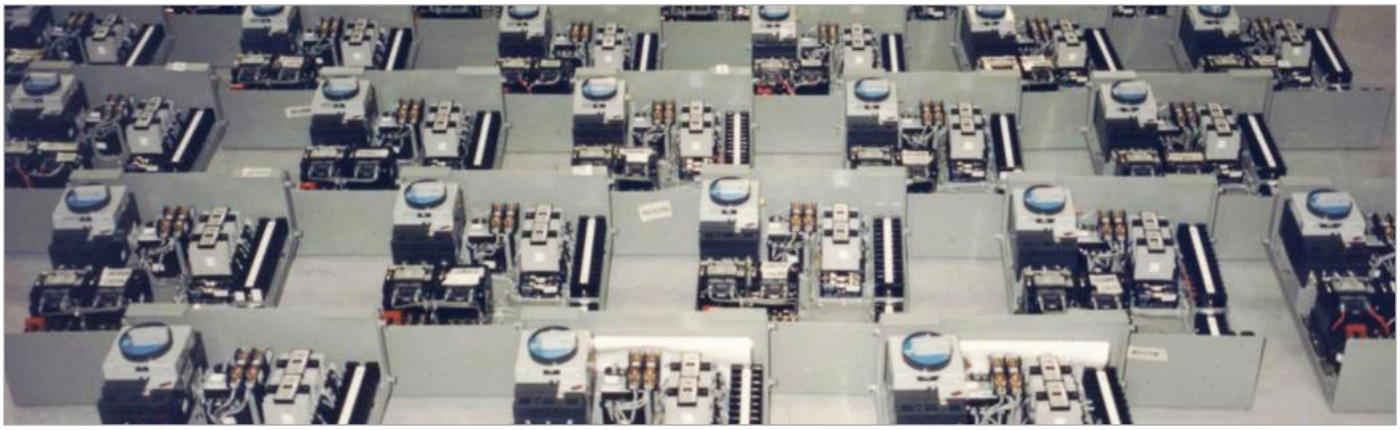
Motor Control Centers (MCCs)

ITE/Telemecanique and Legacy Brands

CURTISS-WRIGHT

Nuclear Power Products and Services



About

Curtiss-Wright Nuclear has a long history of developing solutions for obsolete parts and systems, including support of all manufacturers' Motor Control Centers (MCCs). This document highlights efforts in developing an obsolescence solution (OBSOLUTION) for the ITE/Telemecanique Series 5600 MCCs. The Series 5600 MCC was originally provided under a variety of legacy OEM names. Curtiss-Wright owns and maintains the engineering drawings and records for Telemecanique, Rowan, Gould, and ITE legacy Series 5600 MCCs, which are installed in domestic and international nuclear power plants.

FACTS

ITE/Telemecanique Series 5600 and Legacy MCCs

CHALLENGE

Obtaining replacement parts no longer supported by the OEM

SOLUTION

Reverse engineering, CGD parts substitution

BENEFITS

Improved operation, reliability, and maintenance

Background

The Series 5600 MCCs were used in safety-related applications with qualification provided by the original equipment OEM. Routine maintenance of MCC equipment often requires replacement of breakers, starters, and relays, as well as other components. Even when replacement parts are available from the OEM, it is generally acknowledged that it is an inherent challenge when an OEM product begins to change hands leaving a trail of "legacy" OEMs to deal with. Such is the case with the Series 5600 MCC. In addition, the natural advancement of an OEM's product line and obsolescence for these replacement components begins to produce another challenge.

Challenge

As the original MCC equipment began to lose OEM support and spare parts became obsolete, the challenge became obtaining replacement components that have the least impact on the established system. The challenges included both "fit" as well as "electrical performance". In many cases, the initial components that needed replacing were the breakers. As the breakers became obsolete, the desire was to replace them with a similar item that fit within the same "footprint", aligned with the operating mechanism/door, and had minimal impact on the existing time current curve.

The next challenge was associated with continuously energized coil items, such as starters and relays. This presented a unique challenge: NEMA standards had changed since the MCCs were initially installed. These changes affected the physical size of the starters as well as the operating voltage range. Changes in the breakers, starters, and relays lead the utilities to consider complete bucket replacements. With complete bucket replacements, there were additional challenges associated with selection of replacement components, bucket layout, mechanism/door alignment, as well as considerations for door mounted components. Curtiss-Wright provided solutions for both individual component replacement and total bucket replacement.

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Solution

Having a complete understanding of the issues associated with replacement components for the 5600 Series MCC, Curtiss-Wright Nuclear embarked on the solution process. To provide additional insight into the issues at hand, the Series 5600 motor control center line up and the rights to the original equipment qualification were acquired by Curtiss-Wright. This route provided a more thorough evaluation of fit issues and a better understanding of the qualification requirements for the replacement components.

Initially, the Curtiss-Wright engineering team reviewed the "time/current curves" for the installed breakers to identify replacement breakers which would provide the least impact on the system. Breaker adapter kits were provided to assure fit and alignment. The replacement breakers were qualified in accordance with the original equipment qualification report. The result was a best fit solution for breaker replacement without replacing the entire bucket.

Changes to the NEMA standards complicated the selection of other components. The NEMA changes resulted in a starter with a larger footprint than the original, which complicated space constraints within an already tight bucket. The newer standard also changed the minimum operating range to 85% of rated voltage instead of the 70% rating which was associated with the original equipment. Although Curtiss-Wright was able to provide replacement starters, relays, and other associated components for use in the original MCC buckets, the complexity of the challenges led toward a total bucket replacement solution.

Total bucket replacement introduced multiple "fit" challenges due to revised bucket layout and interface variations with the operating mechanism as well as the door. Tolerance build up due to all these variables had to be considered. Bucket replacement also required a detailed understanding of the initial bucket configurations. Given the electrical and physical constraints, Curtiss-Wright overcame the challenges associated with bucket layout, component selection, and fit-up issues. Rigorous levels of engineering were needed to achieve the various bucket layouts associated with multiple starter sizes and original bucket design performance requirements. Component evaluation and selection were crucial activities requiring in depth component expertise. Curtiss-Wright engineered a special design feature which allows an adjustment in breaker location of +/- 1/8 inch from center (left/right and up/down). This special design feature assures best fit and represents the best adjustment feature in the industry. The various bucket replacement configurations were then qualified in-house for safety-related applications.

Curtiss-Wright designed the replacement bucket to be as self-contained as possible by minimizing the components located on the door and taking advantage of pluggable terminal blocks. Thus the installation and removal process was facilitated.

Plants will replace individual components as long as possible, however certain sets of challenges may drive a plant to a total bucket replacement option. When pursuing bucket replacements, most plants choose to develop a prioritization strategy which generally replaces one line up at a time. This typically involves 20-25 buckets per cycle until the entire system is replaced. The plant may choose to use components from existing buckets as spares to extend the life of the program.

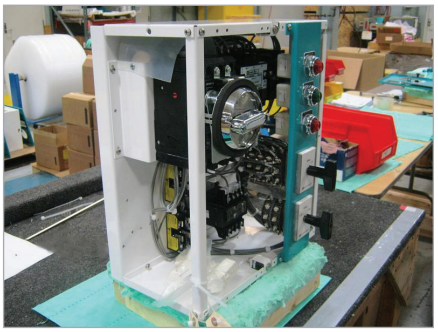
Some plants have chose to resolve the issue with a long-term solution: replacing the total bucket. On multiple occasions, Curtiss-Wright has provided over 400 buckets per order to support total bucket replacement programs.

Benefits

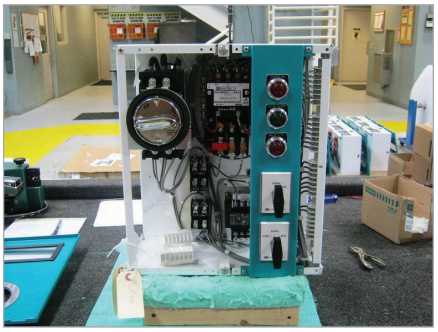
Curtiss-Wright's approach provides the customer with a complete engineered solution that addresses electrical, physical, fit, and coordination issues. Customers receive improved equipment operation, reliability, and simplified maintenance.

Summary

Curtiss-Wright provides the nuclear industry with obsolescence solutions for all manufacturers' MCC components, including engineering, parts procurement, fabrication, commercial grade dedication, and equipment qualification for individual components and complete bucket replacements. With experience identifying and overcoming challenges applicable to *all* manufacturers' motor control centers (not just the 5600 Series MCC), Curtiss-Wright's innovation and solution development brings value to customers.



MCC Assembled - Side View



MCC Assembled - Front View

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