A computational model for doctoring fluid films in gravure printing

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To be presented at the 18th International Coating Science and Technology Symposium (ISCST), September 18-20, 2016, Pittsburgh, PA[1]

The wiping, or doctoring, of residual liquid presents a fundamental barrier to resolving fine features in gravure printing. The presence of a residual fluid film left behind after doctoring undermines printed feature sharpness, especially as feature sizes become smaller. In this work, a multi physics model was developed and implemented to represent the physics underpinning the residual film formation. Through the model-validation process, two key aspects were revealed. First, deformation of the doctor blade body contributes to reducing the predicted residual film when compared to a rigid blade body. Second, the model is sensitive to the particular portion of the doctor blade that is wetted during doctoring. Given the sensitivity to the wetted region, altered blade profiles are examined to further push the limit of the residual film thickness. Doctoring over features is also examined with a three-dimensional model to address other forms of printing quality defects.

*Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000

[1]Unpublished. ISCST shall not be responsible for statements or opinions contained in papers or printed in its publications.