Saudi Aramco Pipeline Valve Care Truck

A Mobile Way for Valve Maintenance

One of the important factors to achieve effective pipeline valve maintenance is the availability of suitable equipment and tools to remote locations. Proper equipment and tools ensure work quality and safety; as well effectively reduce the time required during emergencies when response time is critical. The objective of this paper is to provide an introduction about the design and capability of the Valve Care Truck, which can provide on-the-road preventative valve maintenance.

By Bader M. Al-Jarallah and Mohammad W. Qahtani, Saudi Aramco

Recently, Saudi Aramco Pipeline Department successfully commissioned a new Valve Care Truck (EW-4394). The truck was custom-designed for Saudi Aramco by the Canadian company Sealweld Corporation, a world leader in valve maintenance. The truck is designed to suit pipeline needs and is equipped with all necessary tools required to perform on-line valve maintenance. The truck will be utilized for routine valve maintenance and response to emergency valve repair, including external and internal valve leaks.

Valve Care Truck Design

Valve care truck includes a mounted unit skid, which was custom-designed for Saudi Aramco by the Canadian company Sealweld Corporation, a world leader in valve maintenance. A special shock absorber system is installed to ensure that the equipment does not suffer any damage during off road transportation. The truck will be used for routine valve maintenance, but it also can be used for fast response to emergency valve repair, including external and internal valve leaks.

'Figure 1: Pump Control Cabinet'

'Figure 2: The Air feed Skid'

Injection Pumps

The skid unit is equipped with the following high pressure pumps:

1) Sealant Pump:

Skid is equipped with a pneumatic reciprocating pump which has maximum air input supply of 100 psi and maximum working pressure of 10,000 psi which makes it capable of servicing large diameter pipeline ball, gate and plug valves. The pump is utilized for injecting high viscosity grease and sealants in order to stop valve leakage in the case any seat damage.

2) Lubricant Pumps:

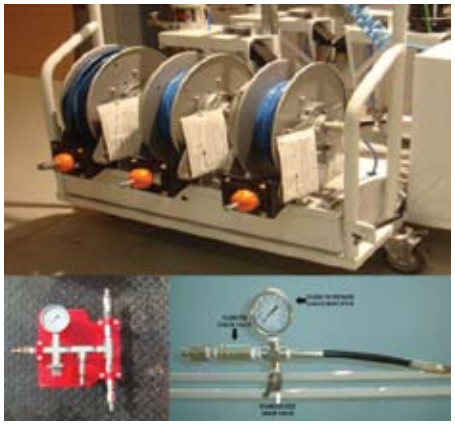
The skid is equipped with two additional pneumatic reciprocating pumps with a maximum air input supply of 140 psi and a maximum working pressure of 8,400 psi, utilized for injecting low viscosity grease such as: Valve Cleaner, Solvent, Lubricant and diesel fuel used for flushing purposes.

For safe and easy operation the pumps are fully operated through one control cabinet. For each pump there is a pressure gauge indicator for the discharge grease pressure and one for the inlet air pressure supply.

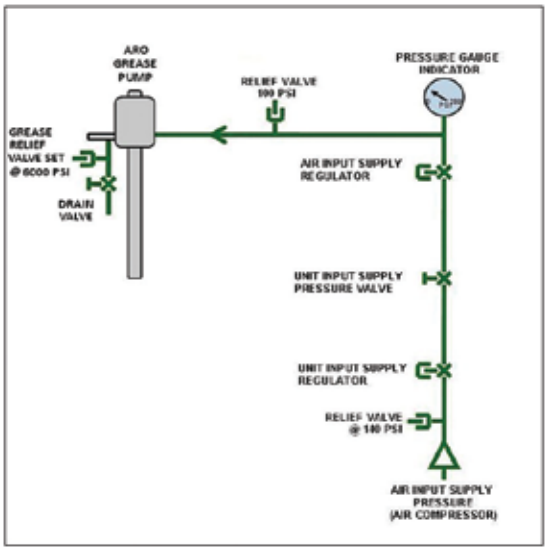
In order to insure continuous supply, the skid unit is equipped with multipurpose tanks, which can be utilized for pumping different products. The pumps are air operated and fed from a 300 LR capacity pressurized receiver tank. The tank is kept pressurized by an air compressor driven by a portable diesel engine capable of operating three pumps simultaneously. The air compressor and pumps are operated through separate control cabinets as shown in the photo below.

Accessories:

For easy operation the skid is equipped



'Figure 3: Accessories: (a) Hose reel skid (b) Distribution manifold (C) Safety whip hose'



'Figure 4: Air Input Diagram: showing relief valve locations'

with hose reel skid consisting of three 2" spring loaded lubricating/reel complete with 12-meter high-pressure sealant hose. The hose is connected to a heavy duty whip hose manifold consisting of high-pressure Easy Connect, Check Valve, Pressure Indicator, High Pressure Release Valve & Cross Tee and 10" x 1/4" Whip Hose. The truck is equipped with a distribution manifold, which allows pumping to different valve fittings from the same pump. It also can be utilized in a revised mode where two pumps can pump at the same time during emergency in order to increase the pumping capacity. Additional accessories includes: general purposes water tank, drinking water tank, sealant storage area and a tool box including all necessary tools and fittings.

Safety Aspects in the Design

Safety emphasis was included in the design of the skid to insure safe operation. This equipment includes: preset safety relief valves in the air supply system and sealant injection loops, safety whip hose, pressure gages at the control, and the injections points, spark arrestor, and grounding equipment. Safety apparatus such as fire extinguisher, Scott Air-Pak, a fire blanket and emergency shutdown switches are also equipped on the truck for faster response incase of an emergency such as fire, gas leak, etc.

Truck Capability

With the on-board equipment the truck is capable to perform all on-line valve maintenance activities including:

- Passing valve (leakage across the seats)
- All external leaks: from stem packing, bonnet flange, valve fittings etc.
- Seized and hard to operate valves
- Utilization for other field activity valve site hydrotesting, operating portable GOVs, and portable actuators Figures 5 and 6 illustrates different types of valve repair activities utilizing the new valve care truck. Several advantages including:
- Enhanced safety and a reduction of associated risks
- High capacity pumps reduce the time required by up to 75%
- Reduction of the required manpower: Maintenance of any valve regardless of its size and type required only two trained valve technicians
- Enhances emergency response time in both external and internal valve leaks

Conclusion

The new valve care truck, utilized for routine valve maintenance, is designed to suit pipeline needs and is equipped with all necessary tools required to perform both safe and effective on-line valve maintenance. It is also available for fast response to emergency valve repair including external and internal valve leaks. Benefits include: enhancing the quality and safety for the valve technicians, reducing the associated risks of in-line and under pressure valve maintenance, reduction of response time and required manpower.

Acknowledgement

Authors would like to appreciate Mr. Dean Chisholm, On Line Valve Repair Specialist and President of Sealweld Corporation Ltd. for his valuable contribution in the design and arrangement of the Valve Care Truck.

'Figure 5: Repair internal passing of 56" through conduit gate valve.'

'Figure 6: Repair internal passing of 36" Ball Valve.'