



# On-Demand Pumping

## Double diaphragm pump controls fluid levels at UK oil terminal

By Dave Rozee

The BP Oil Terminal site in Hamble in the U.K. occupies an area of about 53 acres on the banks of Southampton Water, a tidal estuary, and is one of many similar terminals operated by the company throughout the country. The terminal acts as a temporary storage facility for hydrocarbon products produced in refineries, such as gasoline, diesel, aviation fuel, etc., before they are transferred to customers such as gas stations, domestic premises and aircraft companies.

### Protecting the Storage Tanks

The hydrocarbon products arrive at the terminal by pipeline and ship and are stored in large bunded storage tanks. The large bunds surrounding the tanks provide a safety barrier in the event that a tank is breached; any spill would collect in the bund rather than contaminate the surrounding area. Provisions, therefore, have to be made to empty the bund. In fact, the likelihood of such a spill is low—in the past 10 years, oil exports from Hamble have been carried out with complete safety and with no harm to the environment. The bund can easily accumulate rainwater, however, which must be pumped away to make sure that the full bund volume is kept available. In addition, the tanks are located at the end of the site in an area below sea level, meaning that in the event of any local flooding, it might be possible for surface water—which could include seawater—to spill over into the bund.

### Pumping Solution

- The pumping solution had to be:
- Capable of pumping all possible fluids in the bund;
  - Intrinsically safe;
  - Able to operate on demand;
  - Able to stop instantly without damage; and
  - Appropriately filtered.

The solution was engineered by Tri-Ark Pumps Ltd, a supplier of diaphragm pumps in the U.K.

An air-operated double diaphragm (AODD) pump equipped with an automatic flow switch was chosen for the job. This particular pump is capable of pumping liquid at flow rates up to 500 liters per minute over the 50-meter distances required when emptying the bund. This pump was chosen because it is constructed from stainless steel and is equipped with PTFE diaphragms, ensuring that hydrocarbons, rainwater, surface water and seawater can be pumped if necessary without any corrosion to the pump. It also is equipped with an automatic flow switch, meaning that as soon as the switch detects fluid, the pump is switched on, so no one is required to switch the pump on and off manually, providing true on-demand operation.

There are likely to be small spills of hydrocarbons into the bunded area when the tank is being filled and emptied, so all water removed from the bund is likely to have some level of contamination and must be transferred to a container for treatment; it cannot be discharged directly into the sea. In the event of a major breach, the contents of the bund would

be primarily hydrocarbons, and would be transferred to a different container and removed from the site for re-processing.

The site is regularly monitored and has to account for all waste generated and how it is disposed. AODD pumps operate through the movement of their diaphragms due to the action of compressed air, and offer a number of benefits.

They are inherently dry self-priming, capable of drawing up liquid even when installed above the source liquid level, which makes positioning of the pump far less critical than other pump types. In addition, the pump cannot be damaged if it runs dry (it continues to operate with no fluid passing through it) and will cease pumping immediately (stop dead-head) as soon as it is switched off with no damage to the pump.

One of the most important factors in the choice of this pump type for the application was that the pump is powered entirely by compressed air, not electricity, meaning there is no likelihood of any spark being generated when it switches on or off or while it is running. This makes it ideally suited for hazardous environments, as the whole area had to be certified to ATEX, the European directive for explosive atmospheres.

### **Simplicity of Operation**

The choice of an AODD pump allowed the creation of a simple and effective engineered solution, and also utilized few components, in order to keep costs down. The pumps contain few moving parts, so there is less maintenance, and they offer easy access to those parts that may need servicing.

In addition, they are not damaged if solid particles are pumped with the liquid. A filter system was installed on the suction side to prevent macro solids such as leaves from entering the pump. Discharge flow rates are easily adjusted by controlling the air inlet or the discharge flow, so no complex control systems are required.

The pump has been in operation for two years and is tested once a week to make sure that everything is in order.

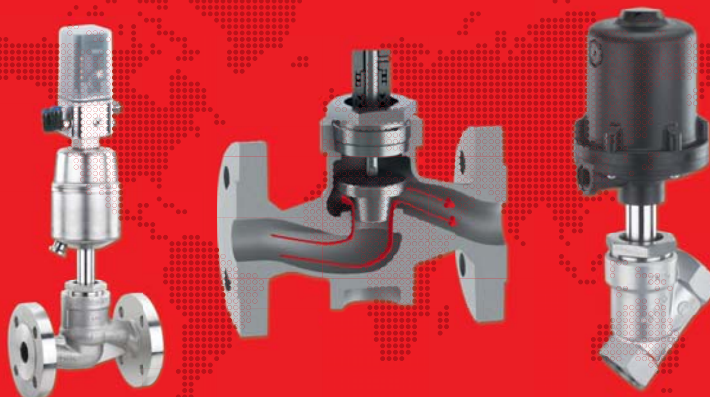
It has not had to deal with any tank breaches, but is pumping away any excess water that appears. **iwwd**

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