

MSE SEMINAR

March 23, 2018
113 McBryde Hall
3:30 – 4:30 PM
Refreshments at 3:00 PM

Kelly Bessette

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“Stresses in the Adhesive Bond in Servomotor Applications”

ABSTRACT

Servomotors are used in multiple applications including aerospace and defense, industrial automation, and medical imaging. Many servomotor designs operate at high speeds and magnet failures can cause total motor failure if a magnet de-bonds from the rotor, especially in applications where the magnet is bonded to the rotor with adhesive and there is no secondary retention method. This failure is more prevalent in designs where the rotor and magnet mass are large. Using Newton’s second law applied to rotational motion, the centrifugal stresses on the adhesive bond are estimated in a steady state condition. Interfacial shear and peel stresses are determined using elastic beam theory with a simplified model of the magnet, adhesive, and rotor assembly into a 3-layer system. These methods provide a simplified look at the stresses experienced by the adhesive layer between the magnet and the rotor and provide insight into failures on larger magnet and rotor designs.

BIOSKETCH

Kelly Bessette is a Masters of engineering student under Dr. Reynolds and graduated from Virginia Tech with a bachelor of science in Engineering Science and Mechanics in 2011. She has worked for Kollmorgen in Radford, Virginia for almost 7 years, starting as a Motor Lab Test Engineer before transitioning to a Test and Materials Engineering Role in 2013, and then was promoted to Senior Materials Science Engineer in October of 2017. She provides technical support to their plating department, production, and design groups with material qualification and failure analysis as well as new material recommendations.

Other projects she has worked on are determining chemical compatibility of non-metallic components on Kollmorgen’s AKMH product line, defining specifications and qualifying materials for the second generation Advanced Kollmorgen Motor (AKM2G) and project managing the UL approval process for the AKM2G design. Currently she is working with AKM2G design team to characterize magnet failures and explore different rare earth magnet surface treatments to prevent corrosion and how to enhance bonding with post-processing methods.