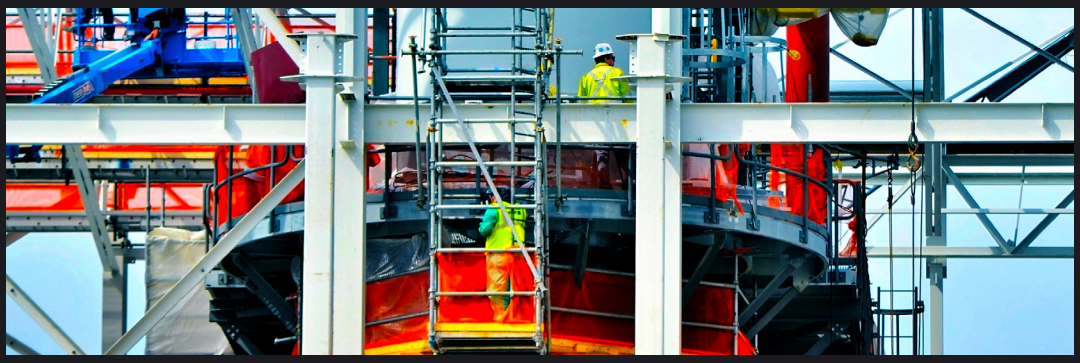
CASE STUDY

Octave Loop Material Readiness and the power market: A combined-cycle power plant case study



Key facts:

Industry: Power

Country: U.S.A.

Octave products used: Loop Material Readiness *(Jovix)*, Barcode Labels, Active RFID tags

Key benefits:

- Saved $1M over two years
- 54% reduction in work hours

This client is a multi-national construction and development company with expertise in civil infrastructure and commercial development initiatives that chose to increase its presence in the power and energy market. In May 2016, the client implemented the Loop Material Readiness solution on a natural gas and combined-cycle power plant construction project. The owner operator stated that the project was to produce a gross capacity of 650 megawatts, improving energy efficiency in the region and powering over 650,000 homes. The power facility was designed to greatly reduce the emissions footprint per unit of power, overall fuel costs and nearly 85% of clean water usage.

Specifically, the client needed to automate its material receipt and location activities on the site. The project team had been receiving materials for months using manual processes, which proved inefficient and error-prone, especially considering the volume and complexity of the lifecycle. Loop Material Readiness was deployed to address their pain points and automatically provide data for relevant key performance indicators (KPIs), providing an ongoing methodology to measure positive impact and ROI throughout the project.

Quick facts

- The client is listed in the top five largest building/ manufacturing contractors by revenue and top five largest heavy contractors by revenue in the US (ENR Magazine)
- The client is aligned in a joint venture with another top 10 ENR contractor and a large local contractor to form the structural EPC firm that is using Loop Material Readiness
- Upon completion, this power plant is considered one of the cleanest power-generating facilities in the state of New York
- The plant is predicted to lower the region's CO2 emissions by approximately 494,000 tons per year for the first 15 years of operation

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Deployment scope

Initially, the planned Loop Material Readiness deployment scope supported only the management of thousands of heat recovery steam generator components of the plant. Through a detailed discovery and operational assessment, it was determined a more comprehensive deployment was needed. The client's status quo materials management processes were dependent largely upon paper transactional processes and multiple spreadsheets. It was agreed that to maximize the value of Loop Material Readiness, it would also be needed to digitize field materials management and processes to allow for more time on tools. As a result, the project would see increased labor productivity and real-time material data powered by auto-ID and tablets.

Pain points

The project was very complex, with over 80,000 diverse materials. Care, custody and control was shifted between several concurrent teams over the span of 2½ years. The Loop Material Readiness team needed to address the following pain points:

- Schedule delays
- Cost overruns
- Limited material visibility and low inventory accuracy
- Disorganization
- Delays in material location
- Re-procurement risks
- Manual, inefficient processes

Solution

The Loop Material Readiness deployment was designed to relieve these specific pain points and to achieve the following goals:

- Enhance productivity
- Material visibility throughout the supply chain
- Reduction of direct and indirect labor costs
- Virtual separation of designated material inventories
- Proper reporting data for high-level fulfillment
- Create digital receiving, storage and issuing processes
- Re-procurement cost avoidance by accurate electronic record-keeping and GPS/RFID location tracking
- Inventory management and recognition across multiple yards and warehouses
- Preventative maintenance record-keeping

Deployment details

Material readiness approach

The client was looking for an opportunity to utilize a continuous improvement solution within their materials management processes. According to industry studies, the typical direct laborer spends 15% of the day waiting on materials. With Loop Material Readiness, users have access to real-time material data throughout the supply chain, ultimately reducing wait times through positive material location identification, better planning with reliable data and a collaborative platform with work planning tools and scheduling software. Field users perform the following material transactions on mobile devices:

- View and identify material locations
- Request materials
- Allocate materials to pick lists
- Perform inspections and preventative maintenance
- Flag overage, shortage and damage (OS&D) issues to quarantine
- Issue bulks to site
- Return items to stock

This increase in accuracy, visibility and efficiency ultimately drives a more productive, less wasteful site.

Material visibility and inventory accuracy

Prior to the Loop Material Readiness deployment, material receipts had been ongoing for months. The first challenge presented to the team was to improve inventory accuracy. Over 2,200 materials had been received on-site, and each piece required identification, verification and placement into inventory. Integrating purchased material data into Loop Material Readiness was imperative to achieve a streamlined process.

Within two weeks of deployment, the first laydown yard had been geo-mapped, and all materials had been received and labeled. All physical locations were referenced in the system, enabling the team to find, pick and issue materials quickly and accurately. The method of material data integration was also defined, allowing large numbers of materials and incoming shipments to be loaded into Loop Material Readiness. The proven process was presented to the site team, ensuring both a successful project commencement and eventual turnover of material receipt responsibility to client personnel.

Tagging strategy

Barcode

The client opted for geo-location via barcode to manage the materials in its equipment laydown yard. Barcode labels are ideal for warehousing and controlled laydown yards where materials aren't moved frequently, and they provide a cost-effective solution for materials stored indoors or in fixed locations.

Active RFID tags

These tags are battery-powered and transmit RF signals at a regular cadence, making them the ideal solution for high-dollar, long-lead time, engineered materials that might be scattered across a large outdoor area. These materials have high a possibility for movement and thanks to the active RFID tag's beacon, users can easily keep track of their real-time location and status.

Receiving, storing and issuing material

Receiving material manually is inefficient, and independent time studies show an average of 40 minutes per receipt when using a clipboard. Loop Material Readiness digitizes and automates material transactions throughout the supply chain. That data is fed to the server, enabling a streamlined process in real time. Independent time studies for receiving material in Loop Material Readiness show an average of eight minutes per receipt, and that includes OS&D activities.

The Loop Material Readiness implementation included rugged tablets, barcodes and active RFID tags.

Deployment lessons learned

Following each project implementation period, the Loop Material Readiness team project management team would meet to identify challenges that may have impacted overall success, ease of set-up, adoption and/or full deployment of Loop Material Readiness. Below are lessons learned that would help increase the overall positive impact, as well as the perceived and realized values of Loop Material Readiness.

Lesson 1: Vendor material data

Material data presented by vendors was incomplete, with many shipments arriving without notice. This caused a backlog of data input to the Loop Material Readiness system and without proper assignment of a material ID, the assets couldn't be received in real time. The client relied on the owner to provide contacts, packing lists and bills of material (BOMs), as the owner was the stakeholder responsible for purchasing materials. Therefore, the client had limited leverage over the vendors when requesting BOMs and packing lists. These obstacles hampered the materials management team's ability to plan and work efficiently.

Recommendations

For a client to realize maximum material visibility and lifecycle functionality, the Loop Material Readiness team recommends identifying data requirements early in a project timeline. Ideally, this should be defined and documented during the contract negotiations between contractor and owner. Doing so ensures the contractor has the necessary leverage to require suppliers to provide the proper documentation.

Lesson 2: Limited field users

At the time that the on-site Octave System Coordinator (JSC) de-mobilized, the joint client/Loop Material Readiness team consisted of one field material manager (FMM) and two field users. The FMM was responsible for data entry management responsibilities in the system, and the field users were responsible for completing the physical requirements of receiving, picking and issuing materials. Although these processes can be completed relatively quickly and easily in Loop Material Readiness, the sheer quantity of in-bound materials began to overwhelm this small team.

Recommendations

While the team of three was sufficient at the project launch, we recommend cross-training and adding users as material activities increase to peak volume. This not only helps prevent staff overload, but also lessens the risk of schedule impact if one or more members leave the project temporarily or permanently.require suppliers to provide the proper documentation.

Lesson 3: Limited preventative maintenance and inspection (PMI) requirement information

The importance of reliable and efficient PMI processes to any project cannot be overstated. However, full PMI requirements for this project were not provided in the early stages of the Loop Material Readiness implementation.

Recommendations

It's vitally important for the contractor and owner to outline proper procedures early and designate expectations of completion. Doing so before a project's start will improve the implementation rate of Loop Material Readiness processes on-site.

Lesson 4: Material process flow

Prior to the Loop Material Readiness implementation, a material process flow wasn't fully defined across departments. Additionally, there were limited operators, resulting in delays across yards and site. Without defined material processes in place, individuals pulled materials at will and without proper notice or request, leading to substantial material handling errors and inaccurate inventory counts.

Recommendations

We recommend that material processes are fully defined across all relevant departments as early as possible with an implemented system of checks and balances. It not only contributes to the complete and proper definition of acceptable processes, but also ensures individuals are accountable for their actions and that inventory remains accurate.

Measured improvements with Loop Material Readiness

Receipts

In the first 60 days of Loop Material Readiness usage on the project, over 8,300 material receipts were performed digitally with tablets. The labor savings and cost avoidances from the new material receiving report (MRR) process is anticipated to reach a 3-to-1 return on investment over the life of the project.

Issues

Since deployment, Loop Material Readiness has recorded over 900 material issues. Based on independent time studies, the typical issue activity with pen and paper takes 11 minutes. With Loop Material Readiness, this activity now averages 3½ minutes. A 7½-minute decrease per material issue means significant savings over the life of the project.

Direct and indirect labor

Two of the client's most important requirements for a successful Loop Material Readiness deployment were increased efficiency and cost savings associated with material withdrawal requests (MWRs) and PMI activities.

Material withdrawal requests

Paper-based MWRs were the norm for this client until Loop Material Readiness enabled the creation of a digital MWR with need-by date. Within the digital MWR, the requester can immediately see the percentage of materials ready for pick and issue and can also drill down to which materials are unavailable and why (inspection, OS&D, shipping delay, etc.). MWR status is visible to all associated parties in real time. Managing by exception empowers team leads to better plan the work of those in the field, significantly increasing tool time.

Documented savings

Project lead times were greatly improved as Loop Material Readiness provided metrics for engineers and managers to allocate resources more efficiently. Timed studies showed that digitizing the MWR saved an average of four minutes per document vs. its paper counterpart. Yet the most significant impact is the visibility into work planning, making field activities far more productive.

Preventative maintenance and inspections

The client also wanted to improve upon its paper-based PMI activities. Loop Material Readiness was able to drive efficiency by enabling material activities such as receipt to automatically trigger an inspection task. Additionally, preservation activities are able to automatically update material information. For example, if a material fails inspection, Loop Material Readiness can automatically place that material into quarantine status. With Loop Material Readiness PMI functionality, users are able to perform the following tasks:

- Build inspection templates
- Upload requirements from suppliers
- Documented Savings
- Create recurring inspections
- Set reminders and alerts
- Assign inspections to a user
- Locate equipment requiring maintenance
- Collect photos and digital signatures

Documented savings

Time studies revealed that the status quo process for creating and updating PMI records averaged 15 minutes per material transaction. Using Loop Material Readiness and a mobile tablet, that time was knocked down to five minutes.

Analysis and conclusion

By deploying Loop Material Readiness, the client has reduced material-related risks and eliminated associated inefficiencies. As the project progresses and time savings associated with direct and indirect labor increase, the labor savings will also increase.

Projected savings over two years:

$1,047,123

Projected reduction in work hours:

54%

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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