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e Insights

NAC Executiv

This Executive Insight looks at the materials management during the various engineering phases. It describes an approach where the owner separately contracts with a designer and a construction manager.

Responsibilities, activities, and workflow are described for the civil/structural discipline.

Tracking, reporting, and reviewing forecast and actual engineered and bulk material quantities during the lifecycle of a project is a critical success factor for predicting and controlling project costs. Early variance identification allows for corrective action.

Materials management activities are focused on large quantities, primarily bulk items. Material Take-Off (MTO) Allowance is the quantity for growth in estimated quantities of the bulk material.

This Executive Insight looks at the management of materials during the various engineering phases and engineering support to construction. Responsibilities, activities, and workflow are described for the civil/structural discipline. The information here is most applicable to large process, power, mining, and industrial plants,

o Piling Each

o Engineered Foundations
Oubic yards/ meters
o Fireproofing
Oubic yards/ meters
o Structural Steel
O Modules

Cubic yards/ meters
Tons/ metric tons

Tons/ metric tons

During project initiation, scope definition, and conceptual engineering phases, an overall project execution strategy is developed with a contracting and material management plan. Material management responsibilities are established at this stage and materials are mapped to the developed WBS and construction work packages. Initial purchasing, expediting, logistics, material control, inspection and acceptance, and field management plans begin development at these early stages and preliminary bidder lists may be developed as part of market surveys conducted by procurement.

o Pipe Racks

A control level schedule is issued as work moves into preliminary engineering and construction planning and the baseline is reviewed and validated by the discipline lead engineer against civil/structural requirements. This ensures completeness and reasonableness of assumptions. As preliminary engineering proceeds, a quantity control base is established for the civil/structural quantities to be controlled. Typically, those are the principal bulk materials reflected in the prior section. RFQs (Requests for Quotation) for any long lead procurements would be awarded near the end of preliminary engineering.

As design shifts into detailed design, quantity management activities commence. Trends and deviations are closely monitored and corrective actions are taken as needed. Any deviations are processed for formal approval and incorporation into periodic quantity reports, which include any then-current forecasts based on material quantity trends. Quantities are continuously reviewed against the established baselines and project level mitigation and corrective measures are taken.

During the final design phase, quantity management ensures that bulk material orders are consistent with estimates and any bulk over orders are per project execution plans and budgets. Material takeoffs from BIM model reviews are confirmed for completeness.

Engineering provides other material management support through the engineering phase and into receipt of materials at site. The assistance includes technical support in proposal evaluation, material take-offs on issued-for-construction drawings, vendor or fabrication inspection, and technical acceptance of materials received at the site or any on-site inspection, QA, or QC results.

Waste reduction is a key consideration in material management by engineering.

A Material Take-Off (MTO) Allowance the quantity for growth in estimated quantities of the bulk material and tagged items is expressed as a percentage of the base quantity (net MTO) to account. It includes:

allowances to cover extra work due to engineering quality (design development):

- o this results from the level of details of engineering design (50 percent complete or 100 complete).
- o miscellaneous fittings or quantities not reflected in design details. calculated as a percentage of direct quantity or costs calculations. applied to each material quantity and may be different for WBS elements at different stages of design development. percentage