4th International Conference on GEOLOGY AND GEOSCIENCE

April 27-28, 2017 Dubai, UAE

Elastomer packers in petroleum drilling operations: Changes in swelling response and mechanical properties

Sayyad Zahid Qamar Sultan Qaboos University, Oman

Swelling elastomers are fit-to-purpose advanced polymers that undergo an increase in volume upon interaction with water or oil. They have been successfully used in the field of oil and gas drilling and development, for varied applications targeted at production from difficult-to-access, damaged, and previously abandoned wells. Swell packers make it possible to isolate water-producing and other unwanted zones, replace or reduce cementing operations in well completion, and slim down wells for significant reduction in material and energy footprint. For effective design and development of these applications, it is necessary to evaluate the amount of swelling and its effect on material response of the elastomer under actual field conditions. Various studies have been carried out over the last ten years at Sultan Qaboos University, Muscat for performance assessment and characterization of material behavior of swelling elastomers in petroleum applications. These investigations have been carried out through experimental work, analytical modeling, and numerical (FEM) modeling and simulation. The current paper presents some results from experimental investigation of some water-swelling and oil-swelling elastomers. Test procedures either followed standards laid down by ASTM and ISO, or were developed in-house for new types of tests in close collaboration with field engineers and rubber developers. Specialized jigs and fixtures, and dedicated test facilities were designed and constructed wherever necessary. Test parameters such as salt water concentration, type of crude oil, and applicable temperature were carefully selected to emulate actual well conditions in the region. Reported results include amount of volume and thickness swelling, hardness, and tensile properties of elastomer samples before swelling, and at various swelling stages.

Biography

Sayyad Zahid Qamar is currently associated with the Mechanical and Industrial Engineering department, Sultan Qaboos University, Muscat, Oman. He has worked both as a University Academician and a Researcher, and as a Field Engineer (mechanical), during his twenty-five years of professional service. His main research areas are applied materials and manufacturing; applied mechanics and design; reliability engineering; and engineering education. He has worked on different funded projects in excess of 4 million US dollars. He is the author of one research monograph (book), two book chapters, over 120 publications in refereed international journals and conferences and 31 technical reports. He has also edited two technical book volumes and is serving on the Editorial Boards of various well-known research journals. He has conducted experimental, numerical, analytical and stochastic studies in the areas of swelling and inert elastomers; solid expandable tubulars; metal forming process, product, and tooling.

sayyad@squ.edu.om

Notes: