

# Utilities Leader, Leading a Digital Transformation in the Industry



**N**ational Grid is an owner operator utility that operates 2,400 substations in New York and New England, with 14,000 kilometers of transmission line and 7 million customers.

## Challenge

National Grid's intelligent substation design group needed to bring design up to the 21st century in their engineering offices. They could no longer sustain having up to 40 unique 2D drawings that described the same asset in a substation—with hundreds of substations in play, including complex urban brownfield projects as well as greenfield projects created to meet the ever-increasing customer demand. They needed to design and engineer as efficiently as possible. The team knew they needed a single source of truth.

Their vision: to put all of the information into a single model, and then export content as necessary to generate a bill of material, to generate elevation detail sections, and even to check clearances, electrically speaking. Doing

so would help increase the speed of their workflows and increase the accuracy of their output.

## Solution

For more than 10 years, National Grid has been relying on Bentley solutions, principally MicroStation. Helping a project team visualize and conceive of the designs in advance of generating the hundreds of drawings that go into this asset provided a leg up on the design process.

Process changes and benefits include:

- Converting vendor equipment outlines into MicroStation cell libraries—for use by any designer on any capital project—saves time on previously tedious manual work.
- MicroStation cell libraries support standardization when they have assets that are the same but are different in their geography, giving them the ability to carry over designs and design components from one project to another.
- MicroStation's measured distance commands automate the checking of clearances and generate bills of material from the data contained in the cells.

- Being able to output any view—plan, front, elevation—all at the click of a button, saves days, if not weeks.

- The ability to download orthographic images, and process the files in MicroStation, provides a visual rendering of a project to be used for project permitting and community buy-in.

- Generated reality meshes using context capture can be shared with project teams for dimensional inquiries and save on site visits and time in the field.

"This all fits into our greater vision of adopting BIM (building information modeling) at National Grid," states Tom Diorio, Lead Designer at National Grid.

## In Practice

National Grid's digital strategy was on full display during the final process of a station redesign. The outside contractor designing the project used the wrong voltage standards drawings — 13.8 kv when it was a 34 kv yard. It would have a lot of clearance issues with switches and other assets in the bays.

It was late in the game when this became known, and they needed answers fast. When meeting with the extended team, the contractor used 2D sketches that they'd redlined. The stakeholders were having an impossible time visualizing where they were in the yard and how things presented from one side to the other. Diorio explains that, "they asked us if we could do a 3D model of the part of the station where this problem existed, and if we could do it quickly. Since we had our standard model created for the 13.8 kv yard, and we were

able to take out most of those components and recreate what the contractor had done in their design, this didn't take long at all."

From there, National Grid was able to zoom in and address the biggest problem of the clearances with the under-hung switches. With their 3D model, they were able to actuate the switches to show what it will be like when the switches are in their open position as well as show that clearances would be met. When someone had a question, spinning the model to get the right view helped answer it. When a change was suggested, it could be made on the spot and the results seen immediately.


The stakeholders were quickly satisfied with the new design, and the intelligent substation design group was able to apply them to the 2D cut sheets needed for the new material to be ordered.

That clear and accurate visualization process cut down the design time by critical weeks.

## Results

According to Ken Allen, National Grid designer, "We've done studies on the efficiency gains and ROI of our technology advances, and we know we have achieved 60 percent less design time on some of our deliverables, which translates to at least an 11 percent design time reduction overall on current capital projects. Results that are significant and, of course, allow us to attain our critical milestones all the more."

Moving forward, Allen hopes to achieve 40 percent design time savings project-wide on capital projects, all while continuing to achieve optimum levels of standardization, higher accuracy and increased speed of production. And he goes on to say, "we're looking at efficiencies that stretch far beyond the design process. We're talking about the ongoing operations and maintenance of the asset, the ability for someone in our field personnel to hold an iPad with a 3D model up as a training tool for their technicians to be able to direct them as to switching operations, take measurements on the fly of an energized asset that they couldn't otherwise gain access to. All these benefits are present through the life of the asset."

For more information about MicroStation, visit [Virtuosity.com](http://Virtuosity.com) or scan the QR code. 

## Digital Transformation in the Transmission and Distribution Industry

See how National Grid's design group is successfully deploying digital workflows to accelerate and enhance project deliverables within an intelligent substation design.

Learn how the utilities industry leader is achieving benefits such as:

- Design time reduction—up to 60 percent
- Attainment of station critical milestones
- Early buy-in to project solutions
- Collaborative design



On-Demand Webinar

