit which has been clearly demonstrated has been significant improvements in product quality. In some cases this has been through reduced cross-band variations in product quality parameters such as product colour, height, spread and final moisture. Cross-band heat variation is a well-established problem with ribbon-burner type ovens and the EnviroMont burner has proved an effective basis for the improvement and resolution of this issue.

The improved efficiency of this burner, as the result of the increased direct radiant heat from this design, means that the variable cross-band heat from a tri-zone burner can be more effectively controlled and targeted on the problem areas.

In other cases the improved efficiency of the burner has been used to increase overall heat levels in the oven. This can be used to improve product quality and consistency by ensuring that product is produced to the target specification for moisture and colour rather than operating at the top-end of specification (and above) due to a lack of sufficient heat in the oven.

The improved efficiency and heat output has also been used to improve product throughput. Of course in these cases the increased heat output from the original level will reduce the actual energy savings but the other benefits have been deemed more advantageous overall.

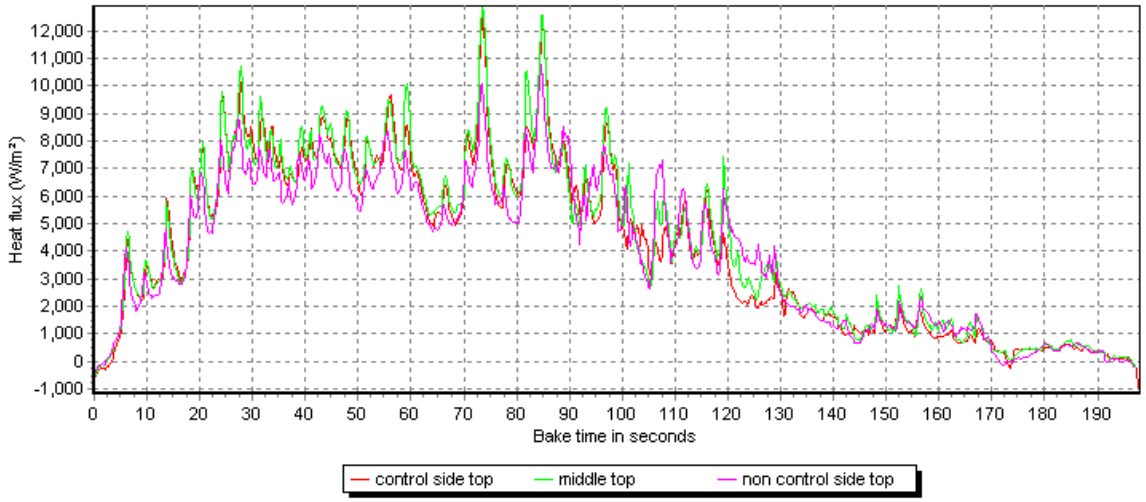
Case Study Oven:

This is a six-zone, multi-burner Direct Gas Fired oven (63 metres long) made by Baker-Perkins which was originally fitted with 100 tri-zone ribbon burners.

Pre-Check Audit:

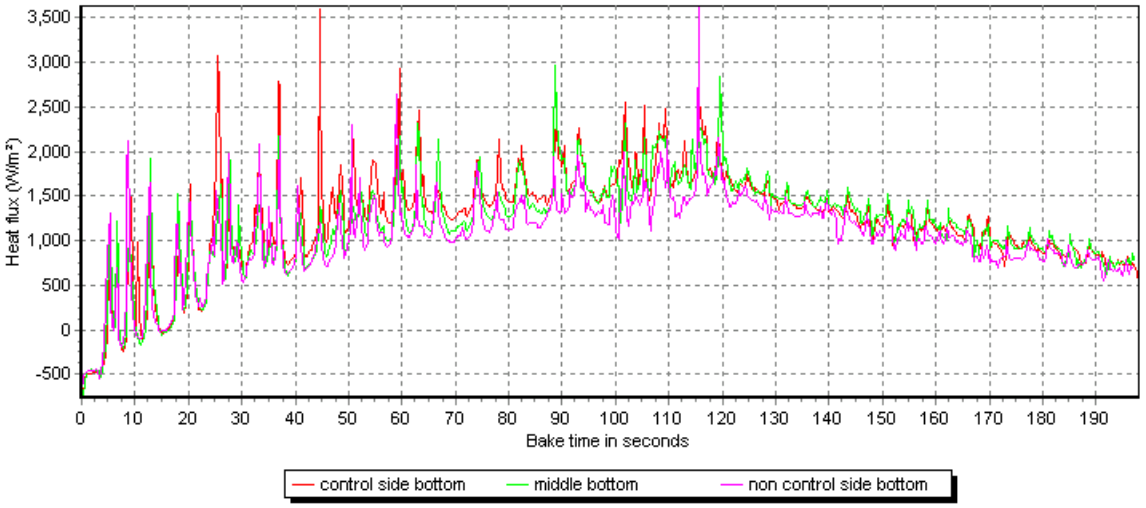
Prior to the burner conversion a full audit of oven performance was undertaken to establish the pre-installation (base line) gas consumption, heat-flux profile, throughput and product quality parameters. Over a three-hour period of continuous production the base line gas consumption was established to be 86.3 m^3/hr.

Pre-Check Top Heat Profile



As the above graph shows there was a quite marked cross-band variation in top heat with more heat available on the centre of the band leading to paler, high-moisture product on each side of the band. This is a common problem on many multi-burner ovens even when fitted with tri-zone ribbon burners.

Pre-Check Bottom Heat Profile



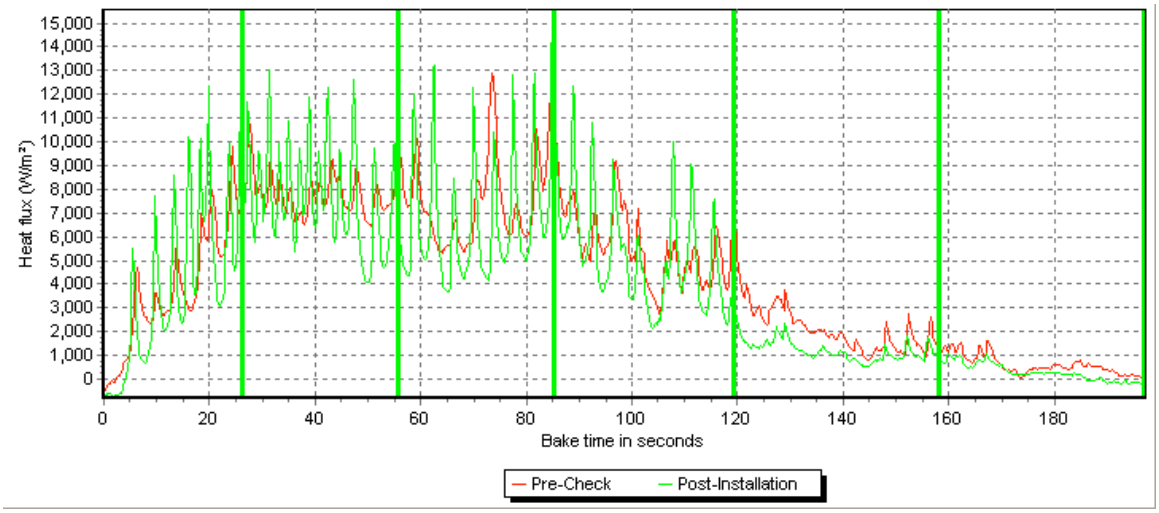
The bottom heat profile also exhibits some cross-band variation. This appears to affect the non-control side in particular after 60 seconds of the 190 second bake.

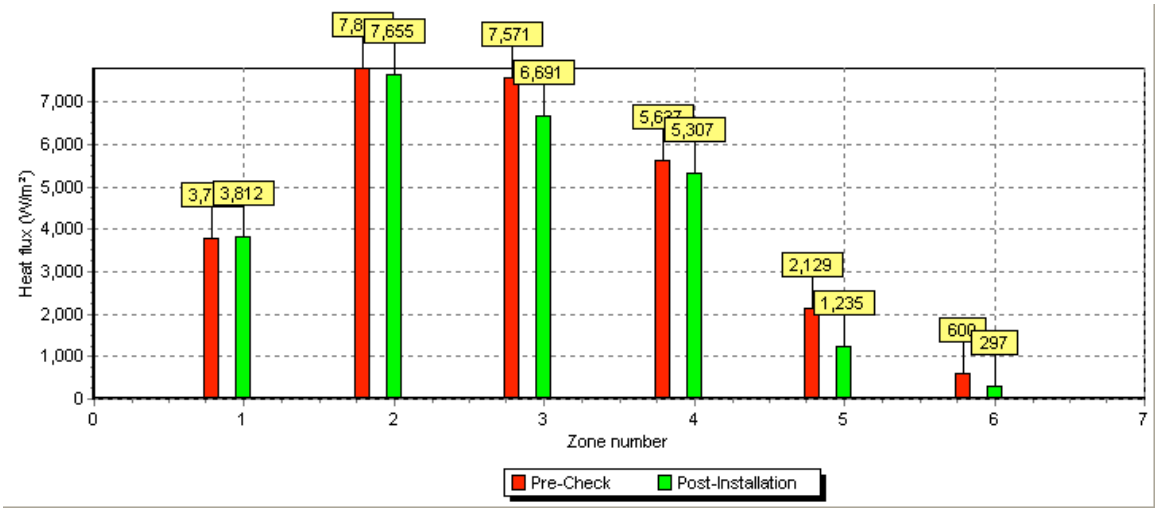
Post-Installation Audits:

For the first audit the oven heat profile was set to replicate the base line heat profiles and product quality values from the pre-conversion check.

For these conditions the measured gas consumption was 66.8 m^3/hr which represents a 22.6 % reduction in energy usage.

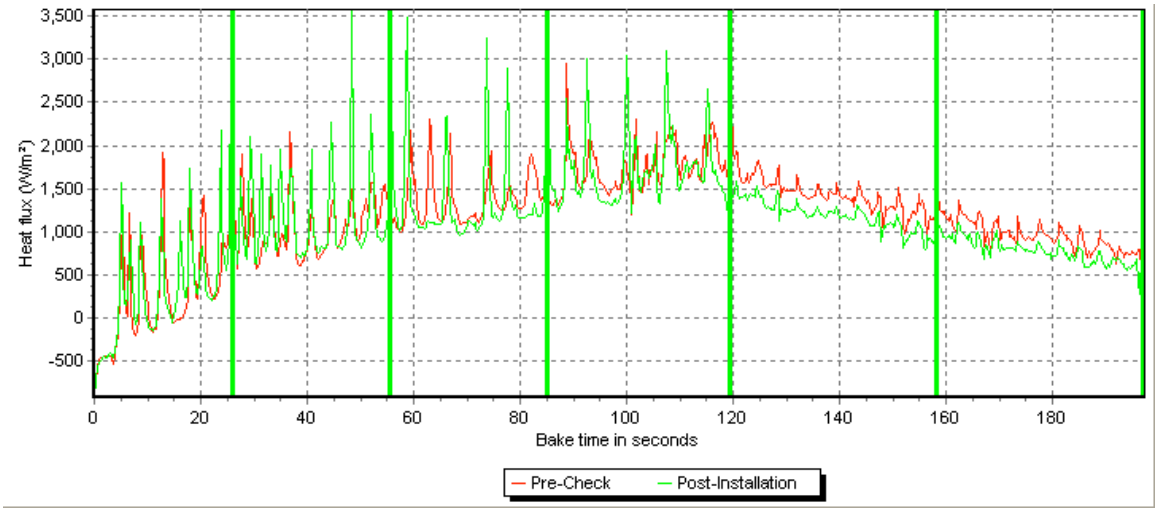
Post-Conversion Top Heat Profile

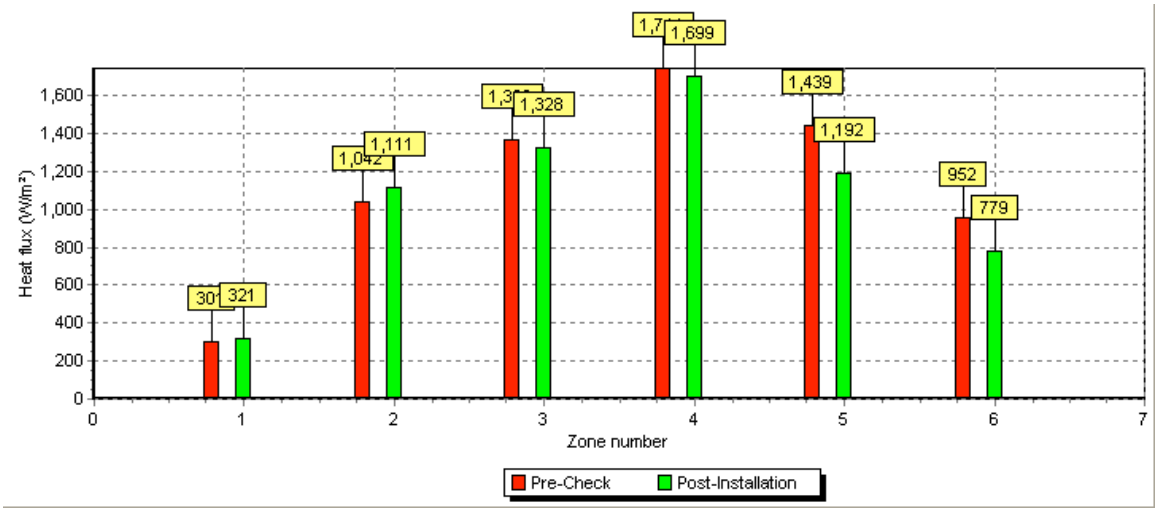




The heat profiles with the EnviroMont burner are noticeably different to the standard ribbon burners with a much “peakier” profile. These higher peaks are due to the extra radiant heat delivered by the incandescent Nitmesh behind the burner flame which also provides the efficiency improvement of the EnviroMont burner. However the potential negative impact of the higher peak is countered by the more significant dip in heat flux between the burners.

Post-Conversion Bottom Heat Profile



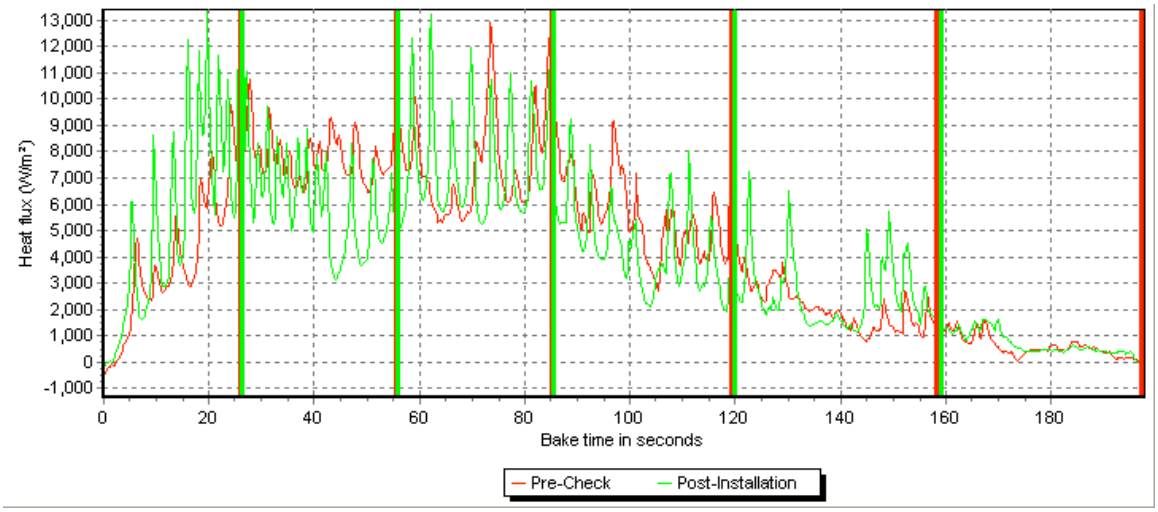


Overall both top and bottom heat profiles were reasonably well matched. Product quality parameters such as moisture and colour were also replicated. It should be noted that all the bottom burners in Zones 5 and 6 were off for both these audits and hence it was not possible to control and replicate the heat levels in these zones.

However as the improved efficiency of the EnviroMont burner also provides the opportunity for higher heat levels it was decided to sacrifice some of the energy reduction in favour of improving the product by reducing final moisture content as well as any cross-band variation of base colour.

For these higher heat levels the gas consumption increased slightly to 70.7 m^3/hr and hence reduced the efficiency improvement to 18.1 % but with significant benefits for product quality.

Top Heat Profile with Product Improvements

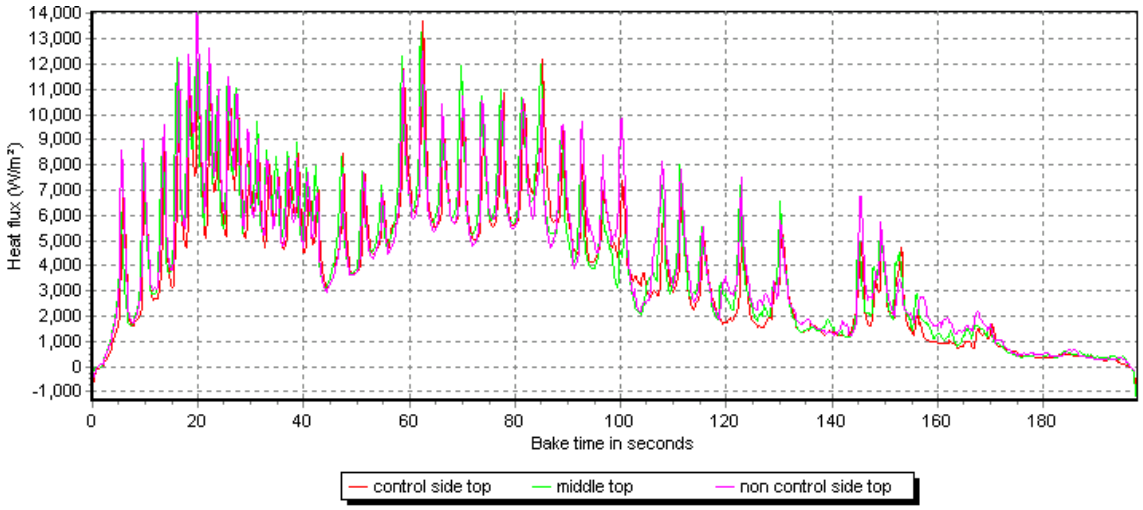


Bottom Heat Profile with Product Improvements

As one of the targets was to improve the base colour most of the extra heat was applied to the bottom burners. The result of these changes was a significant 0.5 % reduction in the final moisture content for only a small reduction in the energy efficiency improvement.

The cross-band heat variation, both top and bottom, has also been substantially improved as shown below.

Post-Installation Cross-band Top Heat Profiles



Post-Installation Cross-band Bottom Heat Profiles