

# CASE STUDY

Facility Design

## Akzo Nobel Coatings, Inc.

Nashville, TN

For improved electrical service reliability and protection of process equipment, the Akzo Nobel Performance Coatings Plant needed to replace the Plant's primary electrical service. The primary electrical service for the 137,000 SF Plant was being supplied by three aged utility transformers that were susceptible to failure. In addition, each transformer included an ungrounded secondary, which can lead to transient overvoltage conditions, thus causing extensive damage to process and other equipment. Puckett Engineering was retained as a prime consultant for the planning, design, and construction administration for replacing the electrical service. A primary goal of the Owner was to implement the solutions without production downtime. This was achieved through detailed and creative planning, design, and collaboration with the Owner, utility company, and contractor. Puckett Engineering's solutions included the following:

- Intimate collaboration and coordination with the utility company.
- Evaluated replacement of three existing utility transformers with one larger transformer. Most cost effective and reliable solution included staying with three transformers.
- Planning the phasing of the project to avoid production downtime.
- Evaluate solidly grounded versus High Resistance Grounding system for electrical service. Solidly grounded was chosen.
- Changed utility metering from primary to secondary metering, saving the Owner the cost of 24x7 losses in utility transformers.
- Replacement of main switchgear.
- Multifunction metering capabilities on replacement switchgear for measuring and recording power, energy, and power quality parameters, including access via the Plant's local area network.
- Surge protection in replacement switchgear.
- Replacement of service entrance feeders.
- Evaluation of potential harmonic resonance conditions with the Plant's existing Power Factor correction capacitor banks due to the change in utility transformers' impedance.
- Fault current study to determine changes in fault current levels in the Plant's electrical distribution.
- Coordination study to determine settings for replacement switchgear devices.
- Structural design for transformer pads and opening and closing of existing floor slab for installation of service entrance feeder conduits.
- Geotechnical design for transformer pads and controlling underground spring.
- Construction administration services were also provided, including coordination, equipment submittal reviews, site observations, testing, and closeout documentation.
- Special coordination and collaboration with Owner, contractor, and utility company during construction.
- Post monitoring of electrical service and review data for any adverse issues, such as detrimental harmonic voltage and/or current distortion, voltage levels, and power factor.

### PROBLEM OR NEED

Aged and ungrounded  
Utility Transformers

### PUCKETT SOLUTIONS

Replace transformers.

Solidly grounded electrical  
service.

Switchgear replacement.

Switchgear networked  
metering capabilities.

Surge protection.

Harmonics evaluation.

Planning and design to  
avoid production downtime.



Replacement Transformers

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Year Completed: 2014

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