Modeling and Analysis of a Rotating Turret Winder in Roll-to-Roll Manufacturing Systems

Article

Authors

Aravind Seshadri and Prabhakar R. Pagilla

Publication Information

Conference: American Control Conference (ACC) June 17, 2013, Pages: 6667-6672

Abstract

The process of manufacturing products using roll-to-roll (R2R) methods involves unwinding of thin, flexible material in rolled form into machinery for processing and winding of the processed material into a roll. This paper describes modeling and control of a rotating turret winder in the rewind section of a R2R printing press. Governing equations for web speed and web tension within the rewind section are described by taking into consideration the motion of the rotating turret winder. Data from production runs of an industrial R2R printing press are analyzed to determine web behavior during a wound roll change sequence accomplished by the rotating turret. Model simulations are conducted and data from these simulations are compared with typical data from production runs. The key challenges associated with controlling web speed and web tension in a rewind section containing a rotating turret winder are discussed along with recommendations for machine and control design to achieve improved regulation of process parameters.

Link to the article