

Quality control during the manufacturing of PV back-sheets:

A fundamental key component to the long term performance of PV modules

Robin Kobren – Research Manager at DUNMORE Corporation

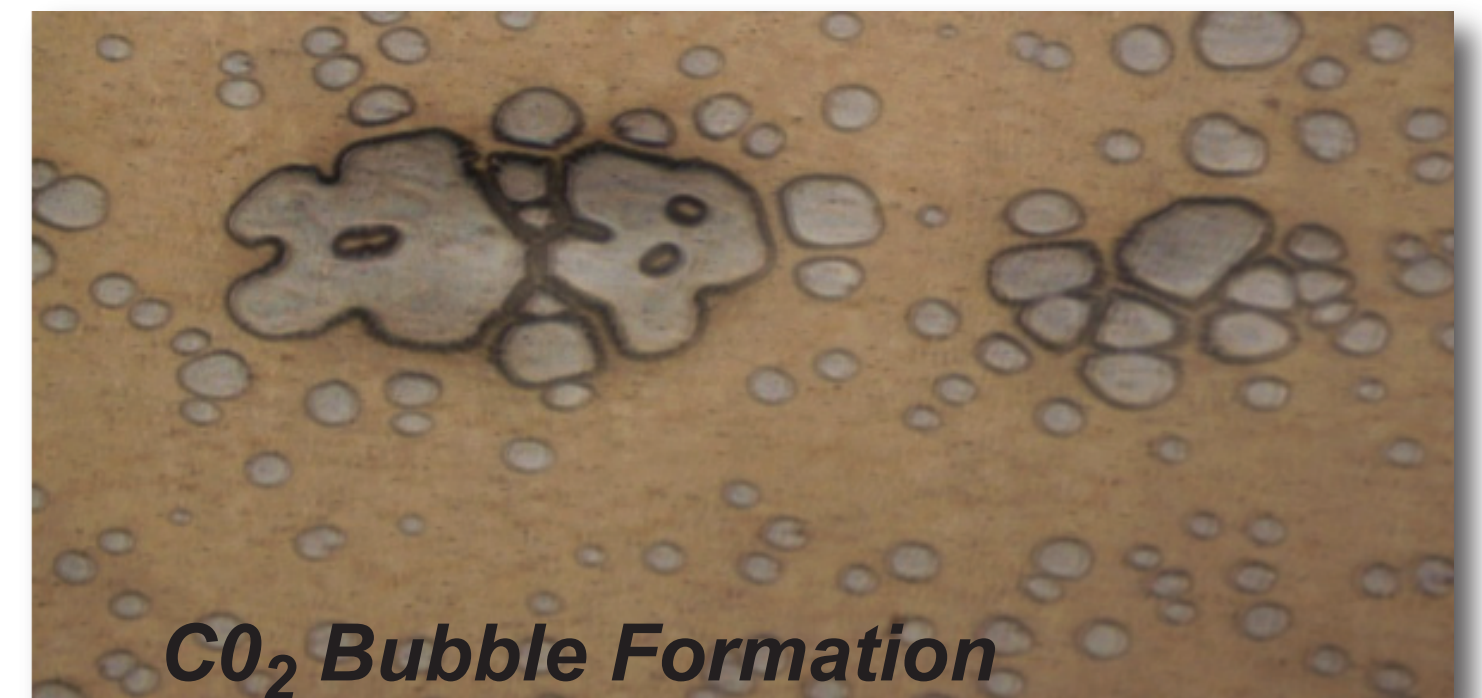
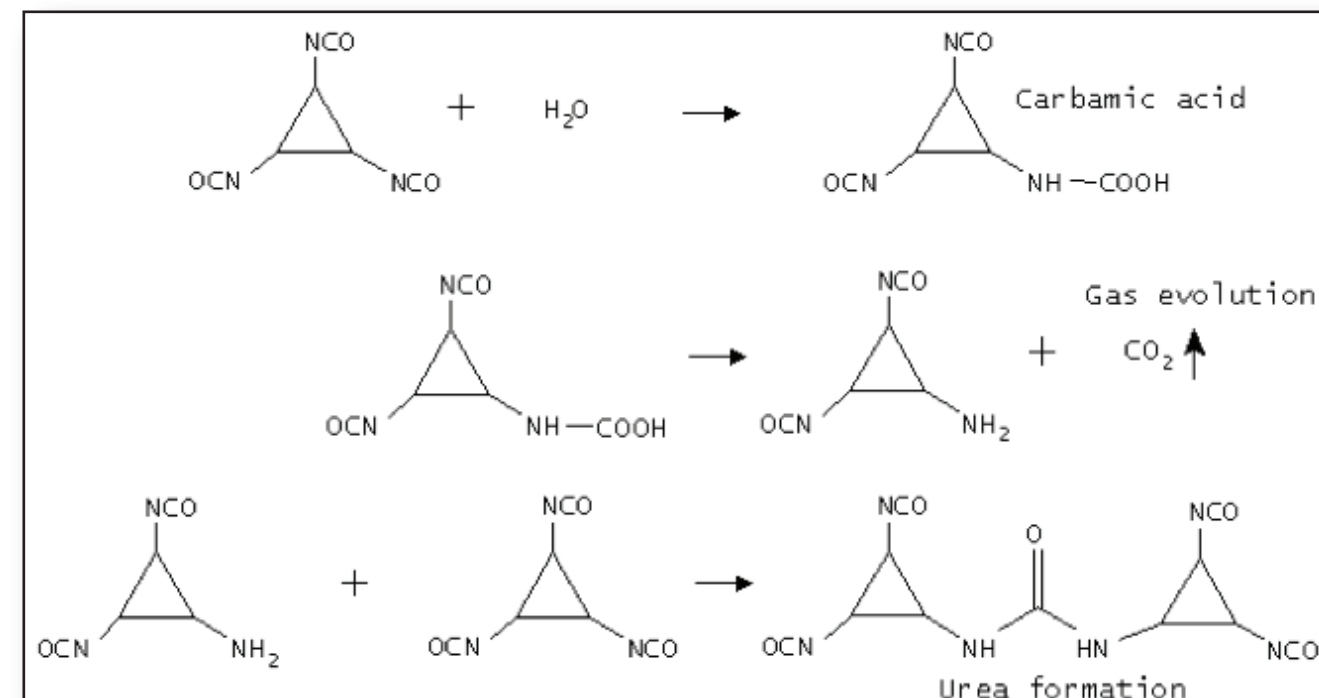
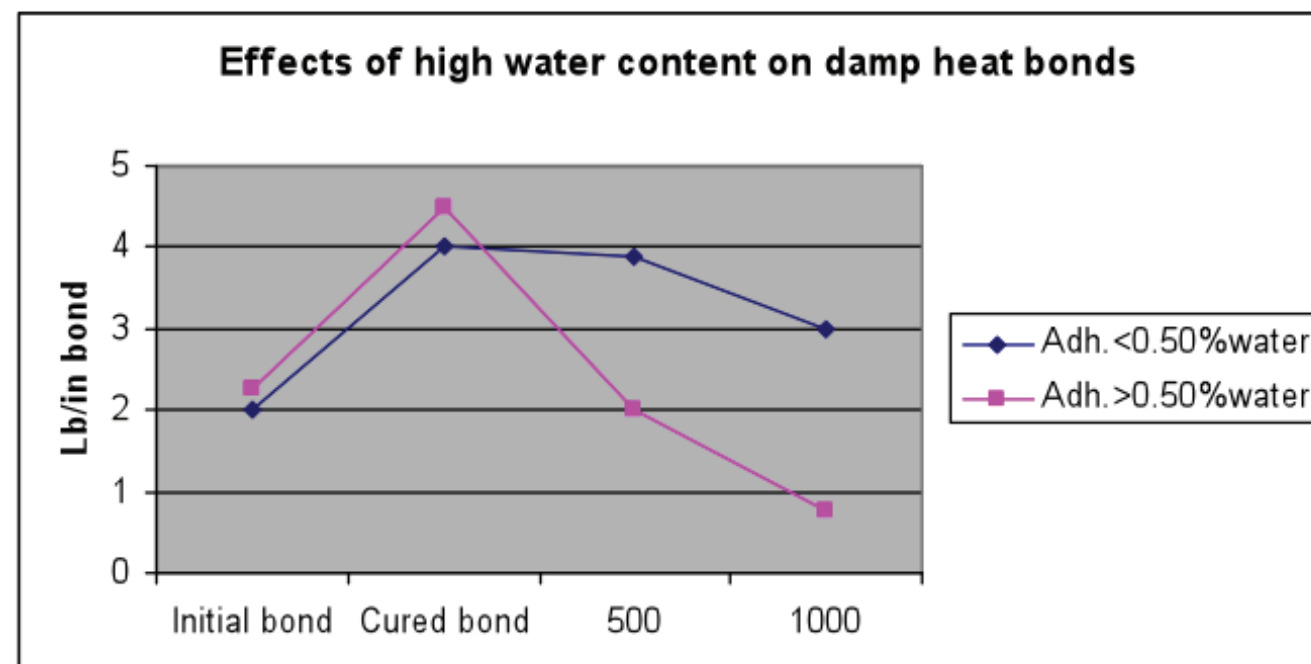


ISO 9001: 2008
Certified

Incoming Raw Components

Chemicals - %H₂O

When polyisocyanates come in contact with water, they react to form a unstable carbamic acid. The carbamic acid immediately decomposes to carbon dioxide and amine. The carbon dioxide can form bubbles in the film and the amine, once formed, reacts rapidly with others to form polyureas. If reaction with water predominated, the polyol would not be fully crosslinked and resulting films would have very poor properties.



%NCO and OH # (ASTM D2572-97 and 1899-02)

Confirmation of stoichiometric NCO:OH ratios are necessary to ensure that they are correctly balanced. If the NCO to OH ratio is less than 1.0/1.0, the adhesive will be “undercrosslinked” and it becomes a less durable outdoor coating. A NCO to OH ratio higher than 1.0/1.0 results in “overcrosslinking” that could lead to harder and a more brittle cured adhesive.



Chemicals: Color

Signals M.W. distribution out of spec or high water content.



Films: FTIR Analysis and Surface Energy

Low dynes will reduce bonds and junction box adhesion.



In Process

Coat Weights

Direct correlation to all bond values

Solvent Retention

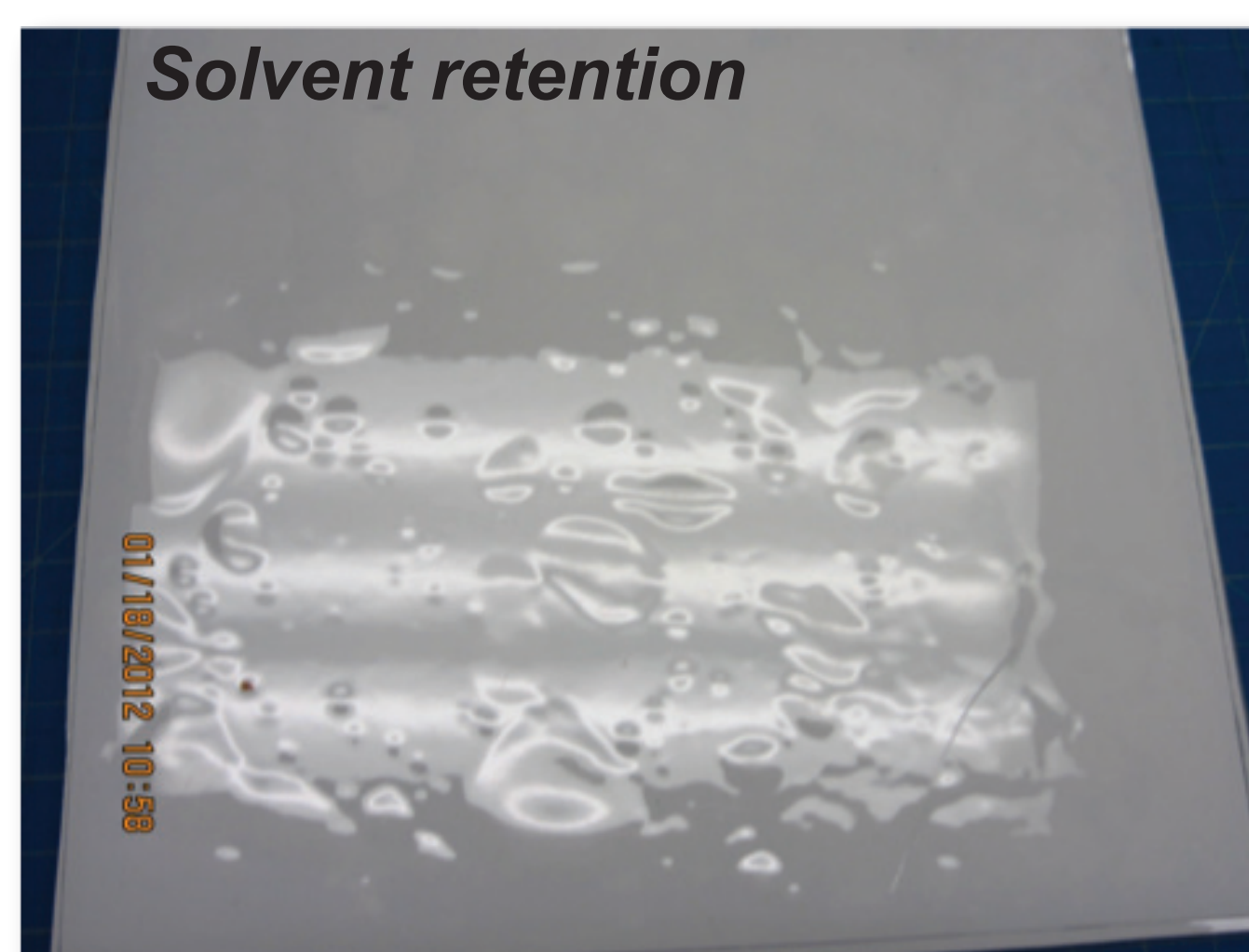
High % SR will result in bubbles during vacuum lamination

%H₂O

Nitrogen filters should be used to minimize water absorption of polyol

180/T Peel Bonds (green)

Signals coat wt. and mix shelf life



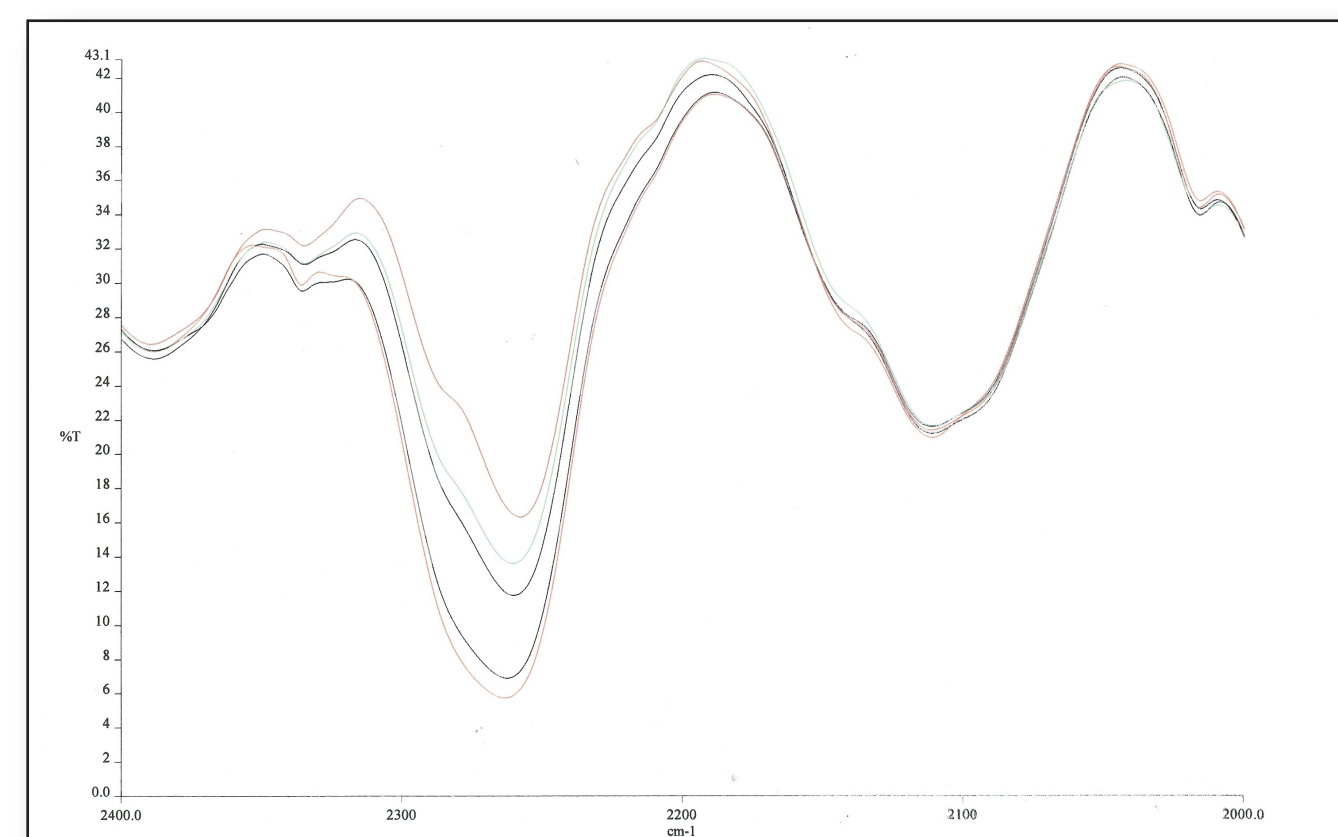
Finishing

180/T Peel Bonds (cured)



%NCO conversion

Inadequate cure will result in bubbles and delamination after vacuum lamination.



Abstract

Quality control is critical in the manufacture of PV back-sheets because process and raw component variability can adversely affect the reliability of installed PV modules. This poster will state the reasons why it is necessary to carry out a quality control program during PV back-sheet manufacturing to ensure that safety and reliability standards are met. Moreover, this work marks the guidelines to following for the basic quality control testing procedures that must be present throughout the manufacturing lifecycle as well as demonstrates the affects on the PV modules if critical parameters are not met.

This poster contains no confidential information