How effective materials management can drive more successful project execution

With the ever-increasing need for improved efficiency and higher margins, cost inefficiencies in project execution can negatively influence global competitiveness for engineering, procurement, and construction (EPC) companies. MAURIZIO M. GRANATA discusses the challenges of materials management, and the business benefits of implementing an effective materials and supply chain management system.

As both plant operators and EPCs embark on bigger and more complex projects, materials management has become an increasingly challenging process. The management of procuring materials is critical, as any material surplus or shortage will delay the project and put it at risk. This can affect the maintenance of a consistent flow of materials for production, thus affecting the overall project and resulting in extended project schedules and exceeded budgets. Inaccurate materials information, such as incorrect bills of materials or cycle counts, shipping, and receiving errors can also disturb the overall project lifecycle and increase project costs. Having to deal with subcontractors outside of the materials management process influences the overall project supply chain as there is an increased risk of data inconsistencies.

In order to remain competitive, we have seen how EPCs have identified materials management as a critical work process that needs to be streamlined and integrated for improved productivity. Some of the key industry challenges include:

- Paper based document centric procurement
- Increased risk and project costs due to delays caused by breakdowns in the materials management process
- Lack in digitally integrating materials management work processes within the overall project lifecycle.

Business benefits

An effective materials management system has the capability to integrate the entire materials and supply chain work processes. This way, project teams will have online access to information during all project phases, from engineering through the complete supply chain to onsite management. This maximises communication and cooperation among all project materials stakeholders, also going beyond ICT boundaries of a company’s IT ecosystem. This can also drive to increase procurement efficiency, save costs, and ensure digital integrity of shared information.

Effective materials management governs the material quality, quantity, and delivery by providing:

- Efficient corporate and project specification management
- Engineering integration with customers and subcontractors
- Definition of procurement packages and engineering requisitions — best suited to the project and client requirements
- Full materials tracking through goods supply and delivery
- Accurate scheduling and forecasting of materials availability on item
- Timely construction planning down to the work package level.

Managing reference data at one place

With an effective materials management system, all partners in the EPC project supply chain can manage all reference data in one location. This enables users to define the key technical material attributes for bulk materials or itemised equipment, ensuring information integrity. Similarly, this provides a common foundation for defining all bulk materials, which eliminates redundancy by creating and managing attribute-driven bulk commodities and specifications at a corporate standard or enterprise level.

Materials standardisation in one location brings several clear benefits:

- Up to 79 percent reduction on traditional paper-based project piping specification costs
- Up to 70 percent reduction on manual 3D load file costs
- Up to 13 percent reduction on change and revision management.

Engineering and procurement integration

The integration of engineering and procurement data makes it possible to access the most recent status of any material item that is used within the project. At first, it improves information quality and market effectiveness by providing the ability to turn dynamic engineering data into stable, but flexible procurement data, which will match suppliers and vendors capabilities, together with company procurement best practices. This ensures tight integration between engineering and procurement, and ultimately improves management of change, therefore reducing risk for over, under, wrong or inconsistent procurement.

Globally integrated supply chain management

An effective materials management system also enables users to seamlessly integrate interchanges with commodity suppliers, subcontractors, manufacturers, fabricators, and freight forwarders. Another substantial
benefit is how the effective management of materials milestones adds value by providing timely information and flexible event tracking, increasing project savings. Furthermore, manual errors and information inaccuracy are eliminated by centralising storage of all data involved in the inquiry process, supplier information, attached documentation, and requisition-based data. Buyers can also choose items during the bid evaluation process and/or optimise the selection of suppliers for requisition line items to minimise project costs.

Enhanced site management

Site management is a key component of effective materials management with several benefits, including total materials visibility from shipments through issue of materials to the final installation. This ensures controlling critical tasks at site, such as balancing onsite personnel and materials availability. In addition, automated procedures for materials receiving allow materials to be assigned to site inventories in the shortest possible time, therefore preventing errors in the inventory information. The multiple warehouse status capabilities, and an ability to track materials movement between the warehouses with audit trails, helps to avoid wrong materials installation and inefficient materials control.

How to improve procurement efficiency?

A complete technological solution, such as SmartPlant Materials provided by Intergraph Corporation headquartered in Huntsville, US state of Alabama, can support enhancing efficiency by providing a common collaboration platform and project workbench for all partners in any EPC project supply chain. SmartPlant Materials enables improvement in procurement efficiencies through:
- Single data input and integration with SmartPlant Enterprise means that downstream processes/groups are not required to re-input data for their purposes, and copy and paste through Microsoft Office files is no longer required.
- Rule-driven processes allow less time to be spent on organising data, freeing more resources for strategising and negotiating.
- Creating a common system and processes for all projects will improve efficiency as reporting will be consistent across all projects.
- Planning is improved and the amount of ‘panic’ buying is decreased by having access to better quality information that is made available earlier.
- Flexible, data centric and project specific approach to supply chains replaces the traditional document centric and consolidated approach, which is no longer matching for today’s requirements from joint ventures / partnering projects where enhanced sharing of data and key project information, as well as improved work-process execution is needed.

Often, inadequate audit performance can impact project schedules as the project teams need to respond to findings and do any required modifications. However, having easier access to key audit data makes it easier to track performance and to recover from modifications faster.

Minimised shortages and surpluses

Tight integration of engineering and procurement also facilitates better tracking and forecasting, eliminating surpluses and shortages of materials. It can also help creating a construction-driven schedule for early planning of engineering and procurement material activities.

One of the key features of a modern materials management solution is the ability to integrate all EPC materials data in one system, providing a centralised access to all relevant materials stakeholders. A centralised portal, such as Intergraph SmartPlant Materials Portal, enables users to manage supplier qualifications on a global level, allowing vendors to virtually ‘knock on any door’ to qualify as a supplier. In addition, when choosing a supplier, not only pricing information or terms and conditions can be exchanged, but suppliers can also provide additional information such as Q & A

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documents and technical information through the portal. Furthermore, during the delivery of goods, the supplier can exchange and provide more information on the goods and delivery. Information on how the materials will be packaged, which kind of shipping method is used, as well as real-time information on the shipping itself can be provided. This enables transparency throughout the supply chain, enabling all parties to have the latest and most relevant information at hand any time.

Chosen by industry leaders

Many of Intergraph’s current SmartPlant Materials customers have seen the benefits of using a complete materials management and subcontracting solution. SmartPlant Materials provides the users with a common collaboration platform and project workbench for all partners in any EPC project supply chain. Several world leading engineering firms have adopted the software. WorleyParsons, a leading provider of professional services to the energy, resource and complex process industries, implemented the Intergraph SmartPlant Enterprise suite of engineering applications, including SmartPlant Materials. This has enabled the EPC to increase productivity through core engineering and materials control tool standardisation, streamlined work processes and consistent training methodology.

In addition to WorleyParsons, also CB&I, one of the world’s leading EPC companies, has implemented SmartPlant Materials as its materials management system across its global network of 80 offices and 16 000 employees. CB&I used SmartPlant Materials on its energy and natural resources projects, including oil and gas and offshore installations, across the complete project execution lifecycle. SmartPlant Materials has helped CB&I to improve efficiencies across all material management work processes and drive efficiency in plant engineering and construction.

Closure

An effective, state of art materials management system can help all project materials stakeholders, including EPCs, to improve competitiveness, project execution, overall efficiency, and lower capital expenditure. A modern software solution, such as SmartPlant Materials, can provide project workbench for all material and subcontract-related activities, spanning the entire project lifecycle to enable organisations to focus on corporate project objectives rather than departmental or discipline specific goals.