

Case Study

Balaji Multiflex reduces energy costs with NIRA LEL

About the customer

Balaji Multiflex Pvt. Ltd., is a well-known manufacturer of flexible packaging materials based in Rajkot, Gujarat, India. Over the years, this company has gained a reputation of being a manufacturer and supplier of high quality packaging materials to a wide range of industries for various packaging functions.

Challenges

The management of Balaji Multiflex realised that increasing raw material costs and a growing need for emission control would make it necessary to explore new technologies. Balaji Multiflex were convinced these new technologies would help reduce overhead costs such as those associated with production, energy (electrical and thermal), and consumables, and thereby help them increase profitability.

Balaji Multiflex (as with most converters) use rotogravure printing machines these machines consume a lot of energy (200,000 to 500,000 kcal/hr) for the heating of the drying stations that are a part of these machines. The drying stations use energy to dry the wet film and evaporate the solvents used in the printing process, after which the air is exhausted into the atmosphere. This hot, solvent-laden exhaust from the dryer still carries around 60-70% of the thermal energy that was fed into it. Hence, there is great potential to recover this energy which otherwise wasted.

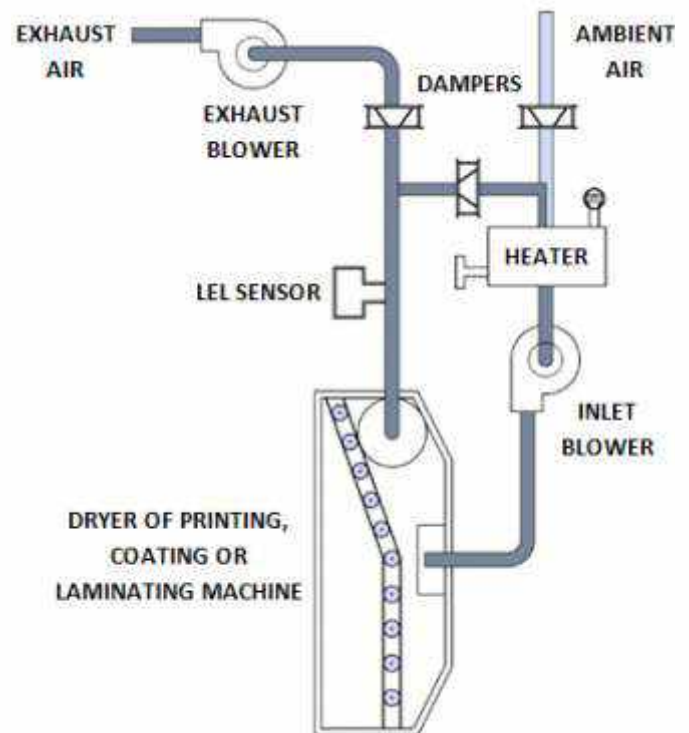
For reasons of safety, during solvent-based converting processes, the concentrations of solvents in the air need to be controlled and maintained within a specified percentage of the Lower Explosive Level (LEL) value of the solvents used. An increase in the solvent concentration beyond this threshold LEL increases the risk of an explosion that could be dangerous to the human life as well as capital machinery. Hence, Balaji Multiflex approached A.T.E. for a safe and sustainable solution.

Solution

After a careful study of the challenges faced by Balaji Multiflex, A.T.E. recommended the high precision N.I.R.A continuous LEL monitoring and control solution for energy savings coupled with safety.

About the N.I.R.A LEL System

The LEL monitoring system analyses the concentration of solvents (in g/m³ and % LEL) in the air. A part of the hot air leaving as exhaust can be automatically recirculated back into the inlet air channel while making sure that the solvent concentration in the exhaust air is below the threshold LEL value. This is done by the use of automated dampers that receive the appropriate inputs of the solvent concentration through the blower. Because of ATEX zone 1 and SIL 3 certified sensors it can be installed on outlet air channels. Due to its dual source and dual receiver construction, the NIRA infrared LEL sensor is completely calibration free. These sensors have a very short response time of 2 seconds, meaning that any changes in the solvent air mixture is quickly recognised and responded to, thus ensuring maximum safety.



Schematic of NIRA LEL monitoring

Result

Balaji Multiflex were very happy with the N.I.R.A. LEL system recirculation of 60-70% of the exhaust air, resulting in 30-40% savings in thermal energy.

- Operator alarm when the solvent concentration reaches higher levels.
- Interface between production and LEL monitoring system stops the machine when the solvent air mixture crosses permissible limits.
- Savings of INR 1,32,047/- per month resulting in a payback of less than 2 years!
- Improvement in product quality, with low amounts of residual solvents on the substrate.
- Continuous LEL monitoring during recirculation of solvent laden air.



Temperature difference calculations

Before NIRA LEL automatic air recirculation

Parameter	Without Recirculation
Average Dryer Temperature	55 °C
Average Inlet Temperature	31.33 °C
Temperature difference (ΔT)	23.56 °C

After NIRA LEL automatic air recirculation

Parameter	With Recirculation
Average Dryer Temperature	55 °C
Average Inlet Temperature	40 °C
Temperature difference (ΔT)	15.11 °C



After NIRA LEL automatic air recirculation

Parameter	Without Recirculation	With Recirculation	Difference
Total Air volume (m3/h)	27,845	17,505	10,340
Energy in kcal/hour	1,96,725	79,350	1,17,375
Fuel saving per month in rupees (25 days X 12 hours)			1,32,047
Savings/month			1,32,047

Mr Pranav Bhalara, Director Balaji Multiflex Pvt. Ltd. said —

“We are now completely sure that our system is working in safe conditions, thanks to the NIRA LEL monitoring system. This is an essential diagnostic tool for monitoring LEL values at each print station. Overall, NIRA LEL met all my initial expectations and I am satisfied with the operation and performance of this system.”



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