UNIVERSITY TRANSPORTATION CENTER FOR RAILWAY SAFETY

Exhibit F - UTCRS

UTC Project Information	
Project Title	Prototyping and Testing of Electrically Conductive Thermoplastic Polyurethane (TPU) Railroad Suspension Pad
University	The University of Texas Rio Grande Valley (UTRGV)
Principal Investigator	Robert Jones, Ph.D., Mechanical Engineering (PI) Constantine Tarawneh, Ph.D., Mechanical Engineering (Co-PI)
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Funding Source(s) and Amounts Provided (by each agency or organization)	Federal Funds (US DOT UTC Program): $63,251 Cost Share Funds (UTRGV): $20,868
Total Project Cost	$84,119
Agency ID or Contract Number	DTRT13-G-UTC59
Start and End Dates	February 2017 – August 2018
Brief Description of Research Project	This research will take formulations of carbon nanofibers in thermoplastic polyurethanes (TPU), which have shown promising levels of electric conductivity, for use in a conductive steering pad, and prepare them for deployment in a commercially viable product. Plain elastomers are insulators and prevent transmission of current from rail to frame to signal door or gate opening devices. In addition, the thermal insulating properties of these materials reduce the rate of heat flow from bearings through the bearing adapter and into the side-frame, where it can be dissipated. Previous studies performed by the University Transportation Center for Railway Safety (UTCRS) revealed that traditional conductive additives, such as carbon black, must be applied at high volume fraction in order to generate sufficient conductivity, which in turn results in substantial increases in pad stiffness and

	degradation of pad durability. Vapor Grown Carbon Nanofibers (VGCNF) are extremely efficient conductive additives that can produce the desired conductivity at much lower concentrations and with less impact on mechanical performance than traditional additives. Prior efforts have identified a TPU carbon nanofiber combination and fiber loading that produces excellent conductivity, and results in an electrically conductive part when molded under commercially useful molding temperatures. The identified system first needs to be scaled from laboratory quantity testing to injection molding quantities, and then prototyped. Moreover, the microstructural contributions to conductivity as well as the allowable processing range need to be fully described in order to support process development and quality control processes in commercialization.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Pending Project Completion.
Impacts/Benefits of Implementation (actual, not anticipated)	Pending Project Completion.
Web Links • Reports • Project webs	http://www.utrgv.edu/railwaysafety/research/mechanical/2017/prototyping-conductive-tpu-railroad-suspension-pad/index.htm