

Friction and Wear Issues in Conventional Energy Extraction Infrastructure

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Conventional energy extraction represents a significant portion of the Albertian and Canadian economies. While often not a primary focus of the industry, there are several factors impacting the lifetimes of the infrastructure used in energy extraction. Often the focus on low-cost steels, the ease of manufacturing and other factors out-weigh the short lifetimes of the infrastructure. Recent efforts to modernize, increase the lifetime of the infrastructure and reduce overall costs have highlighted some systematic friction and wear issues that are impacting this sector. Focusing on hydraulic fracturing, the constant recycling of the water used in the process results in high salt concentrations in the fracturing fluid as well as the entrapment of hard, irregularly-shaped debris in the fracturing fluid. The combination of the salinity and the particles in the water causes excessive corrosion issues for the steel pipes carrying the fluid to and from the fracturing site. There are several mitigation standards that can be implemented to improve the lifetimes of these pipes, including applying wear and corrosion resistant coatings to the inner walls of the steel pipes and/or injection of wear and corrosion inhibiting chemicals into the fluid to protect the infrastructure. In this talk, we will discuss how tribocorrosion (tribology + corrosion) can be used to find solutions to optimizing the performance of the systems. While this data only begins to tackle the larger issues relevant to the industry, it demonstrates a systematic approach that we have taken that can support the industry in reducing costs and environmental impact during energy harvesting.