

Study Committee B3

Substations and Electrical Installations

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Results and Lessons Learned from Early Adopters of BIM Technology for Substation Design

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Motivation

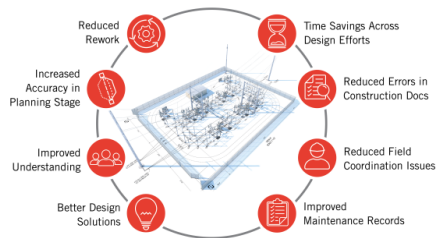
- The use of Building Information Modelling (BIM) tools and workflows may fundamentally change the way utilities design, construct, operate, and maintain substations. Potential benefits of adopting this technology include reduced costs, improved safety, and increased quality and standardization of designs. However, there are significant implementation costs and barriers to adoption, and the benefits actually achieved by utilities adopting this technology have not been well documented.
- The purpose of this study was to document results and lessons learned by utilities in the United States and Canada that have implemented BIM-based substation design.

Method/Approach

- Multiple electric utilities in North America have engaged a consulting firm to provide support for transitioning to BIM-based substation design.
- This work has enabled the author, who is employed by the consulting firm, to gather information on numerous implementations of intelligent substation design tools and processes.

Results with BIM-Based Design

- Savings in Design Time
 - Protection and control drawings: Estimated 40% reduction in design time
 - Physical design: Potential for major savings when digital assets can be reused; estimated 30% to 70% reduction in design time
- Cost Savings
 - Reductions in change orders associated with estimated savings of 1% to 4% of total contract cost (US\$100,000 to \$300,000 or more per substation), depending on project size/complexity
 - Total cost savings of 3% to 7% of project budget based on improvements in planning and estimating, efficiency of detailed design, and numbers of change orders
- Other Benefits:
 - Increased standardization of designs
 - Better coordination across disciplines and teams
 - Enhanced staff recruitment and retention
 - Decreased environmental impact through reduction in project timelines, energy use, and material waste



Summary of Documented Benefits with Use of Intelligent Substation Design

Lessons Learned

- Persuading utility leadership to invest in BIM-based design may be a significant challenge, despite the expected long-term value.
- Leadership needs to engage actively in change management to ensure a successful transition, especially for staff who are skeptical or resistant.
- There is a significant learning curve for use of BIM-based design tools, and proficiency requires extended use of tools after training.
- Adopting BIM technology requires implementing a system for organizing and managing a multitude of electronic files, which presents its own challenges.
- Adoption of BIM can help to recruit and retain designers who want use this new approach.
- When evaluating the business case for BIM-based design, utilities need to look at the complete lifecycle of a substation, including construction, operation, and maintenance, to document value added.

Conclusion

- The adoption of BIM technology can save utilities substantial time and money and improve quality and safety throughout the lifecycle of the substation.
- Successful implementation requires significant investment of resources and careful planning to address potential challenges.
- Results from early adopters in the United States and Canada suggest that implementation can result in considerable, quantifiable benefits but requires a comprehensive approach and long-term commitment to making the transition.