Utilities Service Alliance's Material Cost Reduction project

Material cost reduction may be realized through cost-effective procurement scenarios, such as application of commercial grade dedication, reverse engineering, and electronic component repairs.

By Brad Vickery

The Utilities Service Alliance (USA) was founded in 1996. Current membership stretches from coast-to-coast and includes eight utilities and nine nuclear stations: Energy Northwest, Columbia; Luminant, Comanche Peak; Indiana Michigan Power Company, Cook; Nebraska Public Power District, Cooper; DTE Energy, Fermi; Xcel Energy, Monticello and Prairie Island; STP Nuclear Operating Company, South Texas Project; and Talen Energy, Susquehanna. These plants represent 14 reactors (six boiling water reactors and eight pressurized water reactors) and more than 15,000 MWe of generation.

The USA Material Cost Reduction (MCR) project kicked off in January 2017. The Nuclear Energy Institute's Delivering the Nuclear Promise initiative was in full swing as the utilities' chief nuclear officers created multiple focus areas for cost reductions at the plants.

The Utilities Service Alliance's organizational banners.

USA's MCR project plan

The objective of USA's MCR project is to achieve savings for each USA member through the implementation of targeted savings opportunities. In some cases, there are proven industry solutions (e.g., fastener/gasket surveys and standardization, third-party electronic component repairs, inventory optimization strategies, high-value commercial grade dedication) resulting in significant savings that have not yet been implemented at some (or all) of USA's nuclear stations. In other cases, new opportunities exist that need to be vetted, coordinated, and implemented as applicable.

The project was funded by the USA board of directors, and over the past three years, USA documented nearly $30 million in savings for its members. USA has multiple agreements with suppliers whereby the alliance can leverage its collective spend and fleet-like mentality to partner with suppliers and seek out low-cost alternate solutions to procuring, repairing, and sharing inventory. Highlighted below are two suppliers' contributions to the MCR project to illustrate the project's success. The most important institutionalized change management attribute is a new culture at the plants to seek out and find alternative low-cost solutions, even when it doesn't seem possible. Listed below are the strategies and methods used by USA members to achieve these savings.

Communications

Every change management plan requires a communication strategy to educate and engage the participants to gain alignment and support for the plan. Paragon Energy Solutions was and still is one of many key USA suppliers working on the MCR initiative. Together, USA and Paragon started what we internally called the "MCR Road Show." Its goal was to visit all nine USA stations within about a six-month period, starting in mid-2017. Meeting face-to-face with management and staff in supply chain, procurement engineering, quality receipt inspection, and design engineering and with representatives from plant projects or plant health committees was encouraged. The concepts explained below were introduced, and project schedules, actions, and savings metrics were established to measure progress and the success of the project. USA also set up a monthly MCR team call to review these schedules and actions. MCR updates were provided at the regularly scheduled USA board meetings.

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Having support from the chief nuclear officers was also very valuable during the early stages of the project, as the CNOs continually asked where they could help communicate the importance of the project to their teams. A second set of Road Shows was conducted in year two of the project to follow up face-to-face with plant personnel, answer questions, provide training on the tools used, and build mutual respect and trust with key participants who will ultimately institutionalize these concepts.

Long-term asset management

Long-term asset management (LTAM) plan reviews with plant personnel have turned out to be the most significant savings opportunities. LTAMs, or as some plants call them, long-term capital plans, long-term project plans, or long-term outage mod lists, are where the plants track the big modifications that are identified by their plant health committees (PHC) and most likely require approval from the plant finance committee or similar entity. During the USA/Paragon Road Show, personnel met with the plant staff and reviewed member LTAMs to see if Paragon recognized any components or systems where they had previously provided an alternate solution through reverse engineering, commercial grade dedication, or repair strategy. As potential projects were identified, it was USA's job to connect the right technical person from the plant with the right technical person from Paragon to discuss the project and potential alternative low-cost success paths. USA also provided the plants' LTAM reports to other key USA suppliers to review and suggest potential solutions.

Dave Mueller, Paragon's vice president of strategic programs, commented, "We discovered early on that success on avoiding a perceived costly modification and identifying alternate paths that would ultimately help sustain an existing component or system required not only collaboration, which we found to be the key to successful innovation, but also time, as many of these planned replacements were scheduled out a number of years, well before it got into the hands of the supply organization."

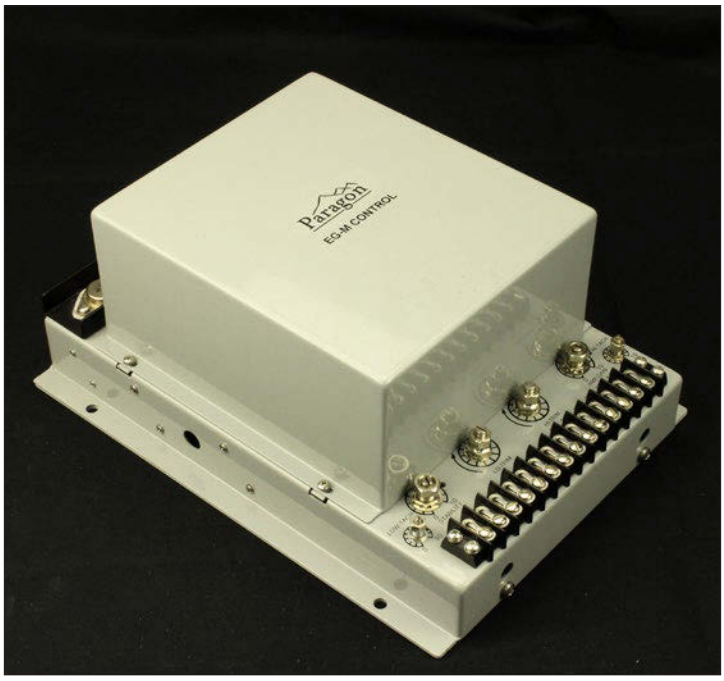
Mueller added, "We discovered that past obsolescence/modification successes by Paragon could quickly be transformed into significant cost savings once we shared and harnessed our collective resources. Once we were able to review the long-term asset management plans and included key subject matter experts and stakeholders, the perceived barriers to success quickly disappeared."

USA and its key suppliers maintain an ongoing LTAM project opportunity list for the USA plants. Suppliers are encouraged to visit the USA plants and reach out to supply chain and technical subject matter experts to discuss potential LTAM candidates, timing of the project, and potential alternative low-cost solutions. There is an element of risk involved that in some cases has led the plants to choose the original equipment manufacturer replacement parts at a higher cost than an alternative solution provided by USA-suppliers. The plant, of course, always makes the final decision based on its technical assessment and risk tolerance.

The following are two examples from the USA plants of the success achieved in this area:

■ Governor: Documented plant savings, $7,851,998.

The speed control system for the high-pressure coolant injection and reactor core isolation cooling turbines is an OEM electronic governor module (EGM)/electronic governor regulator (EGR) system. Manufacturing of this system was discontinued in the mid-1990s, and OEM support for repairs was discontinued. The OEM for the turbine did offer a digital replacement for the obsolete speed control system, and several other nuclear sites had already implemented the costly modification. Plant Engineering, working with Paragon, identified an alternative option



Paragon OEM electronic governor module

that could be completed to not only sustain the current product line but provide the plant a significant cost savings by eliminating the need for the modification. As a result, Paragon ensured the availability of spare units in the plant inventory, refurbishment of the electronic units (EGM and the ramp generator signal converter [RGSC]) and the actuator (EGR), and reverse engineered EGM and RGSC units from Paragon.

■ Butterfly valves: Documented plant savings, $622,000.

The plant was experiencing seat leakage with the Grinnell butterfly valves installed in its split bypass flow application to the steam generator preheater. The parts needed to refurbish the valve were obsolete, and the OEM was no longer in business. Supply chain reached out to a key supplier of the USA Alliance, Curtiss-Wright Nuclear, for solutions. Curtiss-Wright Nuclear put together a team to evaluate options and proposed a refurbishment project that involved reverse engineering of the seats and other components that needed replacement, along with a qualification testing plan at Utah Water Research Laboratories and NWS Technologies to qualify operability and design of the reverse engineered parts.

The reverse engineering of the obsolete components and the refurbishment of the valve allowed the plant to avoid costly design modifications and engineering costs that would involve alternative valve designs and having to reanalyze all the flows and failure modes of any valve replacement. Curtiss-Wright Nuclear

Top left: As found body. **Top right:** As found valve disc. **Bottom:** Finished valve body and disc.

(with its products and service brands Enertech and Nova) worked with the plant on the entire process and overcame hurdles along the way to successfully pass all qualification and operability testing and have a new source of spare parts. Joe Cinelli, Curtiss-Wright vice president of sales for North America, commented, "This project was a collaborative effort. By leveraging capabilities from businesses across Curtiss-Wright's Nuclear Division, we were able to develop a complex, cost-effective solution with long-term supply chain benefits."

Inventory optimization

USA nuclear plants have a combined total inventory value of $860 million. Analysis of the inventory indicates that approximately 20 percent is over the maximum stocking quantity, commonly called "surplus inventory." The surplus inventory is valuable to the stocking plant and other plants within USA and the industry. The question becomes how much each plant can stock, share, or sell to others without jeopardizing their own plants' equipment reliability. Paragon worked with USA to create a database called PeAks that allows USA plants to look across its members' inventory to buy, sell, and optimize stocking strategies to lower cost, identify savings, and reduce inventory.

Listed below are a few examples from the USA members identifying the success achieved in this area.

■ Commodity reviews: The USA MCR team, working with Paragon, used the PeAks database to select power supplies and circuit boards as the first commodity review candidates. Paragon generated reports showing the common parts that, in many cases, were being stocked by four or more plants. (Matched stock items reviewed for circuit boards, 888; for power supplies, 677.) Quantities on hand alone in many cases were enough to last multiple plants for many years, allowing the plants to reduce minimum/maximum levels and avoid buying new parts when they could buy and sell the surplus stock to one of the member plants. Surplus inventory is typically sold at book value rather than replacement cost between USA members.

Mueller commented, "The nuclear industry, and specifically the USA Alliance, due to the number of independent inventory data systems, has been slow to embrace technology that increases or could increase the opportunity to share common components. The MCR project, thanks mainly to the Paragon PeAks program, which contained the USA inventory data, initiated a project to review USA's common circuit boards and power supplies."

He added, "This effort was accomplished by innovation and collaboration. Paragon went to each site, met face-to-face with station subject matter experts, and from a prepared scope was able to review the list confirming the in-depth details found in the station inventory data base. This assured accuracy and ownership and provided the project confidence in the results and savings. One USA member commented, 'We never would have accomplished savings this significant without the human verification (trust but verify), and we would have never even started or thought about such a project without the PeAks tool.'"

Each plant evaluated its stock items to identify potential changes to the following inventory attributes: quantity on hand compared to minimum/maximum and other plants' stock on hand, zero on hand, obsolescence, critical spare and single point vulnerability applications in the plant, historical use, future demand, repairable/refurbishable opportunities rather than buying new from the OEM, shelf life comparisons to other plants, and expired shelf life trends to reduce write-offs of expired inventory.

USA used two savings identification methods for this effort:

■ *Inventory reduction*—Recognized when plants reduced the minimum/maximum for a stock item.

■ *Innovative strategic sourcing*—Recognized when a plant changed the normal procurement path to a lower-cost alternative, such as repairing rather than buying new, and used sourcing strategies such as purchasing surplus inventory within the alliance or available through a third-party supplier at a reduced cost.

Surplus inventory

As discussed earlier, surplus inventory is prevalent across the nuclear industry. Leftover material from construction placed in inventory at the startup of a nuclear plant, components and material left over from outages, and over-buying of parts for plant modifications have driven inventory values up across the USA plants and many others in the industry. Selling excess inventory at book value reduces a plant's inventory and benefits another plant. A plant must identify which parts to sell after doing its research to ensure that it is not selling critical plant assets that could impact its own plant's equipment reliability. The nuclear industry does support selling critical parts for emergent needs to other plants to support the greater good of the industry. Arrangements for replacement parts are established as part of the transaction.

The USA MCR project has also embraced the opportunity to buy and sell inventory across its plants and the rest of the industry. Using its RAPID Response service, Paragon is able to match up the right buyer and seller to achieve the best solution and price possible. Three USA plants documented surplus inventory sales of $123,000, $173,000, and $226,000 in a six-month period. USA's efforts to institutionalize this concept through the implementation of new processes enable the plants to easily continue to buy and sell surplus inventory. USA records through the first quarter of 2020 show increased participation and savings in this area.

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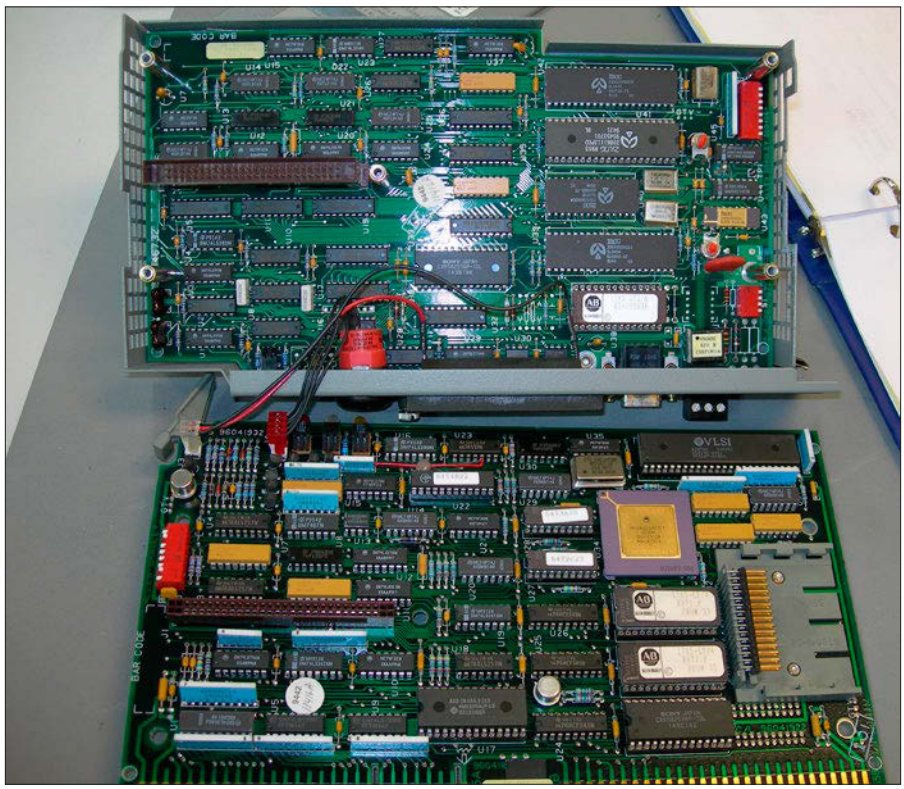

Repaired component from Paragon.

Sourcing

Sourcing is the day in, day out procurement of parts performed by supply chain with support from procurement engineering and anyone else in the plant that creates or initiates the requisition process for materials. Instilling a questioning attitude, preferably with all the engineering disciplines, project groups, maintenance, outage management, and the PHC, is where the question is asked, "What are my options to fix or replace this system, component, or part?" The next question that needs to be asked during preliminary discussions is: "What is it that's broken or not working as expected?" A questioning attitude by the PHC should lead to a discussion whereby users are able to drill down and determine that a new system may not be needed if a replacement for a part or component could be acquired to maintain the system for many years to come.

At the end of the day, all that suppliers want is a chance to bid. For the buyer, however, that could mean an extra step and could slow down the process, but USA has documented multiple success stories when that is done well.

Sourcing success examples

Paragon was asked to provide five transponder circuit boards. It was discovered that there would be an extremely long lead-time, and thus they would not be available from the OEM. Paragon was able to locate and provide the like-for-like replacement boards without the need to expedite or pursue a work-around or expensive temporary modification. Additional savings were obtained as internal work hours by plant personnel were not required, and Paragon was able to locate them from existing Paragon partners. (Savings, $26,599.)

Because Paragon had previously dedicated these parts, it was able to provide 40 Teflon rings and 55 OEM seat ring discs. (Savings, $81,683.)

Utilizing the PeAks database, Paragon was able to locate not only a spare that would help support a plant's outage, but also provided instant inventory reduction, as it was identified as over maximum at another USA plant. As a result, the plant was able to release the surplus valve and reduce inventory. (Savings, $48,762.)

A USA plant approached Paragon due to an obsolescence issue with a power supply. Paragon reviewed the existing component and was able to reverse engineer the component. Paragon provided a quote to the plant, and after review, it was determined that the plant has not only a large installed base but has averaged a usage of 15 components per year. Given that an alternative design would require a costly modification and most likely a configuration change, Paragon was able to provide the negotiated quantity at a significant discount. This component is used at most USA stations, and those stations will be able to benefit from this reverse engineering and the future savings that will be documented per station at that time. (Savings, $329,280.)

The USA plant/buyer made the decision to bid an alternative source for five 353 controllers and found the Paragon bid to be significantly lower. (Savings, $480,000.)

The plant was faced with the challenge of replacing obsolete voltage regulators. Paragon was contacted to provide a like-for-like replacement. Paragon determined that the voltage regulator could be reverse engineered. A digital equivalent upgrade, including engineering and other modification costs, would have cost significantly more than the Paragon replacement. (Savings, $898,000.)

The takeaway

There is not a one-size-fits-all material cost reduction plan. A company's plan must be tailored to its specific needs. Inventory optimization, reverse engineering, and other sourcing savings add up quickly if the culture drives the entire organization to ask the question, "Is there an alternative solution that could save the company money?" NN