

SOUTHWIRE'S NOVINIUM UNDERGROUND SERVICES MODULAR INJECTION COMPONENT (MIC) REDUCES PROJECT COSTS FOR NATIONAL GRID THROUGH IMPROVED CREW PRODUCTIVITY

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HIGHLIGHTS

- National Grid injected over 5,000 conductor feet of aged cable during two separate trials of the MIC in 2019 and 2020.
- The MIC increased the number of segments addressed per week by reducing crew time spent per cable by 48%.
- National Grid reduced project costs and overhead by an estimated 15% due to productivity gains of MIC.

OVERVIEW

Cable rejuvenation improves the dielectric strength of water-tree damaged power cables and restores their reliability to like-new conditions. The sustained pressure rejuvenation (SPR) process typically requires a cable segment to be deenergized and the crew to be on-site for the duration of injection. The duration of the injection is variable and depends on segment length. The Modular Injection Component (MIC) enables energized SPR injection, allowing the crew to proceed to the next segment, reducing the crew time required spent on each segment.

THE COMPANY AND THE SITUATION

National Grid, an investor-owned multidisciplinary utility company in the Northeast US, serves more than 10 million natural gas and electric customers in New York, Massachusetts, and Rhode Island using thousands of miles of aging unjacketed XLPE URD cable. SPR injections have been performed on National Grid's systems since 2007. In that time, close to 1,700 individual segments were injected, a total of more than 750,000 conductor feet. National Grid prefers the SPR process because of the long cable life extension it offers.

THE MIC

The Modular Injection Component (MIC) is the first 200A cable accessory designed specifically for the SPR injection of energized, medium-voltage cables. The MIC is installed together with a standard length 200 amp elbow to create a termination capable of injection at pressure up to 200 psi, while energized at up to 28 kV. The MIC is a patented device that was developed as a collaboration between Southwire's Novinium Underground Services and Richards Manufacturing.

RESULTS

National Grid's Standards Group approved the MIC for field trial in June 2019 after identifying the MIC to fall under the same guideline as 200amp injection elbow already approved on their system. National Grid program managers recognized the MIC's potential to improve productivity on SPR injections. A field trial was soon scheduled for August 2019. Following this successful trial, a pilot project was performed in November 2020.

If the segment is a candidate for injection using the MIC, the segment is briefly taken out of service, for diagnostic testing, craft work, and the start of injection. The segment is then re-energized while the injection is ongoing, and the equipment is closed, securing the terminations. At a later time, injection is completed when Novinium crews return to remove injection equipment, which can be performed without de-energizing the segment or the presence of National Grid line personnel.



Figure 1: Assembling the MIC body onto the cable.



Figure 2: MIC termination in a transformer.

Southwire's Novinium Underground Services would like to acknowledge National Grid's support in advancing cable injection technology.



The crew time required to address each MIC termination during the two programs was recorded and saved into Southwire's Novinium Underground Services cable tracking system Knomentous. The data was used to create a model of the crew time that would have been required to address these segments using the standard SPR process. The model concluded that addressing segments with MIC reduced average crew time by 48% when compared to the standard SPR process. The MIC allows for applicable segments to be consistently injected using less crew-time per cable, freeing the crew to address additional segments. These productivity increases allow for more segments to be addressed, shortening project durations, and reducing the overall cost of the project. Additionally utility overhead costs are reduced and utility line resources are freed to perform other work. These gains equate to an estimated savings of 15% in overall program cost to the utility.



Figure 3: Completing MIC Injection.

SUMMARY

Using the MIC, National Grid was able to inject over 5,000 feet of energized cable segments while realizing the superior cable reliability of SPR injection.

- MIC increased crew productivity by reducing the time required to address an average segment by 48%.
- Improved productivity is estimated to reduce the overall project costs by 15% and free up utility line resources for other projects.