I/UCRC Executive Summary - Project Synopsis		**Date**: March 2019
Center/Site: CANFSA/Colorado School of Mines		
Tracking No.: 28 Laboratory Testing to Identify Permanent PVD Coatings to Minimize Lubricant Use During Forging	**Phone:** (303) 384-2301	**E-mail:** kehe@mines.edu, kclarke@mines.edu, smidson@mines.edu
Center/Site Director: M. Kaufman/A. Clarke/P. Collins		**Type: (Continuing)**
Project Leader: Trevor Kehe (UG researcher), Kester Clarke and Stephen Midson (advisors)		**Proposed Budget**: $40,000
Project Description: CANSFA is working to identify how a different coating on open faced dies affects the friction associated with forging operations for given materials. These coatings will be placed on open dies using physical vapor deposition (PVD), and other techniques. In order to test different coatings, a modified open die system will be required, where multiple replaceable faces/surfaces for the dies with different and unique PVD coatings on each face can be tested.		
Experimental plan: Design and manufacture a set of forging dies with capability to have PVD coatings applied and can be used at temperatures up to 400°C. Use these dies to perform ring forging tests with various materials to measure frictions conditions.		
Related work elsewhere: Previous work in PVD coatings have been performed in the late 1990s and before.		
How this project is different: Current PVD technologies have created new coatings that might improve performance.		
Milestones for the current proposed year: Produce forging dies, coat die inserts with various PVD coatings, and perform friction testing.		
Deliverables for the current proposed year: Completed forging dies, testing, and annual report.		
How the project may be transformative and/or benefit society: Creating forging dies with lower friction will allow for longer service duration, faster production, and the potential to produce parts that were not previously possible, transforming manufacturing capabilities.		
Research areas of expertise needed for project success: Metallurgical engineering, PVD coatings, forging, die manufacture.		
Potential Member Company Benefits: Advanced forging die technologies.		
Progress to Date: Dies have been designed and manufactured. Testing of friction conditions for uncoated dies to evaluate baseline friction conditions has been completed, and four sets of dies have been PVD coated. Two of the tested coatings show significant reduction in friction coefficient when tested at room temperature without lubricant.		
Estimated Start Date: Spring 2017	**Estimated Knowledge Transfer Date**: Spring 2019	

The Executive Summary is used by corporate stakeholders in evaluating the value of their leveraged investment in the center and its projects. It also enables stakeholders to discuss and decide on the projects that provide value to their respective organizations. **Ideally, the tool is completed and shared in advance of IAB meetings to help enable rational decision making.**