

OK FOODS - PLANT 1 RENOVATION

by: Donald L. Yates, P.E.

INTRODUCTION

In November of 1993, Yates Engineering Services, Ltd. started the design of the electrical renovation of the oldest poultry kill plant in the OK Foods system. In starting the project Mr. Marv Schilling, Vice-President of OK Foods, laid down the following design goals: 1) Bring the complete facility into compliance with 1993 NEC requirements; 2) Design the project so there would be no production down time; 3) Analyze the primary system (12.5 KV) and propose changes to increase reliability; 4) Provide spare capacity in the new system for future additions.

Mr. Donald L. Yates, P.E. assumed the design team leadership role. In this capacity Mr. Yates was responsible for the electrical design work, coordination of project requirements with the Owner and coordination of other engineering disciplines. Mr. Yates worked closely with Mr. Les Saulsberry and Mr. Darrell King, who both functioned as project managers for the Owner.

EXISTING ELECTRICAL SYSTEM

Since there were no drawings of the existing electrical system, a thorough field investigation was started. Working on weekends, the design team gathered as much information as possible about the facility. With the help of an electrical contractor, Bieker Electric, Inc., the team mapped out the electrical system of the facility over the next month.



Figure 1 - Existing Electric Room

The facility's electrical system was served from 12.5 KV primary, owned by OK Foods, which fed a 3750 KVA padmount transformer. In addition, this primary served several other large transformers providing power for other OK Foods' processing facilities on this site. The Plant 1 transformer fed six disconnects located in various locations in the plant. The largest concentrated load in the facility was located in the engine room. This load consisted of approximately 1300 horsepower of ammonia refrigeration compressors. The remainder of the load was mostly smaller motor loads in the production areas and lighting.

The facility was in extremely poor condition when the renovation was undertaken. Over the years abandoned electrical equipment, conduits, wiring, etc. were simply left in place. These contributed to the general state of confusion regarding

the operation of the electrical system. The facility also had some severe safety hazards, such as a mostly abandoned electrical room located above the maintenance area. This electrical room had equipment on all four walls, with wires protruding from wireways and open switches. Most of this equipment was abandoned, but some did still feed active loads.

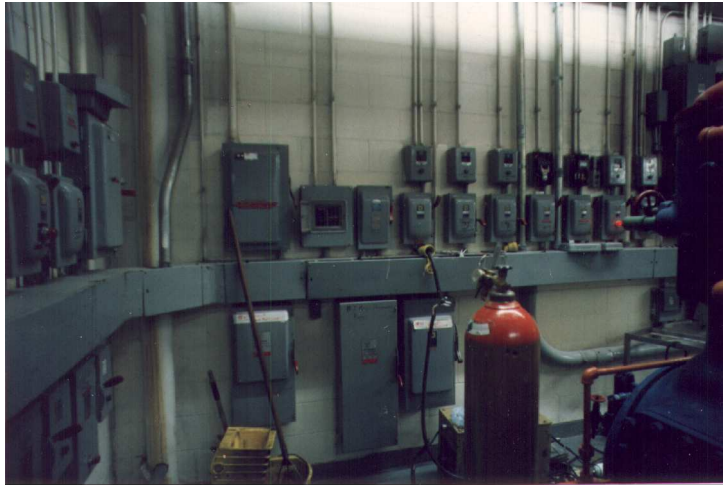


Figure 2 - Engine Room Before Renovation

DESIGN OF NEW ELECTRICAL SYSTEM

With the field investigation well under way, it was now possible to start making design decisions. Mr. Yates, working closely with Mr. Saulsberry and Mr. King, decided that a new electric room would be built adjacent to the maintenance room. A standard OK Foods arrangement, 2-2500 KVA transformers, feeding 2-3000 amp switchboards, would be utilized to feed the plant. New underground primary would be installed to serve these transformers and also provide a looped underground feed to these transformers and one additional 2500 KVA transformer serving the Reed Lane facility. One of the main switchboards would be dedicated to the engine room load while the second switchboard would be used to serve the remainder of the plant load. Several motor control centers would be used to feed the various motors located throughout the facility and "Spectra" style panels would be used for other power loads.

The engine room presented the biggest challenges to design success (see photo #2). The area was fed from the 3750 KVA transformer into 2-600 amp switches. The individual loads were fed by tapping the load side conductors of these switches. These conductors were located along the wall in wireways. To minimize equipment down-time was a high priority in this area. The best way to achieve this requirement was to install two new motor control centers and several "Spectra" style panels. This would allow the Contractor to energize the new equipment and then transfer loads in an orderly manner.

The production areas in this type of facility are extremely wet and corrosive due to washdown requirements. The conduits used in this area were a mixture of various types in a state of disrepair. It was decided that all conduits in the wet areas would be either PVC coated rigid or PVC. PVC would only be used along the ceiling areas where it was not subject to physical damage. These requirements necessitated that all conduits throughout the production areas be replaced.

The design process was completed in approximately three months. This fast time frame was due to the Owner's active involvement during the design process. Mr. Shilling, Mr. Saulsberry and Mr. King have a high degree of expertise in the design and construction of these facilities. They provided positive direction for the Engineers during the design process and actively participated in the design decisions.

CONSTRUCTION

The Owner negotiated a Contract with G.E.R., Inc. to serve as General Contractor

on this project. Electrical Sub-contractors would be Bieker Electric, Inc. and Hughes Electric. Hughes Electric would be responsible for all primary work, new switchgear, new motor control centers and new panels. Bieker would take the responsibility of bringing the wiring systems of the facility into compliance with plans and specifications. The cost of the project was \$1,400,000.00 and was scheduled to be completed in 18 months. Yates Engineering Services, Ltd. was contracted to perform construction administration on the project.

Construction started on the electric room since it was the key to the project. The new equipment had to be installed and energized so existing loads could be refed. The primary work also started at this time with new conduits being installed, transformer pads being poured and overhead primary work on the riser poles commencing. In addition, removal of all abandoned electrical equipment and conduits started.

The project continued on-schedule and when the new electric room was completed, loads started being transferred. This was a complicated process, since this work could only be done on weekends. All equipment had to be operating by Sunday night when the first shift of workers came in. Bieker Electric in close coordination with the Engineer and Owner used a combination of methods to accomplish this work. New motor control centers and panels were installed in locations where they did not effect existing electrical equipment. This new equipment was then used to temporarily feed other loads to clear space for the remainder of the new equipment.

In approximately 14 months, the project was completed within budget. The Contractors had succeeded on minimizing plant down-time while bringing the facility into compliance with NEC requirements.

THE FIRE

On December 13, 1994 at approximately 1:00 PM, everyone in our office received quite a shock when it was announced on the radio that the OK Foods plant was on fire. The production areas of Plant 1 were completely destroyed by this fire which originated in the box room (later determined to be caused by arson). Mr. Donald Yates was summoned to the site at approximately 3:00 PM to provide drawings of the facility and provide assistance at the fire scene. The drawings were utilized by firefighters and OK Foods personnel to assess the damage. Mr. Yates toured the burned-out plant at approximately 9:00 PM to determine the damage to the electrical system.

The electrical system in the production area was a total loss. However, the new electric room and the engine room survived the fire. The new switchgear had in-fact played a large part in preventing an even larger catastrophe. By isolating the engine room on one set of switchgear, it had been possible to deenergize the plant areas for the firefighting effort, and leave the engine room energized to allow personnel time to purge the ammonia lines over the fire area. This prevented what could have been a major ammonia leak. which would have been a major health risk for fire fighters, plant personnel and the residents who live in the vicinity of this plant.

REBUILDING

The effort to rebuild the plant started immediately. OK Foods contracted with

Nabholz, Inc. to lead to design and construction effort. Nabholz assembled a design team that consisted of Tim A. Risley and Associates - Architects, Yates Engineering Services, Ltd. - Electrical Engineers, Schmalz Engineering, Inc. - Structural Engineers and



Figure 3 - Plant Interior During Construction

Hathaway/Symonds and Associates - Mechanical Engineers. All the team members had previous experience in working with OK Foods and were able to hit the ground running.

The first priority for the electrical effort was to make sure sufficient materials would be available. With construction slated to start in four weeks, design

decisions had to be made very quickly. The Engineer working closely with Bieker Electric and the Owner, came up with estimates of the materials needed. Suppliers were notified, and they proceeded to work diligently to secure the materials.

The Engineer and Bieker Electric worked very closely during the design process. It was important due to the timing of the project, that the Engineer did not surprise the contractor. Review documents were provided to the contractor on an almost daily basis. Every few days, Mr. Yates would meet with Mr. Jeff Bieker and Mr. Brent Bieker (of Bieker Electric) to go over the proposed design.

The design process was completed in approximately six weeks. Bieker Electric was sitting ready as the precast tees were set on the structure. Once a tee was anchored, Bieker's personnel were running conduits and hanging fixtures. They had already stubbed conduits out of various panels, through or over the existing structure, and to a location where it would join with the new structure. This enabled them to energize the new light fixtures and equipment very quickly.

PRODUCTION STARTS

Approximately four months from the date of the fire, the evisceration area started production. Within one week from start-up, this OK Foods' facility was running at 98% of capacity. The cut-up area and cooler were completed by June 15, 1995. The facility changed from one of OK's poorest facilities to the flag-ship of their poultry production plants.