Dry Dock Management

Dry Dock Planning

Dry dock planning is the systematic process of preparing, scheduling, and executing the temporary removal of water from a dock to allow a vessel to be inspected, repaired, or modified. In the context of a Dry Dock Management course, students must master a broad set of terms that describe the technical, operational, financial, and regulatory aspects of the activity. The following explanation provides a comprehensive glossary of essential vocabulary, illustrated with practical examples and discussion of common challenges. Each term is defined, its relevance to the planning process is explained, and typical scenarios where the concept is applied are described. The aim is to equip learners with the language needed to communicate effectively with engineers, ship owners, regulatory bodies, and contractors throughout the life-cycle of a dry-dock project.

Keel block – A sturdy, often steel, support placed under the keel of a vessel once it is floated onto the dock floor. Keel blocks are positioned according to the vessel's design lines to ensure even weight distribution and to prevent hull deformation. For example, a Panamax container ship may require a series of keel blocks spaced at 1.5-Meter intervals, each capable of bearing several hundred tonnes. A common challenge is ensuring that the blocks are correctly aligned before the ship is lowered, because misalignment can lead to excessive stress on the hull plating, potentially causing cracks that require costly repairs.

Dock sill – The horizontal structural component that forms the base of a dry dock, supporting the dock floor and the weight of the vessel. The sill must be designed to withstand the hydrostatic pressure when the dock is flooded and the dynamic loads when the dock is drained. In practice, engineers calculate the required thickness of the sill based on the maximum displacement of ships that will use the dock. A frequent issue is corrosion of the sill in older docks, which can compromise structural integrity and necessitate reinforcement or replacement before a new docking campaign.

Scantling – Refers to the dimensions and material specifications of structural elements such as beams, plates, and girders. Scantling tables are used to verify that existing dock components meet the required strength for a given vessel size. For instance, a dock designed for vessels up to 250,000 deadweight tonnage (DWT) will have scantling values that differ significantly from those of a dock limited to 50,000 DWT. Misinterpretation of scantling data can lead to under-design, increasing the risk of structural failure during the docking operation.

Docking plan – A detailed document that outlines the sequence of activities, resource allocation, and safety measures required to conduct a dry-dock operation. The plan typically includes a layout of block positioning, pump schedules, personnel assignments, and contingency procedures. An example of a docking plan for a cruise liner might allocate 48 hours for block placement, 72 hours for hull cleaning, and 96 hours for repainting, with overlapping shifts to meet the overall project deadline. One of the principal challenges in creating a docking plan is reconciling the shipowner's time constraints with the realistic capacity of the dock's workforce and equipment.

Project schedule – The timeline that maps out all critical milestones from the arrival of the vessel to the completion of all maintenance activities. Gantt charts are frequently employed to visualize the schedule, highlighting dependencies such as "pump down must be completed before hull inspection." A practical application involves using a schedule to coordinate the arrival of subcontractors for tasks like propeller polishing, ensuring that no idle time is incurred. Delays often arise from unexpected weather conditions or late delivery of spare parts, which can cascade through the schedule and jeopardize the agreed completion date.

Critical path – The sequence of interdependent tasks that determines the minimum duration of the entire dry-dock project. Any delay on the critical path directly extends the overall project timeline. For example, if the critical path includes "dry-dock de-watering, hull inspection, and structural repair," a one-day delay in the de-watering phase will push back the entire schedule. Identifying the critical path early allows managers to allocate additional resources to those tasks, mitigating the risk of overruns. However, the dynamic nature of ship repair work means that the critical path can shift as new issues are discovered during inspection.

Work breakdown structure (WBS) – A hierarchical decomposition of the project into manageable work packages. Each level of the WBS provides increasing detail, from high-level phases such as "pre-docking preparation" down to specific tasks like "apply anti-fouling coating to the starboard side." The WBS is instrumental in cost estimation, resource planning, and progress tracking. In practice, a well-structured WBS enables the project manager to assign responsibility for each package, reducing ambiguity. A common pitfall is creating overly granular work packages that become difficult to monitor, leading to administrative overhead without added value.

Bill of quantities (BoQ) – A comprehensive list of all materials, labor, and services required for the dry-dock project, each quantified and priced. The BoQ serves as the basis for tendering and contract negotiation. For example, a BoQ for a tanker refit may specify 12,000 kg of high-strength steel for hull plates, 500 hours of welding labor, and 8 cubic metres of marine-grade paint. Errors in the BoQ, such as under-estimating the amount of primer required, can cause cost overruns and supply chain disruptions.

Contractual scope – The set of work items and responsibilities defined in the contract between the shipowner and the dry-dock yard. The scope delineates what is included (e.G., Hull cleaning, machinery over-haul) and what is excluded (e.G., Optional upgrades). Clear definition of the contractual scope helps prevent disputes over additional work. For instance, if the contract does not expressly cover the replacement of a damaged rudder, the shipowner may be billed extra for that service. Ambiguities in the scope often lead to change orders, which can inflate the project budget and extend the timeline.

Change order – A formal amendment to the original contract that adds, removes, or modifies work items, typically accompanied by revised cost and schedule impacts. Change orders are triggered when unforeseen conditions, such as corrosion discovered during hull inspection, require additional repairs. A practical example is a change order to replace a cracked sea-chest that was not anticipated in the original scope. Managing change orders efficiently requires a robust approval process, as uncontrolled changes can erode profit margins and strain stakeholder relationships.

Risk register – A documented list of potential risks, their likelihood, impact, and mitigation strategies. The register is updated throughout the docking campaign. Typical risks include "equipment failure," "adverse weather," and "regulatory non-compliance." For each risk, the register may assign a mitigation action such as "maintain backup pumps on standby" or "schedule inspections during low-tide windows." The challenge lies in maintaining an accurate register; under-estimating risk probability can leave the project vulnerable to unexpected disruptions.

Safety management system (SMS) – The organized framework of policies, procedures, and practices that ensure the safety of personnel and protection of the environment during dry-dock operations. The SMS includes hazard identification, training requirements, emergency response plans, and incident reporting. For example, an SMS may mandate that all personnel wear fall-protection harnesses when working on elevated scaffolding over the vessel's hull. Implementing an effective SMS often encounters resistance due to perceived productivity loss, but the cost of accidents—both human and financial—far outweighs the effort required for compliance.

Permit-to-work (PTW) – A formal authorization that permits specific work activities under controlled conditions, ensuring that hazards are identified and mitigated. PTWs are commonly used for high-risk tasks such as "hot work" (welding) or "confined space entry" (tank inspections). A PTW process typically requires a risk assessment, isolation of energy sources, and verification by a supervisor before work may commence. Failure to adhere to PTW procedures can result in fire, explosion, or toxic exposure incidents, leading to operational shutdowns and regulatory penalties.

Confined space – An area with limited entry and exit points, not designed for continuous occupancy, and where hazardous atmospheres may develop. In dry-dock contexts, cargo tanks, boiler rooms, and pump rooms often qualify as confined spaces. Entry into a confined space requires atmospheric testing for oxygen levels, flammable gases, and toxic substances, followed by ventilation and rescue planning. A real-world challenge is the presence of residual oil vapors in a tank, which can ignite if hot work is performed without proper gas monitoring, emphasizing the need for rigorous confined-space protocols.

Hydrostatic pressure – The pressure exerted by a fluid at equilibrium due to the force of gravity. When a dock is flooded, hydrostatic pressure acts on the dock walls and floor, influencing structural design. During de-watering, the pressure reverses, creating suction forces that can affect the vessel's stability. Engineers calculate hydrostatic pressure using the formula $P = \rho g h$, where ρ is water density, g is gravitational acceleration, and h is water depth. Miscalculations can result in insufficient reinforcement, leading to structural distress as the dock is drained.

Stability assessment – An analysis performed to ensure that the vessel remains stable throughout the docking process, particularly during de-watering and block placement. The assessment evaluates the centre of gravity, metacentric height, and righting arm at various stages. For example, a vessel with a high centre of gravity may require additional ballast or temporary shoring to prevent excessive roll when the dock is emptied. Conducting a thorough stability assessment is critical because loss of stability can cause the ship to tip, endangering personnel and equipment.

Ballast management – The controlled addition or removal of water in ballast tanks to maintain the vessel's trim and list within safe limits. In dry-dock planning, ballast management is coordinated with block positioning and de-watering to achieve the desired stability profile. A typical procedure involves adjusting ballast after each block is set, checking the vessel's inclination with inclinometers. A challenge arises when ballast tanks are corroded or have leaks, limiting the ability to fine-tune the ship's balance and potentially requiring alternative shoring solutions.

Shoring – Temporary structural support used to reinforce sections of the vessel's hull, decks, or superstructure during repair activities. Shoring may be required when removing large structural components or when the vessel's own strength is insufficient to support loads. For instance, during the replacement of a propeller shaft bearing, shoring frames are installed to support the shaft housing while the bearing is removed. Improper shoring design can lead to collapse, so engineers must calculate load paths and factor of safety precisely.

Scaffolding – A temporary elevated platform system that provides safe access for workers to the vessel's exterior and interior surfaces. Scaffolding must comply with maritime safety standards, be capable of bearing the intended load, and be anchored securely to the dock or vessel. In practice, scaffolding is erected around the hull for painting and coating applications. The main challenge is ensuring that the scaffolding does not impede the movement of other equipment, such as crane booms, while maintaining a clear evacuation route for emergencies.

Crane capacity – The maximum load a crane can safely lift, expressed in tonnes, at a given radius from the centre of rotation. Understanding crane capacity is essential when positioning heavy blocks or lifting large components like propeller blades. For example, a dockside crane rated at 150 t with a 10-meter radius may be insufficient for a 120-t block placed 12 m from the crane's centre, necessitating the use of a larger crane or a two-stage lift. Failure to respect crane capacity can result in equipment failure and severe safety hazards.

Load chart – A graphical representation provided by crane manufacturers that shows the relationship between lift radius and maximum load. Operators consult the load chart before each lift to confirm that the planned operation is within safe limits. In a dry-dock scenario, the load chart helps determine the feasible placement of keel blocks and the sequence of component removal. A common source of error is neglecting the effect of dynamic loads, such as wind gusts, which can temporarily increase the effective load beyond the static rating shown on the chart.

Marine coating – Specialized paint systems applied to a vessel's hull and underwater appendages to protect against corrosion, fouling, and wear. Coating systems typically consist of a primer, an intermediate layer, and a topcoat. Selecting the appropriate coating involves considering the vessel's operating environment, expected service life, and regulatory requirements (e.G., IMO's antifouling standards). An example is the use of a silicone-based antifouling paint for a research vessel operating in tropical waters. Challenges include ensuring proper surface preparation, controlling humidity during application, and achieving the required film thickness uniformly.

Surface preparation – The process of cleaning, abrading, and treating the hull surface to achieve the desired roughness and cleanliness before coating. Methods include high-pressure water jetting, sandblasting, and chemical cleaning. The quality of surface preparation is quantified by standards such as ISO 8501-2, which defines acceptable profiles (e.G., "Sa 2.5"). Inadequate preparation can lead to coating delamination, premature corrosion, and costly re-work. Practically, project managers schedule a dedicated "surface preparation window" to allow sufficient time for inspection and remediation before coating begins.

Inspection regime – The systematic schedule of examinations performed throughout the docking period to verify the condition of the vessel's structure and systems. Inspections may be visual, ultrasonic, radiographic, or involve non-destructive testing (NDT) techniques. For example, an inspection regime for a bulk carrier might include ultrasonic thickness measurements of the hull plating at 30-day intervals. The regime must align with classification society requirements and may be adjusted based on findings; discovering unexpected corrosion may trigger additional inspections, extending the overall timeline.

Classification society – An organization that establishes and maintains technical standards for the construction and operation of ships, and conducts surveys to verify compliance. Examples include ABS, DNV-GL, and Lloyd's Register. The society's surveyors review the docking plan, approve the work scope, and issue certificates upon completion. Failure to obtain classification approval can prevent the vessel from returning to service, leading to significant revenue loss. Coordination with the society early in the planning stage helps avoid last-minute re-work and ensures that all regulatory criteria are met.

Regulatory compliance – Adherence to national and international laws governing ship repair, environmental protection, occupational health, and safety. Regulations may stem from bodies such as the International Maritime Organization (IMO), local port authorities, and environmental agencies. For instance, the IMO's "International Convention for the Prevention of Pollution from Ships" (MARPOL) imposes strict limits on the discharge of oily water and mandates proper waste handling during dry-dock. Non-compliance can result in fines, detention of the vessel, or revocation of operating licenses.

Environmental management plan (EMP) – A documented strategy that outlines how environmental impacts will be mitigated during the dry-dock operation. The EMP includes waste handling procedures, emission controls, and measures to protect local marine life. An example is the use of containment booms to prevent paint runoff from entering the surrounding waterway. One of the biggest challenges is coordinating waste disposal with local authorities, particularly when hazardous materials such as lead-based paints are involved, requiring specialized treatment facilities.

Waste disposal – The process of collecting, segregating, and removing waste generated during docking, including scrap metal, used paints, solvents, and contaminated water. Proper waste disposal must follow local regulations and often requires certification of the disposal contractor. For example, a shipyard may contract a licensed hazardous waste processor to handle spent solvents, ensuring that the waste is incinerated or treated in accordance with environmental standards. Inadequate waste management can lead to contamination incidents, legal penalties, and damage to the shipyard's reputation.

De-watering – The controlled removal of water from the dry dock to expose the vessel's hull for inspection and repair. De-watering is performed using high-capacity pumps, and the rate of water removal must be carefully managed to avoid creating excessive suction forces that could destabilize the vessel. A typical de-watering sequence might involve pumping out water at a rate of 5,000 m^3 per hour while continuously monitoring hull stresses. A common challenge is the presence of "suction pockets" that can cause uneven pressure distribution, requiring the use of venting valves to equalize forces.

Pumping capacity – The combined ability of the dock's pump system to move water, expressed in cubic metres per hour (m^3/h). The capacity must exceed the volume of water that needs to be removed within the project's schedule constraints. For a large dry dock with a capacity of 30,000 m^3, a pumping system rated at 8,000 m^3/h can achieve full de-watering in under four hours, assuming optimal conditions. However, factors such as sediment buildup in pump intakes or power fluctuations can reduce effective capacity, necessitating contingency plans.

Ventilation system – The network of fans, ducts, and filters used to provide fresh air and remove hazardous gases from confined spaces and work areas within the dock. Proper ventilation is crucial during activities like welding, painting, and solvent handling. An example is the installation of temporary exhaust fans to capture fumes from a hull-cleaning operation. The challenge lies in balancing adequate airflow with noise control, as excessive fan speed can create an uncomfortable working environment and potentially interfere with communication among crew members.

Hot work permit – A specific type of PTW that authorizes activities involving open flames or sources of ignition, such as welding, cutting, and grinding. The permit requires a fire-watch to monitor the area for a prescribed period after the work is completed. In practice, a hot work permit for welding a hull plate includes steps like removing flammable debris, applying fire-retardant blankets, and conducting a final inspection before re-ignition of the pumps. Failure to follow hot-work procedures can result in fires that damage the vessel and surrounding infrastructure.

Fire-watch – A designated individual tasked with observing the work area for signs of fire during and after hot work. The fire-watch must be equipped with fire extinguishers, maintain a log of observations, and be prepared to act immediately if a fire ignites. The fire-watch remains on duty for a minimum of 30 minutes after the completion of hot work, as required by most maritime safety regulations. Training fire-watch personnel in early detection and response techniques is essential to prevent small incidents from escalating.

Non-destructive testing (NDT) – Inspection techniques that evaluate the integrity of materials without causing damage. Common NDT methods in dry-dock projects include ultrasonic testing (UT), radiographic testing (RT), magnetic particle testing (MPT), and dye-penetrant testing (DPT). For example, ultrasonic thickness gauging is routinely used to assess hull plate corrosion, while radiography may be employed to inspect welds in critical structural areas. The challenge is selecting the appropriate NDT method for each material and defect type, as well as ensuring that technicians are certified and calibrated to the required standards.

Ultrasonic thickness measurement (UTM) – A specific NDT technique that uses high-frequency sound waves to determine the thickness of metal plates. The device sends an ultrasonic pulse through the material; the time taken for the echo to return is converted into a thickness reading. UTM is indispensable for detecting corrosion loss in hull plating, especially in areas that are difficult to access visually. Practical considerations include coupling medium selection, probe calibration, and temperature compensation, all of which affect measurement accuracy.

Welding procedure specification (WPS) – A formal document that outlines the welding parameters, techniques, filler materials, and quality requirements for a specific welding job. The WPS ensures that welds meet classification society standards and are suitable for the intended service conditions. For instance, a WPS for welding high-strength steel on a ship's hull may specify a pre-heat temperature of 150 °C, a specific filler metal classification, and post-weld heat treatment. Deviations from the WPS must be documented and approved, otherwise the weld may be rejected during inspection.

Post-weld heat treatment (PWHT) – A controlled heating and cooling process applied after welding to relieve residual stresses, improve mechanical properties, and reduce the risk of cracking. PWHT parameters are defined by the WPS and vary according to material type and thickness. In a dry-dock setting, PWHT may be performed in a portable furnace surrounding the welded area. Challenges include ensuring uniform temperature distribution and preventing oxidation, which can compromise the quality of the heat-treated weld.

Quality assurance (QA) – The systematic activities implemented to ensure that the dry-dock work meets defined standards and specifications. QA includes document control, inspection planning, testing, and corrective action processes. For example, a QA program may require that every weld be inspected by a qualified NDT technician before the next phase of work begins. Maintaining a robust QA system helps to identify defects early, reducing re-work and ensuring that the vessel can be returned to service without regulatory delays.

Quality control (QC) – The operational aspect of QA that focuses on monitoring and measuring the quality of specific outputs, such as welds, paint thickness, or component fit-up. QC activities are typically performed on-site by supervisors or inspectors who verify compliance with technical specifications. An example of QC is the measurement of coating thickness using a dry-film gauge to confirm that the applied layer meets the required 200 µm specification. Effective QC requires clear acceptance criteria and immediate feedback loops to address non-conformities.

Acceptance criteria – The set of measurable parameters that determine whether a work item is satisfactory and can be approved. Acceptance criteria are defined in contracts, specifications, and classification society rules. For instance, the acceptance criterion for hull plate thickness may be “no less than 6 mm after corrosion removal,” while the criterion for paint adhesion could be “minimum pull-off force of 1 MPa.” Clearly communicating acceptance criteria to all stakeholders reduces the likelihood of disputes and re-inspection.

Defect log – A record that documents all non-conformities identified during inspection, including description, location, severity, and corrective action taken. The defect log is updated continuously throughout the docking period and serves as a reference for the final hand-over report. A practical usage scenario involves the shipyard engineer reviewing the defect log at the end of the project to ensure that all items have been rectified before the vessel is released. Maintaining an accurate defect log can be challenging when multiple contractors are involved, each using different reporting formats.

Corrective action plan (CAP) – A structured approach to address defects identified in the defect log. The CAP outlines the steps, resources, and timelines required to resolve each issue. For example, a CAP for a cracked propeller blade may include ordering a replacement, scheduling a crane lift, and performing a post-repair inspection. Effective implementation of CAPs requires coordination among engineering, procurement, and operations teams; delays in any of these areas can prolong the docking schedule.

Project close-out – The final phase of the dry-dock project where all work is completed, documentation is compiled, and the vessel is cleared for service. Close-out activities include final inspections, issuance of certificates, hand-over of as-built drawings, and financial reconciliation. An example of a close-out deliverable is the “Dry-Dock Completion Report,” which summarizes work performed, costs incurred, and any outstanding items. Challenges during close-out often involve resolving last-minute punch-list items that may delay the vessel’s departure.

As-built drawings – Updated technical drawings that reflect the actual condition of the vessel after repairs and modifications. As-built documentation is essential for future maintenance planning and for compliance with classification societies. For instance, if a new bilge pump is installed during the docking, the as-built drawings must show its exact location, connections, and specifications. Accuracy of as-built drawings depends on diligent measurement and recording during the repair phase; errors can lead to future installation difficulties.

Certificate of class – An official document issued by the classification society confirming that the vessel complies with the society’s rules after the dry-dock work. The certificate is required for the vessel to operate in international waters and to obtain insurance coverage. Obtaining the certificate involves successful completion of all surveys, submission of documentation, and resolution of any outstanding deficiencies. Delays in certification can have significant financial implications, as the ship may be unable to generate revenue while awaiting approval.

Insurance claim – A request submitted to the vessel's insurer for compensation related to losses incurred during the dry-dock operation, such as damage caused by equipment failure or unexpected structural failures. The claim must be supported by detailed documentation, including incident reports, photographs, and cost estimates. For example, if a crane collapse damages part of the hull, the shipyard must provide evidence of the incident and the remedial work required to the insurer. Managing insurance claims efficiently requires clear communication and thorough record-keeping.

Cost estimate – A forecast of the total expenditure required to complete the dry-dock project, including labor, materials, equipment, subcontractor fees, and contingency allowances. Cost estimates are prepared during the planning stage and are used for budgeting and contract negotiations. A typical cost estimate for a medium-size cargo vessel may range from $2 million to $5 million, depending on the scope of work. Over-optimistic estimates can lead to budget overruns, while overly conservative estimates may make the project less competitive.

Contingency reserve – An allocated amount of budget set aside to cover unforeseen expenses or changes that arise during the project. The contingency is expressed as a percentage of the total cost estimate, commonly 5-10 % for dry-dock projects. For example, a $3 million project with a 7 % contingency reserve would have $210 000 available to address unexpected corrosion discovered during hull inspection. Determining an appropriate contingency level requires analysis of risk exposure and historical data; too small a reserve can jeopardize project completion, while too large a reserve may be viewed as inefficient use of funds.

Earned value management (EVM) – A performance measurement technique that integrates scope, schedule, and cost to assess project progress. EVM calculates metrics such as Planned Value (PV), Earned Value (EV), and Actual Cost (AC) to derive indices like Cost Performance Index (CPI) and Schedule Performance Index (SPI). In a dry-dock context, EVM can reveal that the project is ahead of schedule but over budget, prompting corrective actions. Implementing EVM requires reliable data collection and regular reporting; otherwise, the analysis may be misleading.

Schedule variance (SV) – The difference between the Earned Value and the Planned Value, indicating whether the project is ahead or behind schedule. A positive SV means work is progressing faster than planned, while a negative SV indicates a delay. For instance, an SV of –$150 000 may signal that critical tasks such as hull cleaning are lagging, potentially threatening the overall completion date. Monitoring SV enables managers to re-allocate resources or adjust the work sequence to mitigate schedule risks.

Cost variance (CV) – The difference between Earned Value and Actual Cost, showing whether the project is under or over budget. A negative CV indicates cost overruns. For example, a CV of –$80 000 could result from higher-than-expected labor rates for specialized welding. Identifying the sources of cost variance early allows the project team to implement cost-saving measures, such as negotiating better rates with subcontractors or optimizing material usage.

Resource allocation – The process of assigning personnel, equipment, and materials to specific tasks based on availability and project priorities. Effective resource allocation ensures that critical activities have the necessary support while avoiding idle time. In practice, a resource allocation matrix may show that the welding crew is booked for 40 hours per week on structural repairs, while the painting crew is scheduled for 30 hours on hull coating. Conflicts often arise when multiple tasks compete for the same skilled labor, requiring careful balancing and possibly the use of overtime.

Labor productivity – A measure of the output generated by a worker or crew per unit of time, often expressed as square metres of hull cleaned per man-hour. Tracking productivity helps identify bottlenecks and areas for improvement. For example, if the average productivity for hull cleaning is 10 m^2 per man-hour, but a particular crew achieves only 6 m^2, management may investigate causes such as equipment malfunction or insufficient training. Enhancing labor productivity can reduce overall project duration and cost.

Equipment utilization – The proportion of time that a piece of equipment is actively engaged in productive work relative to its total available time. High utilization rates indicate efficient use of assets, while low rates suggest under-use or scheduling inefficiencies. For instance, a pump with a utilization rate of 85 % is considered well-utilized, whereas a crane operating at 40 % may indicate that it is idle for large portions of the schedule. Improving equipment utilization may involve adjusting the work sequence or consolidating tasks to reduce downtime.

Logistics coordination – The planning and execution of material handling, storage, and transportation activities required for the dry-dock project. Effective logistics ensure that spare parts, consumables, and equipment arrive on time and are placed in the correct locations. A practical example is the staging area for paint containers, which must be kept dry and temperature-controlled to preserve product quality. Logistics challenges often stem from limited dock space, tight delivery windows, and customs clearance for imported components.

Supply chain management – The broader strategy for sourcing, procuring, and delivering the materials and services needed for the docking operation. This includes vendor selection, contract negotiation, and performance monitoring. For a dry-dock project, supply chain management may involve securing a reliable supplier for marine-grade steel plates, ensuring that lead times align with the project schedule. Disruptions such as a supplier's production halt can cause critical path delays, emphasizing the need for alternative sources and robust supplier relationships.

Procurement process – The series of steps taken to acquire goods and services, typically encompassing requisition, tendering, evaluation, award, and contract administration. In a dry-dock scenario, the procurement process might begin with a request for quotation (RFQ) for a specialized welding machine, followed by vendor assessment and contract signing. Streamlining the procurement process through electronic systems can reduce lead times, but it also requires careful data management to avoid errors.

Contract administration – The ongoing management of contractual relationships, ensuring that obligations are met, payments are processed, and disputes are resolved. Effective contract administration includes monitoring performance against the contract, handling change orders, and maintaining documentation. For example, the shipyard's contract administrator tracks the progress of a subcontractor performing propeller refurbishment, verifying that milestones are achieved before approving payment. Poor contract administration can lead to disputes over scope, cost, and schedule, potentially resulting in litigation.

Performance bond – A financial guarantee issued by a bank or insurer that ensures the contractor will fulfill its obligations. If the contractor fails to complete the work, the bond can be drawn upon to compensate the shipowner. Performance bonds are common in large dry-dock contracts where the financial stakes are high. A challenge is that obtaining a bond may increase the contractor's cost of capital, which could be reflected in higher contract prices.

Retention money – A portion of the contract sum withheld by the client until the project is completed satisfactorily, serving as security against defects. Retention is typically 5-10 % of the contract value and is released after final acceptance and certification. For instance, a $4 million contract with a 7 % retention would hold back $280 000 until the vessel receives its class certificate. Managing retention cash flow is important for contractors, as it affects working capital and financial stability.

Progress payment – Interim payments made to the contractor based on the amount of work completed, as verified by milestones or percentage of completion. Progress payments help maintain cash flow for the contractor to cover labor and material costs. A typical payment schedule might involve monthly invoices tied to documented achievements such as "completion of hull cleaning." Accurate measurement of progress is essential to avoid disputes over payment amounts.

Final settlement – The reconciliation of all outstanding financial items at the end of the project, including final invoices, retention release, and any agreed-upon adjustments. The final settlement ensures that both parties have a clear record of the total cost and any remaining obligations. Challenges during final settlement may include unresolved defects, disputed change orders, or delayed approvals, all of which can prolong the release of final payment.

Stakeholder engagement – The systematic involvement of all parties with an interest in the dry-dock project, such as shipowners, classification societies, regulatory agencies, subcontractors, and labor unions. Effective engagement fosters communication, aligns expectations, and facilitates decision-making. For example, regular stakeholder meetings can be used to review progress, address concerns, and approve change orders. Failure to engage stakeholders adequately can result in misaligned objectives, delays, and increased risk of non-compliance.

Communication plan – A structured approach that defines how information will be shared among stakeholders, specifying channels, frequency, and responsibilities. The plan may outline daily progress reports, weekly coordination meetings, and escalation procedures for critical issues. In practice, a communication plan might stipulate that the project manager sends a concise email summary each morning, while the safety officer conducts a briefing before each shift. Poor communication can lead to duplicated effort, missed deadlines, and safety incidents.

Escalation matrix – A hierarchy that outlines how problems are escalated to higher authority levels if they cannot be resolved at the operational level. The matrix specifies the types of issues, responsible persons, and response timeframes. For instance, a safety incident that cannot be contained by the on-site supervisor may be escalated to the senior manager within one hour. An effective escalation matrix helps ensure timely resolution of critical problems, minimizing impact on the project.

Lessons learned – The documented insights gained from the execution of a dry-dock project, focusing on what worked well and what could be improved. Capturing lessons learned supports continuous improvement for future docking campaigns. Examples include recognizing that early procurement of specialty paint reduces lead-time, or that allocating additional time for hull inspections prevents schedule overruns. Systematic collection and dissemination of lessons learned require a dedicated process, often facilitated through post-project reviews.

Key performance indicator (KPI) – Quantitative metrics used to evaluate the success of various aspects of the dry-dock operation. Common KPIs include “percentage of schedule adherence,” “cost variance,” “number of safety incidents,” and “paint thickness uniformity.” KPI data are collected regularly and compared against targets to gauge performance. Selecting appropriate KPIs is crucial; overly ambitious targets may demotivate staff, while irrelevant KPIs can divert attention from critical objectives.

Safety incident – Any event that results in injury, illness, property damage, or environmental harm. Safety incidents are recorded, investigated, and reported in accordance with regulatory requirements. For example, a slip on a wet deck leading to a minor injury must be logged, and corrective actions such as improving drainage must be implemented. Analyzing incident trends helps identify systemic issues and develop preventive measures.

Near miss – An event that could have resulted in injury or damage but did not, either by chance or timely intervention. Near-miss reporting encourages a proactive safety culture by highlighting potential hazards before they cause harm. For instance, a worker noticing a loose scaffold component and reporting it before a fall occurs constitutes a near miss. Capturing near-miss data provides valuable information for risk mitigation.

Environmental incident – An occurrence that leads to pollution or ecological damage, such as a paint spill or oil leak. Environmental incidents must be reported to the relevant authorities and mitigated promptly. An example is a containment breach during the removal of oily bilge water, requiring emergency response measures to prevent contamination of the surrounding waterway. Effective environmental incident management includes immediate containment, remediation, and documentation.

Compliance audit – A systematic review conducted to verify that the dry-dock project adheres to applicable laws, regulations, and internal policies. Audits may be performed by internal teams, external consultants, or regulatory agencies. A compliance audit might assess whether all waste disposal procedures meet local environmental standards. Findings from the audit are used to implement corrective actions and improve future compliance.