



PolyOne™ ColorMatrix™ Joule Reheat Additive

Proprietary IR Absorber

PolyOne™ ColorMatrix™ Joule reheat additive is a proprietary IR absorber manufactured and marketed by ColorMatrix worldwide for use in PET resin formulations suitable for carbonated soft drinks and beverage applications.

In order to deliver the best blow molding performance, it is customary within the conversion industry to establish 'recipe' guidelines per resin/per supplier as different PET resin production technologies and different specific resin formulations can significantly influence the blow molding performance. Such recipes define the overall power input as well as the lamp configuration and other important process variables consistent with the resin and preform/bottle design.

'Recipes' are usually developed by experienced blowing technicians and are subsequently locked into the blowing machine and dialed up on request. Occasionally, technicians from the equipment manufacturers are used to establish the 'entitlement' performance of a particular machine and most major manufacturers have technical service teams to help with this activity.

As a major supplier of additives and colors to the plastics industry, ColorMatrix has, in the course of supporting its customers worldwide, developed best practice guidelines for its products which it provides as a free service. Such advice, for example how to set up blow

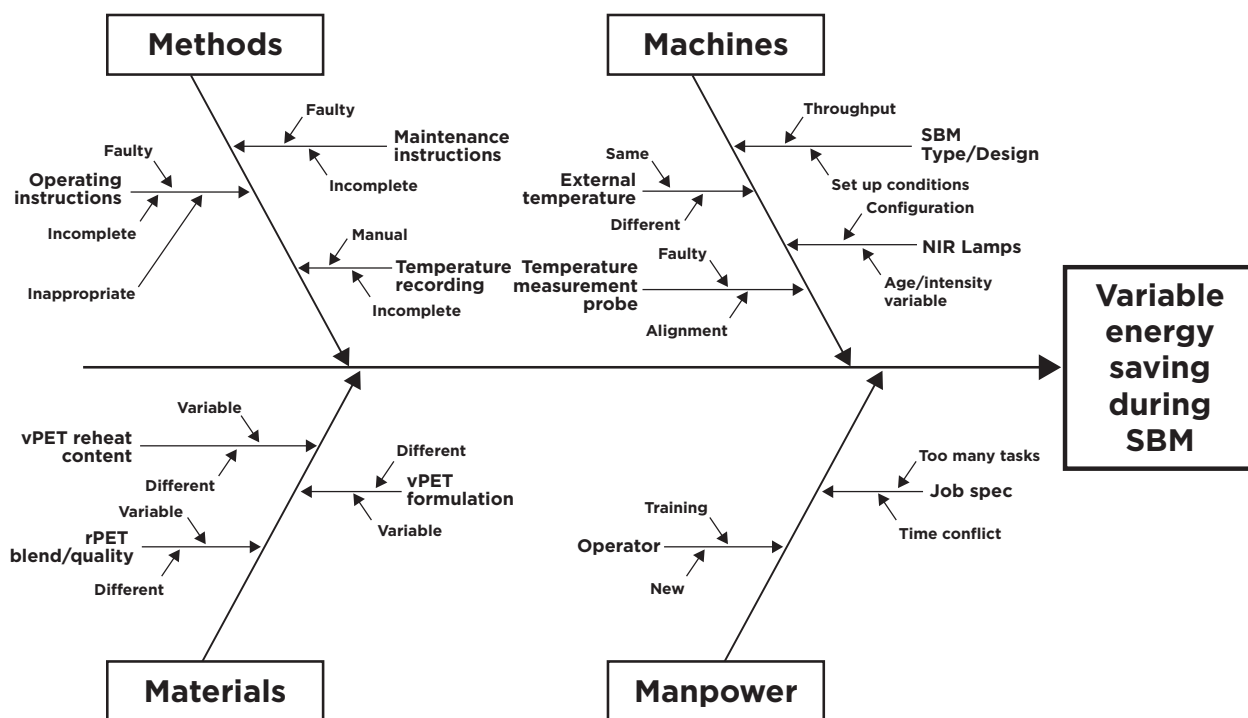
molding machines, is not equipment specific and therefore ColorMatrix would always recommend using local or expert technicians in addition to following best practice points listed below;

- Preforms should be conditioned for minimum 24 hours prior to blowing
- Preforms should always be used in a FIFO manner (First In, First Out)
- Octabins of preforms should be segregated and blown per resin type, i.e. not mixed with other resins
- A preform traceability system should be in place such that any process upsets can be quickly followed up and corrected
- Enhanced QC preform checking resources for bottle distribution, aesthetics and integrity should be on-hand during the performance optimization trials
- Prior to any process optimization, the blowing machine performance should be verified as being within normal i.e. accepted standard ranges and all important components and control features are working satisfactorily. Maximum speed output should be attainable prior to any 'recipe' setting trials

- When starting to process a new resin, first run through new preforms for 15 minutes at 'standard' conditions to establish steady state conditions prior to any process optimization
- Slowly start to reduce preform blowing temperatures until failures are present (visible pearl internal wall or pearl feet)
- Increase blowing temperatures until defects are eliminated
- QC check bottle quality for acceptance versus established tolerances
- Change the power consumption profile in the ovens for early heat and longer sink times but ensure overall temperatures do not exceed cold crystallization temperature
- Repeat temperature reduction stage and then defect elimination stage to test if further optimization is possible
- Recheck QC bottle quality for acceptance versus established tolerances
- Log all process parameters and create new specific 'recipe' for future use

The diagram below shows many of the variables that are typically present during stretch blow molding and this illustrates the complexity of the whole process. It should be recognized that due to this complexity, achieving consistent blowing performance could be regarded more of an art than a science and a high degree of technical competence, rigorous maintenance, thorough operative training and constant vigilance during operation should always be exercised.

CAUSE AND EFFECT DIAGRAM



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