



SCIENTIFIC APPROACH TO PIPE STORAGE IN THE OIL AND GAS INDUSTRY



SUPPLY CHAIN ADVISORY

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INTRODUCTION

INDUSTRY APPLICATION

- Construction
- Chemical
- Steel & Fabrication
- Oil & Gas
- Power

FACTORS IMPACTING STORAGE

- Size
- Material
- Weight
- Weather Constraint
- Application

TYPES OF STORAGE SYSTEM

- Pipe Racks
- Cantilever Racks
- Pipe Stops
- Pipe Carriers

In context of prevalent market uncertainties and growing business complexities, managing the logistics environment is more challenging now than ever. Heavy pipe storage was traditionally been done in yards with wooden chocks used as stoppers, but now the increasing number of products and higher costs of real estate are pushing organizations to look at yard design with a modern view point.

NECESSITY FOR SCIENTIFIC DESIGN

Pipes are widely used across the Construction, Chemical, Steel & Fabrication, Oil & Gas and Power industries. Traditional yard designs are leading to poor utilization of space, higher involvement of manpower for tracing material, and lower stock accuracy because of manual management of storage. Mismanaging the yard leads not only to higher costs but also to poor material availability and long order turnaround times, which in such asset intensive industries can be a hurdle to topline performance. Given the pressure from international suppliers and reducing margins, yards ought to provide a competitive edge to their operations. This paper focusses on the modern storage system alternatives available today.

DYNAMICS OF PIPE STORAGE

The profile of pipes varies based on its application and the industry. Even within the Oil and Gas industry, the requirement of Pipe storage varies across the segments - upstream, midstream or downstream – and also on the product being processed– oil or gas. The key attributes that play a role in establishing the storage mechanism of pipes include:

- Nominal Pipe Size and Schedule
- Weight
- Material & Coating
- Weather Resistance
- Utility of Pipe
- Cost & Likelihood of pilferage

While typically heavy and bulky pipes are stored in open yards, depending on the material of pipe construction and environmental tolerance, pipes can be planned in covered areas as well. Special storage and handling requirements are evaluated based on coating, weight and likelihood of pilferage.

An effective yard design requires a balance of space efficiency and accessibility of the material. Based on the stock and throughput requirements, the density of storage is planned. Accessibility to each location or even individual pipes can be planned to ensure lower turnaround times leading to higher throughput.

Selection of the right storage system should also provide sufficient flexibility in the system to adjust for future business changes. Pipes come in varying sizes, materials and coatings and it is imperative that the storage system chosen offers that flexibility.

STORAGE SYSTEMS SUITABLE FOR PIPES

Popular storage solutions can be categorized in three broad categories – stands, storage racks and ground storage equipment. Few of such storage solutions are discussed below:

PIPE STANDS

Pipe stands analogous to Pipe pallets can be used to store heavy and bulky pipes in unitized loads. These pallets are typically stackable and allow the user to handle multiple pipes together using a heavy duty fork lift. Pallets can be stacked depending on the weight of the pipes and number of pipes per pallet. These racks however are built for a certain size specification of the pipe, hence offer limited flexibility.

CANTILEVER RACKING



Cantilever racking is the most popular storage mechanism for long items including pipes, beams and rods made of metal, plastic or wood among other materials. The system basically consists set of uprights coupled with horizontal beams at the base that balances the rack. Cross bars between the uprights strengthens the stability of the entire storage system. A series of arms attached to the uprights bear the load of the items placed. The arms can be planned slightly inclined towards

the upright to avoid the load from falling off. Alternately stoppers can also be installed at the open end of the arms to secure the load. Items may be handled manually in case of light items, or by through suitable lift-trucks equipment. Cantilever racking is available for loads varying from 50 to 2500 KG.

PIPE STOP



Pipe Stop is a modern day alternative to the wooden chocks used for storage of pipes. It consists of a steel reinforced rail with notches and blocks, that can be arranged at varying distances from each other based on the diameter of the pipe. Depending on the weight of the pipes and the number of supporting rails, the pipes can be stored up to 20 layers high. It allows the flexibility of arranging different diameter pipes adjacently. The commissioning of Pipe Stop is fairly quick, with the only pre-requisite of flat ground for installation.

PIPE CARRIER



Pipe carriers offer an effective way of densely storing pipes on the ground. This system also supports the need wherein pipe-to-pipe contact should be avoided. A series of carriers are used to arrange pipes in an array. Pipes are typically handled using fork lift or cranes. Rolling of pipes and hammering of stop-chocks is avoided that provides additional safety to the entire setup.

CONCLUSION

The right method of storage could be either one or a combination of two or more of the aforementioned storage systems. The amount of space available, pipe properties and the budget constraints best determine the selection of the storage system. Storage design is not limited to just selection of the right storage system. Warehouse or Yard process is the single key driver for optimum selection of storage system, handling equipment, and layout design.

Considering the application of most pipes is to operate at medium to high pressures and temperatures or carrying inflammable fluids, it is imperative that the storage system selection reflects the business requirements.

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