



A Rockwell Automation Company

Enbridge Inc. Spearhead South Expansion - Motor Starting Studies

The Client:

As a transporter of energy, Enbridge operates, in Canada and the U.S., the world's longest crude oil and liquids transportation system. Since it was incorporated in 1949, the company now owns and operates Enbridge Pipelines Inc. and has a 27% interest in Houston Based Enbridge Energy Partners, L.P. (the Partnership). The Partnership is Enbridge's primary means of expanding in the USA. The liquid pipeline systems now comprise approximately 8,000 kilometers (5,000 miles) of pipeline in Canada and approximately 5,600 kilometers (3,500 miles) of pipeline in the USA, delivering approximately 2.2 million barrels per day in

2006. Enbridge has a growing involvement in natural gas transmission and midstream businesses, through the Alliance and Vector pipelines, New Brunswick distribution, and various other U.S. assets. As a distributor of energy, Enbridge owns and operates Canada's largest natural gas distribution company, Enbridge Gas Distribution, which provides gas to approximately 1.9 million industrial, commercial and residential customers.

The Requirement:

Among the deliverables of the project electrical studies, Enbridge US requested motor starting analysis using soft starters. Electrical power companies must protect their customers from system disturbances caused by other customers. They do this by imposing voltage flicker limits for all customers. Quite often the allowable magnitude is dependent upon the frequency of the occurrences.

Voltage flicker can be caused by many different circumstances. For the pumping stations it is caused by the main line pump motors. Voltage flicker is the

result of the rapid fluctuation of the voltage. This voltage flicker can be caused by falling or rising voltage.

Motor start studies require the investigation of various methods of starting the motor until one is found that will satisfy the constraints of the voltage flicker limit imposed. These utilize such methods as current limit, voltage ramp, current ramp, etc. for solid-state soft starters.

The Design Solution:

Flicker guidelines are obtained from the power company to set the limitation for motor starting. In some locations the utility system at the point of connection is weak and the voltage flicker guidelines are low so that alternative starting means, such as a VFD, are required.

Early design decisions selected Motortronics soft starters for this project. Based on the motors, soft

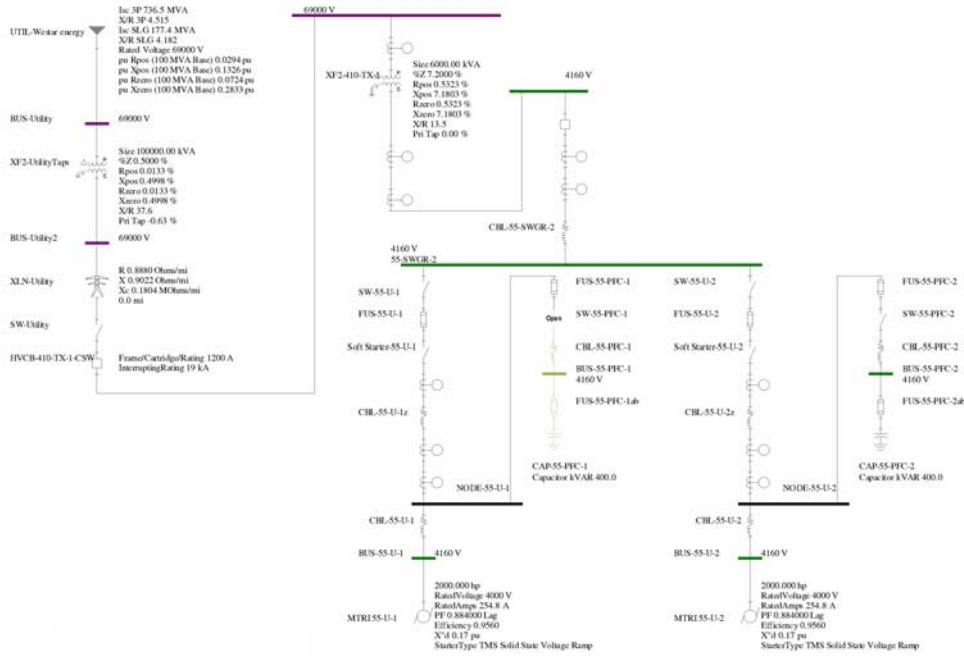
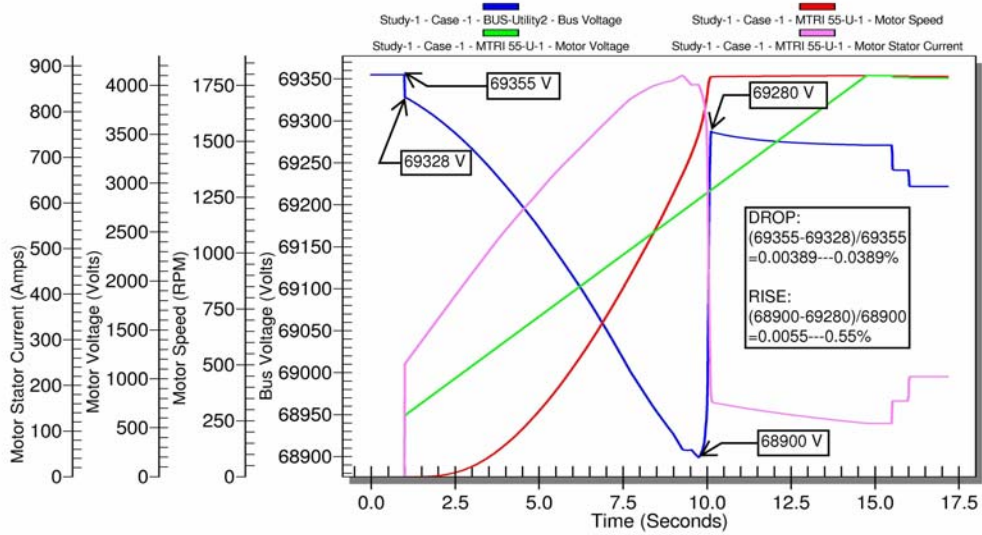
starters, and utility characteristics voltage ramping parameters were set in the soft starters.

Two stations were initially selected to have VFDs for hydraulic purposes and the studies showed that two more stations required VFDs due to voltage flicker limits and a weak power grid.



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Representative Sample Only

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