CASE STUDY

EPC firm saves 58,000 work hours

Automating and digitizing paper processes with Octave Loop Material Readiness leads to significant cost avoidance savings

Key facts:

Industry: Oil & Gas

Country: Kuwait

Octave products used: Loop Material Readiness *(Jovix)*

Key benefits:

- 168 suppliers tagging materials upstream and increasing global supply chain visibility
- 67% improvement in receiving time
- 91% improvement in location change time
- 38% average improvement in pick ticket and issue time
- Loop Material Readiness implementation leads to total cost avoidance savings between $4.2M and $5.8M

Challenges

The project sought to reduce risk and improve project performance by replacing manual, paper-based processes with an RFID material identification system.

Solution

The Loop Material Readiness deployment included sensory technology and field mobility to supply timely data to fulfill construction and management's demand for progress and information for scheduling, workface planning and installation. Gate readers are strategically positioned to read RFID tags that enter site facilities. Paired with pre-set logic and reader rules, gate readers communicate with tagged purchase order line items and shipping units and provide arrival timestamps and notifications.

Pre-set logic and reader rules also supply metrics and notifications regarding field material requests and associated tagged materials that have (or have not) left the facility. Materials removed from facilities without proper requisitioning are flagged by gate readers, and Loop Material Readiness automatically notifies management to investigate and reconcile. Inbound and outbound gates were determined on-site and setup commenced prior to the assessment team de-mobilizing.

The transfer of data collected from barcode and passive RFID-tagged materials into the project's proprietary materials management tool automates material receiving, warehouse material control and inventory, material pick up and material issuing to contractors.

By automating material workflow processes, Loop Material Readiness provides actionable, real-time information regarding the location and status of all materials needed for construction, which ensures visibility and traceability of materials in transport and on-site. The Loop Material Readiness solution also increases the efficiency of the processes related to the management of materials as they flow through a global supply chain and intra-site transfers.

The project has onboarded 168 suppliers by leveraging vendor-supplied barcodes and passive RFID tags associated to finished materials at supplier and fabrication facilities. Information is streamlined using the integration, tablets with the Loop Material Readiness mobile app and sensory technology to provide near real-time visibility of materials throughout the global supply chain.

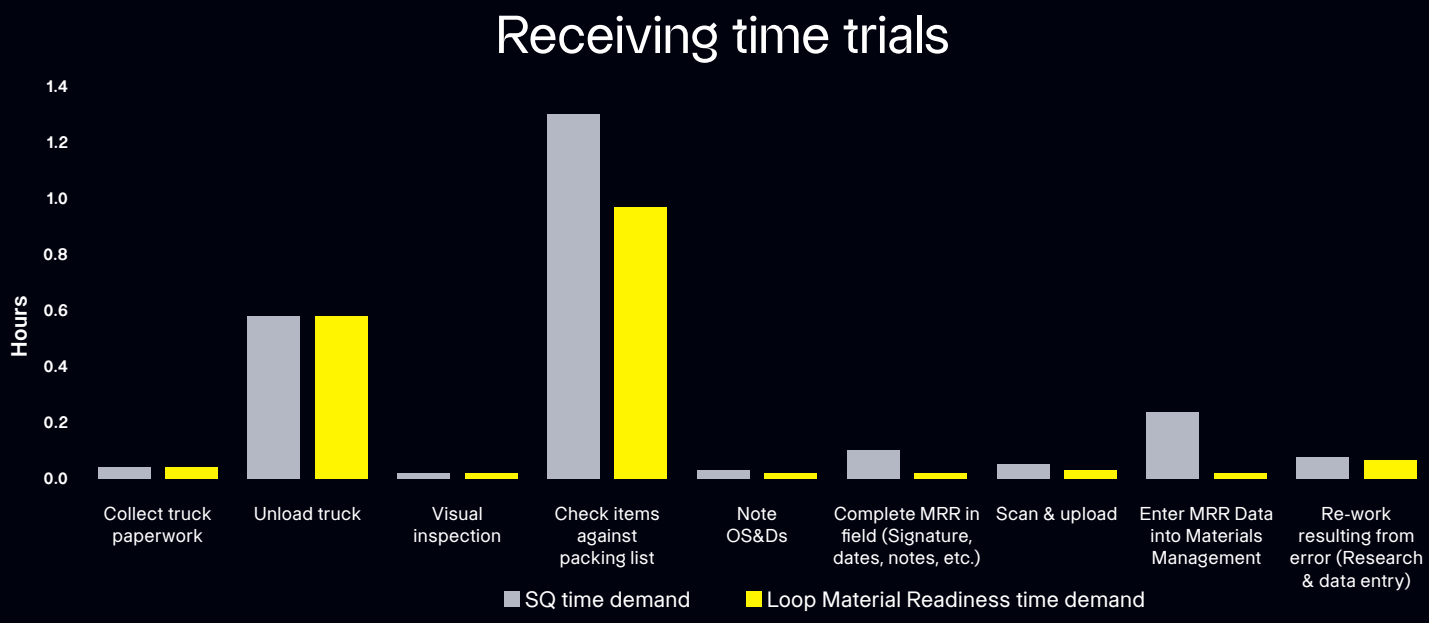
Planned vs. actual implementation activities

Category	Planned Loop Material Readiness scope	Actual Loop Material Readiness implementation
Supplier engagement	Upstream tag association by suppliers	168+ suppliers onboarded
Fabricator engagement	Module scope pilot spool RFID tracking	Data quality issues
Passive RFID Tagging	First large-scale deployment in industry	~400,000 to be deployed
Mobile transactions (Receiving, picking, issuing)	Panasonic toughpad tablets for field transactions	Panasonic Toughpad tablets + Loop Material Readiness mobile app
Loop Material Readiness Integration with EPC's materials management system	First Loop Material Readiness integration for this EPC's BOMs, POs, MRRs, Pick Tickets, etc.	All entities integrated; Staging table management
Data quality and integrity	Managing data from 168 suppliers; publishing validated data into the EPC's materials management system	Supplier data challenges and integration validation delays
User training and adoption	Train 1 Super user per discipline	30+ Super users

Results

A. Transaction efficiencies

Receiving: The project's receiving team utilizes mobile tablets to avoid manual paper transactions and data entry. A total of 47 bulk and mark piece receipts were shadowed, and each activity involved in the receipt process was not only timed using Loop Material Readiness, but also via the old status quo methods.



67%

Improvement in receiving time

Average receipt time

(53 Receipts evaluated)

Status quo: **153.5** minutes/receipt

Loop Material Readiness: **51.0** minutes/receipt

Efficiency gain: **102.5** minutes/receipt

Location management: Status quo processes relied on paper material transfer forms and data entry into a proprietary system to perform location changes. Material movements are common practice on the project when segregating materials by contractor and turning over materials to contractor-designated areas. Currently, Loop Material Readiness is utilized, permitting scanning of supplier barcodes for steel and RFID tags for spools and geo-contextual location management for both mark piece types.

Average location change time

(Steel & spool mark pieces)

Status quo: **22.6** minutes/mark piece

Loop Material Readiness: **2.0** minutes/mark piece

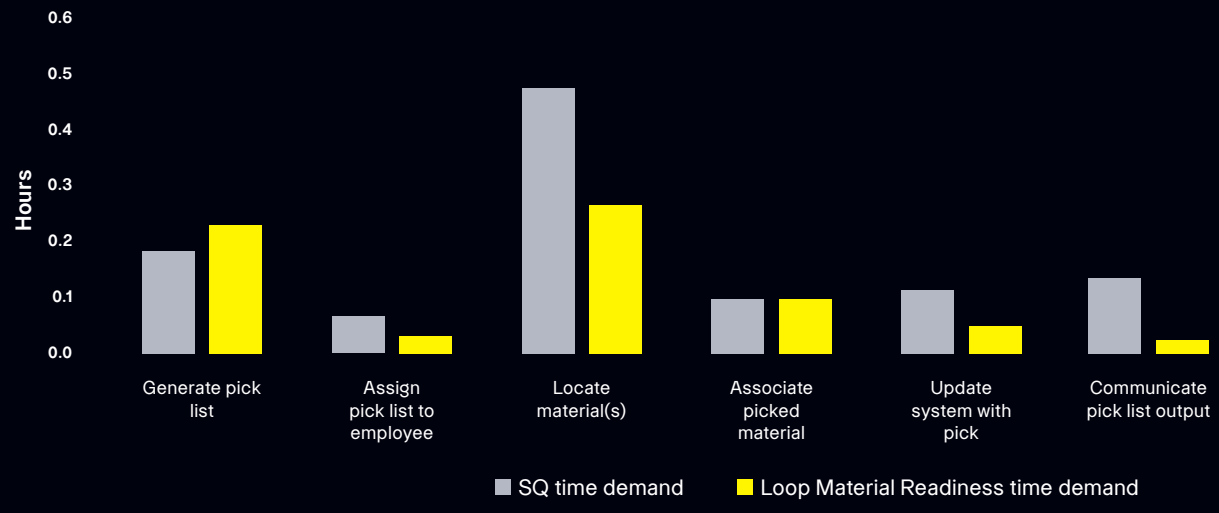
Efficiency gain: **20.6** minutes/mark piece

91%

Improvement in location change

Picking and issuing: On the project, previous practices required completing pick tickets in a proprietary system prior to when actual picks occurred. Pick progress was unknown until the pick ticket paperwork returned from the field. Only manual means of tracking actual completed and issued pick tickets were available. Since pick tickets were completed prior to when picking occurred, pick ticket reconciliation was common practice. Using Loop Material Readiness, pick lists are generated, and field progress of picks and issues are live and presented graphically in the web-based server. Geo-contextual location tracking is also utilized for mark pieces, allowing users to navigate to materials via GPS and visually display optimal pick routes.

Average picking and issuing time



30%

Improvement in pick ticket/issue timing in warehouses

Average pick ticket/issuing time in warehouse

(30 pick tickets evaluated)

Status quo: **68.0** minutes/pick ticket

Loop Material Readiness: **47.9** minutes/pick ticket

Efficiency gain: **20.1** minutes/pick ticket

Average pick ticket/issuing time in laydown yard

(30 pick tickets evaluated)

Status quo: **72.2** minutes/pick ticket

Loop Material Readiness: **38.3** minutes/pick ticket

Efficiency gain: **43.0** minutes/pick ticket

47%

Improvement in pick ticket/issue timing in laydown yards

Summary

The project was estimated to be 38% complete. The statistics below represent the to-date data measure and the estimated remaining work to go on the project. Together, these result in a total savings of **33,417 hours** or more than **$581,000.**

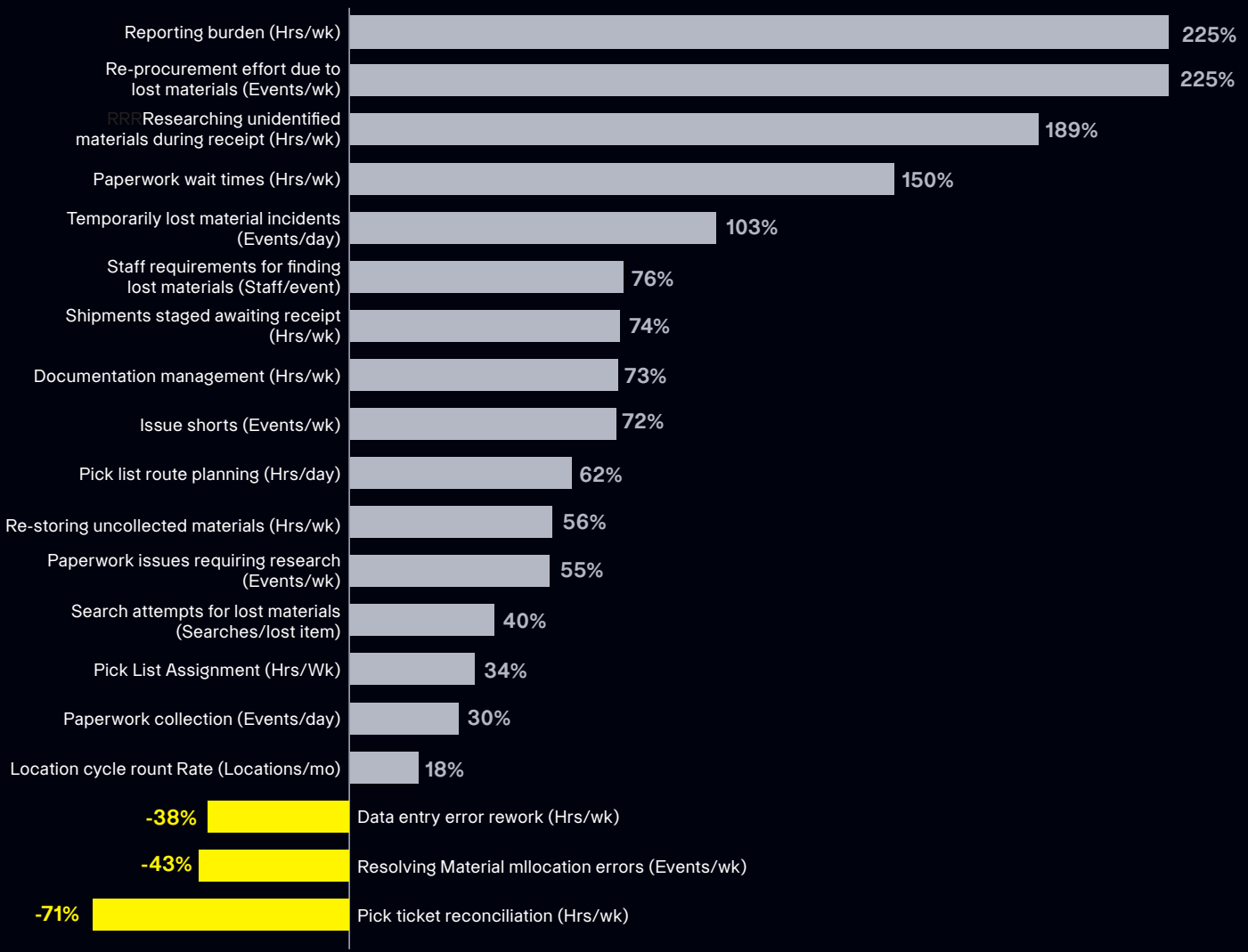
Jobsite transactions

	ACTUALS TO-DATE			REMAINING TO GO ON PROJECT (est.)		
Expected savings (hours)	Mean transactions	Mean hours saved	Mean savings	Mean transactions	Mean hours saved	Mean savings
Loop Material Readiness transactional value streams	Each	Hours	US $	Each	Hours	US $
Receiving (Bulk)	3,107	2,514	$43,748	4,654	4,030	$70,122
Receiving (Mark pieces)	4,770	3,367	$58,590	7,144	5,397	$93,908
Receiving (Bulk)	3,107	2,514	$43,748	4,654	4,030	$70,122
Picking/issuing (Mark pieces)	3,215	1,469	$25,560	4,815	2,354	$40,960
Warehousing (Yard)	13,089	4,502	$78,335	19,604	7,217	$125,576
		12,838	$223,389		20,578	$358,058
					Total savings (Hours) 33,417	Total savings ($) $581,447

B. Comparative experience events

Observational experience results displayed gains and losses in time demanded when using Loop Material Readiness vs. not using Loop Material Readiness. Results yielded that time was lost in processes upstream in the supply chain due to steps of forced data vetting and correcting allocations. The time demand of the required initial vetting and correction processes assisted in producing time savings and efficiency gains in many of the 16 downstream incident occurrences. An additional gain in time demand related to pick ticket reconciliation. Loop Material Readiness allows in-depth picking and issuing compared to previous processes, allowing for immediate identification of non-completable picks and on-the-spot investigation to mitigate exceptions. Previous processes were reactive and limited by functionality, by not allowing users to re-open a pick ticket and requiring reactive resolutions via inventory adjustments and generating new pick list transactions.

Though time demand increased using Loop Material Readiness for 3 observational incidents, efficiency was gained in data quality and work process insights for all 19 observational incidents, resulting in a reduction of re-work, issues and errors downstream. Loop Material Readiness functionality—and the additional vetting and work process steps—added to the time savings and efficiency gains directly to 16 downstream incidents with gains ranging from 18% to 225% compared to previous projects.



The results above show an overwhelmingly positive efficiency gain related to automating manual processes, reducing reporting times and increasing visibility to reduce coordination times. Easy-to-access, real-time information significantly reduced the amount of time spend consolidating and producing project reports.

C. Project observation use cases

In addition to the empirical transactional time studies and observational end user experiences, the RFID assessment uncovered efficiency observed in specific field materials management procedures. Users displayed how incorporating Loop Material Readiness alleviated pain points and added efficiency to 13 distinguished daily tasks.

1. Material controls digitalization
2. Over 5,000 critical materials located in a day
3. Reporting influences yard design and reduces manpower
4. 7.5 minutes saved per item in structural steel receiving
5. Automated request/pick progress improved data availability and time savings
6. Productivity improves with less time spent tracking "lost materials"
7. Over 1,400 work hours saved in overages, shortages and damages (OS&Ds) report generation
8. Increased visibility to manage work package constraints
9. Real-time material status reports for management
10. Pick ticket management efficiency
11. Pipe spools FMR verification efficiency
12. Increased visibility into incomplete receiving
13. Online training increases competency for busy project personnel

The direct and indirect burdened labor rates were used to calculate cost avoidance. Each of the process efficiency gains contributed to hours saved and resulted in a realized cost avoidance of over $1.5m.

Category	Description	Impacted user	Time	Users	Projected time savings	Projected cost avoidance
Automated control efficiency	Automated field materials mgmt. (FMM) prioritization dashboard	Material controller	4	1	3,972	**$79,440.00**
Automated control efficiency	Automated OS&D header generation	Material controller	1	1	3,665	**$73,293.71**
Automated control efficiency	Increased visibility for work package constraint management	Planner	5	4	3,440	**$68,800.00**
Automated control efficiency	Real-time material status reports for management	Material controller	4	3	98	**$23,588.57**
Automated control efficiency	Self-led user training in learning management system	Octave coordinator	3	26	416	**$85,280.00**
Automated control efficiency	Automated field material request (FMR) validation for FMM	Material controller	2	1	365	**$14,600.00**
Automated control efficiency	Automated pick list progress reporting	Material controller	10	3	1,115	**$223,000.00**
Laydown yard control efficiency	Manpower allocation reduction from laydown yard optimization	3B checker	10	4	822	**$486,624.00**
Non-transition process eliminated act	Increased efficiency from FMM subcontractor coordination	Material controller	1	1	993	**$19,860.00**
Steel tagging prior to inventory	Increased efficiency from paperless FMM processes	Material controller	5	1	1,115	**$111,500.00**
Steel tagging prior to inventory	Structural steel receiving cycle time improvement	3B checker	0	1	3,750	**$55,500.00**
Steel tagging prior to inventory	Increased visibility through geo-location of materials received prior to Loop Material Readiness	3B checker	5	1	5,000	**$340,400.00**
					Total cost avoidance	**$1,581,886.28**

D. Construction cost avoidance

Prior to implementing Loop Material Readiness at the off-site laydown yard, structural steel was received and stored in the yard by grid. Steel arrived rapidly and consecutively, congesting the laydown yard and grids and created a backlog of materials, resulting in improper identification and storage. The desert climate and conditions contributed to complications by removing etchings and markings from the materials. Steel FMRs were delayed by weeks, and several were partially issued due to the inability to find and properly identify materials. As a sample, a steel FMR was observed, and results yielded that it took four field workers three full days to locate 26 pieces of steel. On average, 10%-20% of improperly stored and unidentified steel resulted in turnover delays to construction.

FMM solicited the Loop Material Readiness System Coordinator to develop more efficient practices and expedite material turnover for steel that had not been received prior to implementing Loop Material Readiness. The new process included the following:

- Importing supplier barcodes into Loop Material Readiness
  - Allowing for quick selection and assistance with material identification
- Using tablets and the JLoop Material Readiness mobile app
  - Allowing for field mobility, expediting processes and the alleviation of manual data entry
- Utilizing Loop Material Readiness mobile GPS functionality
  - Providing accurate, pinpointed material locations within the yard

The results of the initiative included identifying and providing pinpointed locations for 5,100 steel mark pieces in a single day, creating a viable and efficient solution for structural steel location management and avoiding impacts to construction.

Previously, material delays resulted in lost time for the construction crew, rescheduling and re-prioritized work activities. Based on the average crew size and direct labor rates on the project, the potential impacts to construction were calculated to be approximately 51,000 to 102,000 work hours, resulting in a cost avoidance of $510K to $1.02M.

Structural steel

Description	Value	
Affected mark pieces with unknown locations delivered to site prior to Loop Material Readiness implementation	5,100	
	Low impact	**High impact**
Percentage of affected mark pieces that impact construction	10%	20%
Estimated mark pieces impacting construction	510	1,020
Loss of construction productivity (work hours)	100	100
Potential impact to construction (work hours)	51,000	102,000
Labor rate	$10.00	$10.00
Structural cost avoidance	**$510,000.00**	**$1,020,000.00**

Passive RFID tags and vendor-supplied barcodes are associated to finished materials at supplier and fabrication facilities.

Potential impediments to construction related to supplier pipe spool data and work processes include spools arriving in mixed frames, causing re-work and the turnover of spools to incorrect contractors. Misidentification—or no identification—of spools may result in representatives from quality and engineering interceding to properly identify materials, adding more issuing delays to construction and installation.

FMM developed an initiative to sweep and cycle-count the spools in inventory using Loop Material Readiness and RFID tags to expedite processes and to maintain a practical solution for managing spools. Additionally, management agreed to incorporate a supplier engagement program that began with tracking materials at the supplier. Passive RFID tags were applied at the supplier and associated to materials in the system. Loop Material Readiness System Coordinators performed on-site supplier engagement training at the facilities with a focus on best practices for tagging and labeling pipe spools and frames. Previous practices were replaced by using the Loop Material Readiness mobile app and supplier's devices to associate the RFID tags prior to shipping.

Approximately 25% of the spools have been issued. The remaining 75% accumulate to about 74,000 pipe spools in inventory and pending delivery. The potential impacts to construction were calculated for the remaining spools to be issued, resulting in 111,000 to 222,000 work hour delays avoided on the project and $1.1m to $2.2m in cost avoidance.

Piping

Description	Value	
Remaining spools to be issued	74,000	
Vendor data quality error resulting in delay	15%	
Affected spools	11,100	
	Low impact	**High impact**
Percentage of affected mark pieces that impact construction	10%	20%
Estimated mark pieces impacting construction	510	1,020
Loss of construction productivity (work hours)	100	100
Potential impact to construction (work hours)	111,000	222,000
Labor rate	$10.00	$10.00
Piping cost avoidance	**$510,000.00**	**$2,220,000.00**

Summary of value assessment

The direct and indirect labor rates were used to convert hours saved to cost avoided. The total cost avoidance savings resulting from the Loop Material Readiness implementation on the project is calculated between $4.2m and $5.8m. The results mark significant savings, especially considering the low labor market region in which a $10/hr wage rate was assumed for jobsite workers in the assessment.

Transaction efficiency	
Receiving (Bulk)	**$113,870**
Receiving (Mark piece)	**$152,498**
Picking/issuing (Bulk and mark piece)	**$111,168**
Warehousing (Yard)	**$203,911**
Subtotal	**$581,447**

Project observation use cases	
Laydown yard control efficiency	**$486,624**
Automated control efficiency	**$568,002**
Steel tagging prior to inventory	**$395,900**
Non-transaction process eliminated activity	**$131,360**
Subtotal	**$1,581,886**

Comparative experience events	
Operation efficiency	**$209,538**
Data and document control	**$205,716**
Subtotal	**$415,254**

Construction impact cost avoidance	Low	High
Piping-affected spools	**$1,110,000**	**$2,220,000**
Steel-affected mark piece	**$510,000**	**$1,020,000**
Subtotal	**$1,620,000**	**$3,240,000**

Total cost avoidance	**$4,198,587**	**$5,818,587**

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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