Global Oil and Gas

Colfax®

Fluid Handling

Terminal Fluid Handling Solutions

Terminal fluid handling solutions: with our expertise you're not alone

Around the globe, terminals are a key facet of the midstream and downstream oil and gas market. Their strategic locations, in many instances positioned adjacent to vital waterways, make them ideal terminalling hubs for breaking-bulk, transshipments and redistribution of fluids. Multiple storage tanks of varying configurations and holding capacities support the offloading of fuels, lubricants and industrial fluids for regional distribution or consolidation for cargoes bound for destinations further afield. The flexible and versatile nature of terminal facilities provide the means to safely, swiftly, and cost effectively turn around cargo.

The challenges you face everyday

You measure success by inventory turnover. Unloading and loading of product and petroleum tankers, rail cars and tanker trucks must be performed as quickly as possible. Wasted time is lost revenue. The fluid handling equipment at these facilities must not only be reliable, but efficient as well, delivering the flow needed to move fluids into, around and out of the terminal.

Experience around the globe

In both hemispheres, Colfax has demonstrated its expertise and experience in applying the right flow solution for all of the major terminal fluid handling duties: vessel loading, circulation and blending system, tank-to-tank transfer, vessel and truck loading as well as injection and pipeline transfer. With its extensive product portfolio from world class manufacturers like Allweiler, Houttuin, Imo and Warren, Colfax is able to draw upon nearly 400 years of know-how in applying fluid handling solutions using volumetric pumps.

○ Terminals equipped with Colfax products

Proven terminal fluid handling solutions

For offloading and management within the facility:

	Flow rates up to:	Pressures up to:
Vessel unloading	2000 m^3/h (8800 usgpm)	16 bar (230 psi)
Circulation and blending	300 m^3/h (1325 usgpm)	10 bar (145 psi)
Tank-to-tank blending	1000 m^3/h (4400 usgpm)	10 bar (145 psi)

For exporting from the facility:

	Flow rates up to:	Pressures up to:
Vessel loading	3000 m^3/h (13250 usgpm)	16 bar (230 psi)
Truck loading	100 m^3/h (440 usgpm)	10 bar (145 psi)
Injection and pipeline transfer	750 m^3/h (3300 uspgm)	100 bar (1450 psi)

State-of-the-art terminals around the globe

Safe, reliable, and efficient – How Colfax's pumps excel

From its inception, Colfax has sought to assemble a cohesive range of fluid handling solutions that operate on a fundamentally different operating principle, that being rotary positive displacement (PD). Rotary PD pumps, unlike centrifugal pumps, are volumetric machines. In simple terms, PD pumps move flow, whereas centrifugal pumps produce pressure. PD pumps deliver a nearly constant volumetric output capacity for each rotation of the pump shaft.

FIVE things you likely didn't know about rotary PD pumps:

HOUTTUIN™

ALLWEILER®

1. Positive displacement (PD) pumps **don't** develop head like centrifugal pumps: they move flow.
2. The flow rate of a PD pump, **unlike** a centrifugal pump, **increases** as the fluid viscosity increases.
3. PD pump performance is **not** dependent on specific gravity, unlike centrifugal pumps.
4. Rotary PD pump performance is **not** governed by the Best Efficiency Point (BEP) like centrifugal pumps.
5. **Unlike** centrifugals, most PD pumps are **self-priming** and some can pull almost a pure vacuum.

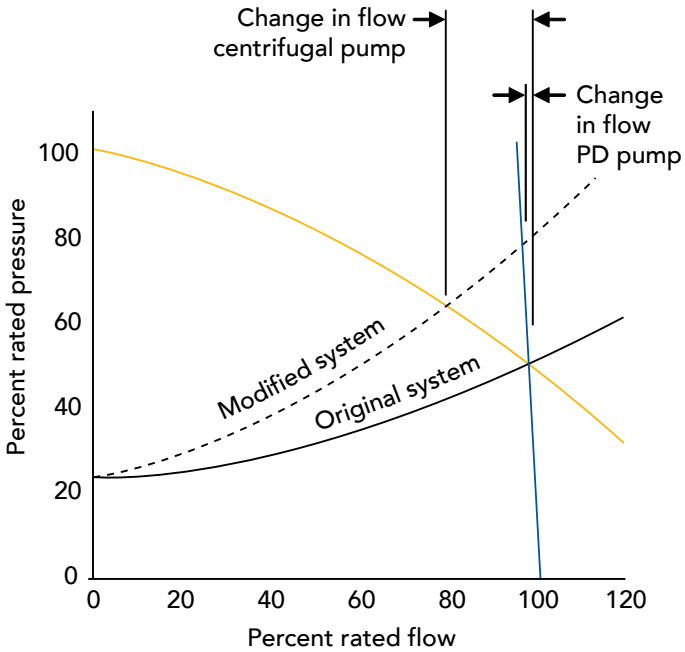
Warren® Pumps

Imo® Pump

Avoiding lost capacity is vital to terminal performance

In terminals, the process requirements will vary significantly throughout the day. Additional flow requirements, or the need to transfer more viscous fluids, will modify the behavior of your processes (see the adjacent graph). In the case of centrifugal pumps, the change in flow can be quite dramatic, whereas the rotary PD pump's performance is often only marginally affected.

Colfax rotary PD pumps help you to complete fluid transfer operations safely and on time, so that you can move onto your next task.



Terminal fluid handling solutions
We'll help you to leverage our technologies

Transfer solutions throughout your terminal operation

Critical applications in your workplace where incoming finished products, crude oil and fuel oils must be off loaded and managed safely within your terminal operation, demand diligent supervision. In your world, failure just isn't an option for services such as:

1. Vessel unloading
2. Circulation and blending
3. Tank-to-tank transfer

Colfax's rotary positive displacement based fluid handling solutions are used around the globe for these services every day.

Products handled:

- Crude oil
- Heating oil
- Diesel
- Jet fuel
- Ethanol
- Gasoline
- Gasoline components
- Heavy fuel oil (HFO)
- Bitumen
- Kerosene
- Propanol
- Naphtha

to improve the profitability of your operations

The throughput rate at your facility determines the operational efficiency and profitability of your operation. Versatile processes and rotating equipment that drive these processes help you to achieve this goal for critical applications like these:

4. Vessel loading
5. Truck loading
6. Injection and pipeline transfer

Volumetric fluid handling technologies give you the performance control that you need to run a world-class facility.

Terminal functions supported:

- Strategic storage
- Breaking bulk for regional markets
- Consolidating bulk for long-haul transshipments and redistribution
- Off spec blending and octane enhancement of fuels

Designs available to latest edition of API 676

Terminal fluid handling solutions

Import and management within the facility

Vessel unloading

Warren two-screw pumps

Vertical pumps, positioned either on the vessel deck, in the ship's pump-room, or below deck, are used to facilitate vessel unloading. To ensure that the unloading system and cargo manifold is functioning properly the initial offloading rate is low, being ramped up once the system performance is validated. Near the end of the cycle, the flow rate is once again reduced to support the stripping of the cargo holds. Technologies like rotary positive displacement pumps that have large turndown ratios and strong suction lift capabilities provide real advantages to operators for these services.

Fluids handled: crude oil, heating oil, gasoline, bitumen
Typical process conditions: Flow rates up to 2000 m^3/h (8800 usgpm)
Pressures up to 16 bar (230 psi)

Circulation and blending

Warren two-screw pumps

As viscous products are received onshore, circulation systems are engaged to ensure that fluids in the above ground storage tanks are being properly turned over. This simple, recycle process is vital to maintain an even product mix and workable viscosity index. As downstream order requirements are received by the facility product, blending is commonly required to enhance the market quality of off spec crude oils and to achieve specific grades of gasoline, including their mandatory octane ratings. Volumetric pumps are used for this purpose to take advantage of their metering capabilities.

Fluids handled: off spec crude oil, HFO, bitumen, ethanol
Typical process conditions: Flow rates up to 300 m^3/h (1325 usgpm)
Pressures up to 10 bar (145 psi)

Tank-to-tank transfer

Houttuin two-screw pumps

Effective fluid-management at a terminal requires the regular movement and consolidation of stored fluids. Tank-to-tank transfer systems are daily employed to perform these operations. To ensure minimal product contamination, the equipment used to execute these services must be able to strip out a variety of fixed roof and floating roof tank types. For fixed roof tanks it is quite common to contend with gas or air vortexing into the suction manifold due to insufficient submergence of the suction take off line. Rotary positive displacement pumps are able to operate under these challenging inlet conditions, with minimal NPSHA, without vapor locking.

Fluids handled: crude oil, jet fuel, diesel, heating oil
Typical process conditions: Flow rates up to 1000 m^3/h (4400 usgpm)
Pressures up to 10 bar (145 psi)

Terminal fluid handling solutions

Export and transport from the facility

Consolidated product from local producers is readied in above ground storage tanks for immediate loading on oceangoing vessels and inland barges when they are berthed. Like the unloading operation, the cargo manifold and loading arms are initially fed at a low rate. This affords time for the inert gas vapors, which are currently occupying the cargo holds, to be evacuated. In this case, the cargo is conveyed to the vessel by large capacity pumps located on shore within the terminal. As the transfer volumes increase, more loading arms are utilized which elevates the backpressure in the system. Volumetric pumps are widely used for these services as their throughput remains constant during the complete loading cycle.

Fluids handled: crude oil, heating oil, gasoline, bitumen
Typical process conditions: Flow rates up to 3000 m^3/h (13250 usgpm)
Pressures up to 16 bar (230 psi)

For land based distribution, truck gantries are utilized to facilitate the loading of transport trailers. These rapid, intermittent services are designed to handle multiple products, each being transferred from storage tanks to truck-mounted tanks via flexible loading arms. As most gantries are configured to support the loading of multiple trucks at one time, the delivery rates demanded from the pumps vary significantly. Adjustable speed control of the pumping equipment reduces the need for control valves, minimizes the need to recycle excess capacity, which in turn improves the operating performance of truck loading systems. Rotary positive displacement pumps, due to their broad operating range, are the ideal technology to employ for truck loading operations.

Fluids handled: HFO, bitumen, gasoline products
Typical process conditions: Flow rates up to 100 m^3/h (440 usgpm)
Pressures up to 10 bar (145 psi)

In many instances, terminals are located in close proximity to refineries. Interconnecting pipelines provide an economical and efficient conduit for delivering feed stocks to these downstream operations. Depending upon the needs of the refinery, multiple products may need to be batched. Transferring products of varying viscosities and densities can be reliably handled using rotary positive displacement pumps.

Fluids handled: blended crude oil, jet fuel, gasoline products
Typical process conditions: Flow rates up to 750 m^3/h (3300 usgpm)
Pressures up to 100 bar (1450 psi)

Vessel loading

Houttuin two-screw pumps

Truck loading

Houttuin two-screw pumps

Injection and pipeline transfer

Warren two-screw pumps

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Fluid Handling

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