A simple measure such as upgrading a terminal's valves cannot only make an engineer's working day safer, it can also save time and money

Making life easier

Many terminals built decades ago no longer fulfil the flexibility needs of today's operations in terms of product handling, speed of operations and modern technology.

In most cases the only option for a re-design is a complete re-build. This is not only costly, it would also require customers to find other storage capacity during the period of downtime.

Oiltanking Copenhagen (OTC) is a typical terminal situated in Denmark, built in stages from 1960-1972. OTC has a storage capacity of nearly 390,000m^3 in tanks sized from 1,000m^3 up to 16,500m^3. The customers include Scandinavia and Baltic regional operators. OTC handles products like A1 jet fuel, diesel, petrol and VGO.

The heart of the OTC terminal, the manifold system, is a DN250 piping system for pumping and DN300 for suction. The valves used on the manifold are gate valves and to make sure nothing comes downstream when the gate valve is in closed position, OTC uses blinds as well. Blinds are needed since the gate valves are not 100% tight and there is no possibility for verification that the valves are sealing as required. Using the blinds avoids any unintended mixing and un-needed waste of product.

The working sequence when closing a valve is:

- Close gate valve
- Unbolt the flanges
- Empty the area between the valve and the blinds for product
- Turn the blind
- Bolt the flanges.

This procedure normally takes 30-45 minutes for two persons and a volume of product is released and recovered at each operation.

The manifold system at OTC is not designed for easy access

One of the main considerations when designing manifold systems today is safe working conditions and easy access for the employees. The piping at OTC, however, was not originally designed for easy access, and harsh weather conditions in Scandinavia make these working positions even more unpleasant. The manifold system has been expanded over the years and includes gate valves of different face-to-face dimensions. In 2010 OTC decided to look into what could be done to upgrade the manifold system to include:

- Meet customers' requirements for clean/certified products
- Verification of the sealing of the valves
- Minimise the waste of product
- Improve the safe working conditions when operating the valves.

The requirements from the customer of today are different than the ones of 1970. Today certified products like A1 jet fuel with sulphur content of up to 5,000 ppm, are handled on the same terminals which handle ULSD with 5-7% FAME (bio content) and with sulphur content of 10 ppm. If these products get mixed in any way, the sulphur content in ULSD could reach an unacceptable level or the certified A1 jet fuel could get contaminated with FAME and the certification of the product is compromised. Both scenarios are unacceptable for the terminal operator.

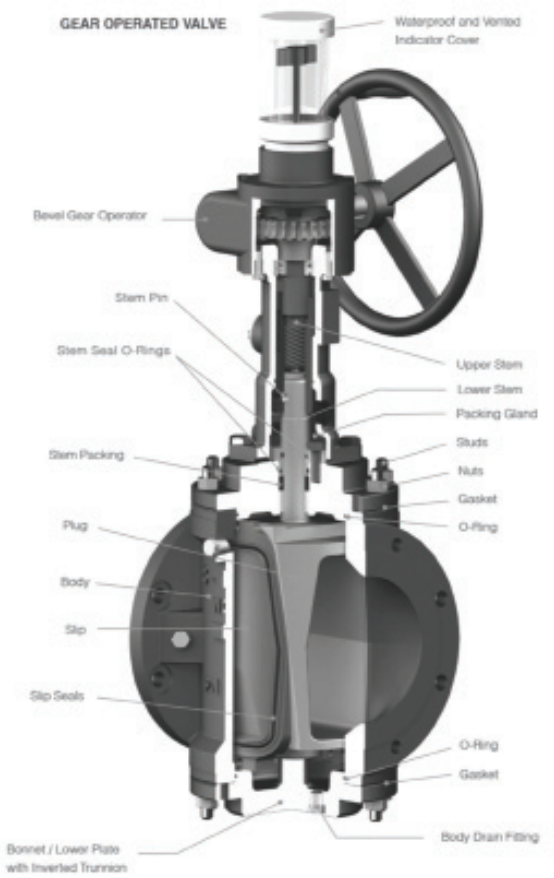
A safe and easy way to verify the sealing of a valve is to use a Double Block and Bleed (DB&B) expanding plug valve. After the valve is in closed position the operator can verify the sealing of the valve by means of the bleed system. It takes less than a minute to close the valve and within another minute the operator has verified that the valve is sealing as it is supposed to.

However in this case the gate valves installed had different face-to-face dimensions so the gate valves could not be replaced by standard DB&B expanding plug valves.

Therefore OTC looked into replacing the existing manifold system including valves and piping. To minimise the downtime, the manifold sections would normally be made outside the terminal with standard face-to-face dimension DB&B expanding plug valves and then, when ready, the existing manifold system would be disassembled and the new sections lifted into the site. OTC could not justify the overall costs, nor the length of downtime for such a project.

OTC has previously tested a DB&B expanding plug valve from OmniValve and found it to be reliable, giving the isolation required.

The Omniseal DB&B



Omniseal DB&B expanding plug valve

expanding plug valve has a wedged plug, which in closed position forces two slips with vulcanised soft sealing towards the seating area of the body. This gives a bubble tight sealing.

The bleed system allows the operator to verify that nothing comes downstream of the valve. At the same time there is an Automatic Differential Thermal Release system (ADTR), which when the valve is in closed position, releases any accumulated thermal pressure which exceeds 25 psi. If the ADTR system was not present, there would be a risk of pressure accumulation, which at the end would prevent an actuator from opening the valve due to high torques.

OTC and Omni discussed the different options available to upgrade the most critical part of the petrol and A1 air fuel manifold system. It was decided a DB&B expanding plug valve based manifold would be the best option. After inspecting the manifold and the gate valves in place, the need for valves on the manifold system was 26pc DN250 with different face-to-face dimensions from 386mm up to 456mm and 33pc DN300 with different face to face dimensions from 388mm to 503mm. Both DN250 and DN300 were all DIN flanged. The standard patterns of the Omniseal DB&B expanding plug valve were shorter than the measured face-to-face dimension of the gate valves.

The following options were available to meet the needs of OTC:

- Standard f-t-f valves with DIN drilled flanges and then OTC to arrange to cut the pipework and weld new and longer pipe and flanges on the manifold
- Standard f-t-f valves with DIN drilled flanges and then spacers to meet the measured f-t-f dimension
- New patterns with the required f-t-f dimension. This would require six new patterns
- A combination of the above three possibilities.

The first option was a no-go since it would require too much cutting and welding on the manifold and that would bring the overall costs to an unacceptable level.

After looking into the costs for the other possibilities OTC decided to use a combination of spacers and new valve patterns. OTC would use spacers on the valves where there were only a few valves with that specific face-to-face dimension. For the dimensions that had more valves with the same face-to-face dimension, it was financially justifiable to develop new patterns. Omni ended up with a total of four new patterns and 12 spacers to cover the 59 valves. The lead time agreed on was five months.

Each valve had a tag number and each was designed and delivered with the hand wheel facing the manifold bridge for easy access to and operation. After the valves were delivered with the OTC specified painting system, the valves were installed.

Today the daily life of the OTC operators is much easier. The operators do not have to spend hours outdoor bolting and unbolting flanges and blinds in compromised working positions. Now the operator enters the bridge and rotates the hand wheel and after less than half a minute the valve is closed and the sealing of the valve can be verified by means of the bleed system. The days of wasting valued product are history.

On the basis of this successful turnaround on part of the manifold system, OTC decided to proceed with upgrading the manifold system and has ordered another portion of Omniseal DB&B expanding plug valves for the complete diesel manifold. These valves will arrive at OTC at the end of 2012.

For more information:

This article was written by Sven-Erik Johannesen, international sales manager for Europe at Omni Valve, http://www.omnivalve.com

Engineering supervisor Søren Lorentzen operating one of the Omniseal DB&B expanding plug valves at OTC