BURNS McDONNELL

WHITE PAPER / **INTERFACE MANAGEMENT**

ALIGNING COMMUNICATION BETWEEN MULTIPLE PARTIES ON COMPLEX PROJECTS

Most complex oil, gas and chemical projects require an array of stakeholders, contractors and site personnel for the decision-making process. Intentional interface management supports effective communication among all involved parties, thereby reducing errors, rework and overall project costs.

Stories of construction mishaps abound in the oil, gas and chemical industry. Suppose the pipe that Contractor A installed from storage doesn't line up with the pipe Contractor B ran from inside the unit. Maybe Contractor A used a green light to signal pump run status in one unit, while Contractor B used an amber light for the same purpose in another unit. Or, Contractor A incorporated an approved design change that increases steam demand without communicating the change to Contractor B, who is responsible for steam generation equipment.

One of the more infamous examples of an interface issue is the Mars Climate Orbiter incident in the late 1990s. The satellite missed its orbital insertion due to misalignment on units of measure. The software sending data to the satellite was using Imperial units (lbf-s) rather than the satellite's expected input of SI units (N-s). The result was the catastrophic loss of a $200 million satellite and years of hard work by the mission team.

Each of these scenarios illustrates a breakdown in interface management. Though individual teams may spend months working through design and construction details, even a minor miscommunication among parties can lead to large, unexpected problems. Correcting the problems introduced as a result of poor interface management is time-consuming and expensive.

The bigger or more complex the project, the bigger the risk of miscommunication at interface points. When you're dealing with a high number of physical touch points, contractors and licensors, all interactions become more complicated. Oil, gas and chemical companies are aware of how difficult it is to make the details line up. Still, it's common to assume interface management will take care of itself.

A better approach is to take time to plan communication interfaces upfront. Implementing a proven interface management process allows you to identify and prevent potential interface issues, thereby reducing changes and, ultimately, lowering project costs.

WHAT IS AN INTERFACE?

The term "interface" is used in many contexts to mean a variety of things. It is often project- or client-dependent. For the purposes of this paper, an interface is defined as a point of contact between parties executing a complex project. There are three main categories of interfaces:

- Physical interfaces are points of contact where hardware in the field must fit when welded. For example, suppose two different contractors run pipe to the same point in a refinery. If the pipes are out of alignment, they will present welding issues.
- Communication interfaces are points of contact where design information is passed from one party to another. Examples include utility system design and operating conditions, standardization on piping wall thickness and general engineering specifications. Unless the flow of design information is carefully controlled, incorrect designs are likely to be produced by one or more parties.
- Soft interfaces are points of contact related to continuity within the complex. These include common facilities, such as control systems, mist oil lubrication systems or storm water drainage sumps, as well as units of measure, applicable standards and human factors. In each of these examples, using a variety of configurations complicates operations and may even impact safety.

Interface management makes sure everything comes together at each of these points of contact.

OBJECTIVES OF INTERFACE MANAGEMENT

Proper interface management facilitates the identification, communication, monitoring and closeout of essential data at interface points. An effective interface management approach strives to make sure:

- Physical interfaces successfully match up in the field.
- Involved parties are aware of and in agreement on design and operating conditions.
- Project standards are clearly communicated to all affected parties.
- Management of change, and process safety management activities, extend across interfaces.

Achieving these objectives requires identifying all physical, communication and soft interfaces early in the project; defining potential challenges; and resolving interface issues in a timely manner relative to the overall project schedule.

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THE INTERFACE MANAGEMENT PLAN

The guiding document throughout this process is the interface management plan. It details the roles and responsibilities of all involved parties, including contractors, licensors, the owner/operator and any impacted facility. It also defines a communication protocol and documentation requirements, and identifies the tools and methods to be used throughout the project.

Comprehensive documentation of the three types of interfaces should be included in this plan:

- Physical interface documents must record all details necessary for the design to match up, such as coordinates, materials used and process design conditions.
- Communication interface documents outline protocols to be followed throughout the project.
- Soft interface documents include design basis documents and a single set of project specifications issued to all parties by a central authority.

The interface management plan should be developed as early as possible in the project to be sure each new party joining the project team understands the importance of interface management and the company's expectations for this project. In Construction Industry Institute (CII) terminology, this is prior to front-end loading phase 3 (FEL3). Early planning also helps inform decisions on contracting and work package breakdown with an eye toward minimizing unnecessary interface points.

ROLE OF THE INTERFACE MANAGER

Making a single individual responsible for oversight of interface management provides uniform application of the interface management plan and a smooth flow of information among parties. Typically, the project interface manager:

- Develops the interface management plan and appropriate procedures.
- Identifies interfaces with input from engineering.
- Defines deliverables, roles and responsibilities.
- Sets schedule requirements and expectations among all parties.

- Summarizes interfaces in a data register.
- Tracks and reports progress.
- Conducts coordination meetings as necessary.

This role focuses on communicating information with all required parties and coordinating compliance with the interface management plan. Any technical work required to complete the interface documentation is delegated to the relevant technical team.

INITIAL PHASE INTERFACES WITH LICENSORS

At the beginning of the project, the primary interface may be between the project team and licensors. The interface manager designates a single point of contact, known as the interface coordinator, for each party. The interface coordinator reviews and clarifies licensor information as it is made available, always including a technical representative in this communication.

Timely receipt of permit information is critical for the success of the project. Accordingly, interface coordinators help translate between available licensor documentation and environmental permitting requirements. They identify gaps in licensor documentation and create a plan to address the gaps so the required permitting information can be completed efficiently.

Meetings of the interface manager and interface coordinators for all parties should be conducted as often as needed to maintain clear communication. It is also important to identify an appropriate tool for long-term data management so all stakeholders can access interface data easily.

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LATER-PHASE INTERFACE TOOLS AND METHODS

As the project progresses, the interfaces increase in number and complexity. On a megaproject, the number of interfaces with each party easily can number in the hundreds. Significant detail is needed for each one.

PHYSICAL INTERFACES

Physical interfaces need to specify exact coordinates to allow hardware components, such as pipe racks, to match up. If revisions or waivers to specifications become necessary during the project, they must be communicated to all involved parties. Similarly, updates to design information for utility systems are likely to be developed and must be passed along to the party responsible for utility supply.

Understanding and controlling the flow of this information is made possible using the tools and methods outlined in the interface management plan. In most cases, the following tools are employed:

- Battery limit diagrams offer a block level view of the ins and outs of a unit or contract package.
- Interconnecting piping diagrams illustrate the lines routed between units.
- The master interface index is a consolidated list of all physical interfaces owned by the project interface manager. It is used for overview communication and status reporting.
- Interface detail forms provide a verbal description of all data pertinent to an interface point.

COMMUNICATION INTERFACES

Communication interfaces are managed through protocols established in the set plan. The flow of information is controlled to prevent the use of unapproved information in engineering design. These protocols often include designating a single point of contact within each organization that is responsible for all communication issues related to interface management.

SOFT INTERFACES

Managing soft interfaces requires sufficient planning and foresight. We recommend maintaining a centralized repository of master engineering specifications that all contractors, licensors and vendors may use throughout the project. The central repository should include documents that outline philosophies to be applied universally throughout the facility, including those related to isolation and blinding, maintenance draining, safeguarding and acceptable flare mitigation measures, and typical residence time requirements.

By centralizing control of interface data under the interface manager and disseminating that information using these tools and protocols, interface issues can be avoided that would otherwise cause delays, rework and additional expense.

CONCLUSION

Interface management is as equally important as an established project management process for megaprojects. As projects scale up, companies must pay close attention to how all involved parties interact. Making sure all physical, communication and soft interfaces match up requires advance planning and continuous oversight. By following the interface management process, you can foresee and prevent interface issues, reduce project rework and complete your megaprojects on time and on schedule.

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