

The Analysis of Emergency Shutdown Valves Torque Data in Terms of Its Use as a Health Indicator for System Prognostics

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Abstract : Industry 4.0 focuses on digital optimization of industrial processes. The idea is to use extracted data in order to build a decision support model enabling use of those data for real time decision making. In terms of predictive maintenance, the desired decision support tool would be a model enabling prognostics of system's health based on the current condition of considered equipment. Within area of system prognostics and health management, a commonly used health indicator is Remaining Useful Lifetime (RUL) of a system. Because the RUL is a random variable, it has to be estimated based on available health indicators. Health indicators can be of different types and come from different sources. They can be process variables, equipment performance variables, data related to number of experienced failures, etc. The aim of this study is the analysis of performance variables of emergency shutdown valves (ESV) used in oil and gas industry. ESV is inspected periodically, and at each inspection torque and time of valve operation are registered. The data will be analyzed by means of machine learning or statistical analysis. The purpose is to investigate whether the available data could be used as a health indicator for a prognostic purpose. The second objective is to examine what is the most efficient way to incorporate the data into predictive model. The idea is to check whether the data can be applied in form of explanatory variables in Markov process or whether other stochastic processes would be a more convenient to build an RUL model based on the information coming from registered data.

Keywords : emergency shutdown valves, health indicator, prognostics, remaining useful lifetime, RUL

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