

A large industrial refinery or chemical plant is silhouetted against a bright orange and yellow sunset sky. The facility features numerous tall distillation columns, complex piping, and scaffolding. Plumes of white steam or smoke are visible rising from various parts of the plant. The foreground shows a body of water reflecting the warm light of the setting sun.

# Performance Under Pressure

Hoses vs. Loading Arms

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## Introduction

In life and in business, there is more than one way to achieve a desired end result. Certain methods are used due to history, purpose, preference, budgets or safety. When it comes to tankers and rail cars there's more than one way to load and unload product. Whether top loading or bottom loading, the two most popular options in the industry are hoses and loading arms. Each has its own purpose as far as moving product, ease of use and increased throughput.

Hose types fall into one of three categories – Vapor Recovery, Steel Braided and Composite.

■ **Vapor recovery hoses** work best on jobs where light weight and flexibility are needed. Vapor recovery hoses are suitable for liquids including diesel, gasoline and lubricating oils. These hoses can be used with accessories such as API vapor couplers, threaded end connections, or cam and groove connections.

■ **Steel braided hoses** have one or more layers of stainless steel wire braid inside a pressure stabilized corrugated metal hose. These hoses are best for hydraulic situations with the dreaded high heat and high temperature combination. These hoses must be absolutely durable and reliable, with a high degree of safety when the hose is in operation.<sup>1</sup>

Unbraided hoses can elongate when pressure is applied. To combat this, an external layer of stainless steel wire braid is added. The braid helps makes the assembly pressure compatible. For really high-pressure applications, sometimes two or three layers of braiding are added. This braiding is flexible and follows the hose's movement. Steel braided hoses have good corrosion resistance as well as resistance to fire and abrasions.<sup>2</sup>

■ **Composite hoses** use thermoplastic films and tubes that are so tightly wound they create a barrier to permeation. When dealing with toxic and flammable

substances you definitely don't want any leaks. Composite hoses are compatible with the widest range of chemicals since they can transfer both polar fluids (like methanol and isopropanol) and non-polar liquids (like gasoline, hexane and benzene). A flexible composite hose won't slow productivity by collapsing or kinking. It also prevents sparking and arc-over hazards that may be possible with metal.<sup>1</sup>



Most hose types can be created with reflex construction. A helix wire is often used as hose reinforcement but once the wire is bent or crushed enough to flatten or kink the hose wall, the wire becomes permanently damaged. A reflex hose on the other hand, bounces back to regain its shape and performance. A thick rubber filler block divides separate groups of wire reinforcement to keep this hose working under the cruelest conditions.<sup>3</sup>

## Loading Arms

In many instances, loading arms are an excellent alternative to flexible hoses. They are superior in performance, durability and most loading/unloading applications. Loading arms come in a choice of materials, designs and sizes and they can handle refrigerated or heated products, liquefied gases, toxic or corrosive substances. Loading arms are often preferable to hoses because of their reliability, low maintenance and long life. Each customer's specific requirements must be taken into account before the design stage to make certain engineers design the proper loading arm for the company's individual needs. Loading arms have other advantages over hoses since they don't require hydrostatic testing, have very few spare parts, minimal spillage waste, no trip hazards and better safety because they won't burst. For some corrosive applications, loading arms can be lined with Teflon®. <sup>4</sup>



There are several arm designs that can be tailored to specific needs. Top loading arms include single arm fixed reach, scissor type, supported boom and unsupported boom. Bottom loading arms, which are the preference in the industry, have similar designs including an unsupported boom, A-frame, A-frame spring balanced and counterweighted. Marine loading arms load/unload barges and carriers.



Some loading arms can even be heated. This comes in handy if there are hot products that tend to crystallize or solidify while inside the arm. Heating is done using either electric tracing or liquid tracing. <sup>5</sup>

## Hose Arms

When the flexibility of a hose is needed for loading and unloading one way to get around some of the negatives is to use a hose arm. Hose arms will keep workers from having to drag heavy hoses around the work area pulling them up and over railings and other obstacles. A hose arm will prevent falls by taking the hose up to the top of a truck or a tank car, so an operator doesn't have to do it. The hose arm can also help employees by holding the hose up while the worker makes the connection. <sup>6</sup>

Hose arms, or handlers as they are sometime called, make loading and unloading hoses more ergonomic for a streamlined operation and faster throughput. Hose arms help free up space on the platform while simultaneously increasing efficiency and revenue by requiring just one worker where there used to be two needed. <sup>7</sup>

### **The Good, The Bad and The Ugly**

There are times when hoses are the best devices for the job. One example would be if you are loading/unloading certain chemicals such as bleach or hydrochloric acid. Hoses used for this purpose are specially lined so they won't corrode.

Hoses are more flexible than loading arms however they are more likely to wear out whether due to weather exposure and/or dragging them across concrete. Hoses are heavy, bulky and create a fall hazard. Because they need replacing often, they are also a constant cost.

Loading arms protect workers and the environment against the devastating effects of hose rupture, pull-apart and failure. They also make quicker connections and load/unload faster meaning better throughput for the company.

### **ENDNOTES**

- 1 <http://www.ushosecorp.com/>
- 2 <http://www.amahusain.com/ssbelowhoses.html>
- 3 [http://www.dunlop-oil-marine.co.uk/pages/offshore-marine-hoses/loading-hose-applications/reflex-hose/reflex-hose\\_en.html](http://www.dunlop-oil-marine.co.uk/pages/offshore-marine-hoses/loading-hose-applications/reflex-hose/reflex-hose_en.html)
- 4 <http://www.fmctechnologies.com/LoadingSystems/Technologies/TruckAndRailcarLoadingArms.aspx>
- 5 [http://www.orey-tecnica.pt/folder/produto/ficheiro1/137\\_produits%20industrial.pdf](http://www.orey-tecnica.pt/folder/produto/ficheiro1/137_produits%20industrial.pdf)
- 6 <http://www.hemcoind.com/hose-arms.html>
- 7 [http://www.carbis.net/products/view/hose\\_handlers/loading\\_arm\\_accessories](http://www.carbis.net/products/view/hose_handlers/loading_arm_accessories)