Six problem valves

The how (and why) of maintenance Part 5

By Ingolf Fra Holmslet

As explained in the previous articles in this series it is important to understand what can happen and why they happen. During the last 40 years I have been working with valves, I have learned that the normal way of solving a valve problem is to buy a new valve to replace the troublemaker.

This is OK when having a flanged valve, but a little bit difficult when it comes to an in-line welded valve; in that case you only change the internal parts of the valve. This change of valve or valve parts may not solve the root of your problem, as it may be due to the operation, media, or lack of maintenance. The cause of your problem may be a minor detail that causes a major problem. Let me tell you about a normal problem involving six identical valves in the same system.
On an installation there were six, 10” class 1500 valves that all started to become troublesome at the same time. The valves were all identical and without lubrication fittings and a blind plug in the bottom of the cavity.
The six valves were all getting harder and harder to operate and one had to use a cheater bar and extension to be able to operate all six. The gear on one of the valves was dismantled, controlled and was found to be working as it should; the problem was clearly the valve.
As the valves were top entry, the plan was to strip all six and replace the internals to solve the problem. This would involve a major operation as the process had to be stopped and the system depressurised. Before starting the work, I was asked to come out to the installation to give a second opinion and see if there

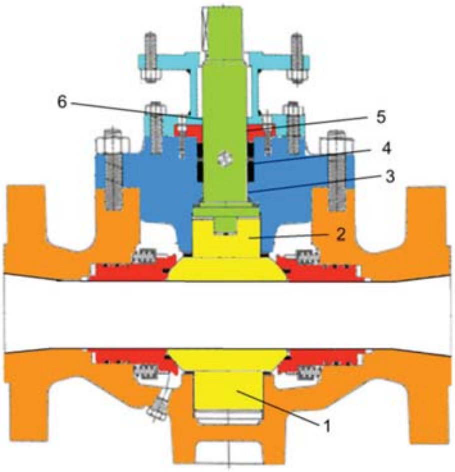

Fig. 21

was anything I could do to solve the problems without having to shut down the system.
The six valves, as illustrated in Figure 21, were top entry valves with six places where friction can normally occur. The normal friction between seats and ball are not taken into consideration. These six places were:

1) Between lower trunnion and body
2) Between upper stem on the ball and bonnet
3) Between stem and bonnet
4) Between stem and stem packings
5) Between stem and press gland
6) Between stem and gear-adapter

The total friction on those six points plus the seat ball friction is the normal torque the gear must overcome.

It is not unusual for the material quality of the valve part not in contact with the media to be of lower quality than the parts in contact with the media. The six valves were all 316, but looking at the valve the gear-adapter looked like it was made of carbon steel and, as we know, that part is not in contact with the media. When condensation or rainwater falls down between the stem and gear adapter there can be a lot of corrosion if any of the parts are made of carbon steel.
Looking at the VDS I could see that the gear-adapter and the press-gland were made of carbon steel, so my advice in this situation was to keep on producing and take the gear and the gear-adapter off the valves and control for friction between the gear-adapter, press-gland and the stem. After taking off the gear and the gear-adapter we saw what you can see in Figure 22 that clearly shows what it looked like below the gear-adapter; it was full of corrosion. The image in Figure

Fig. 22

When condensation or rainwater falls down between the stem and gear adapter there can be a lot of corrosion

Fig. 23

Fig. 24

23 shows the corrosion in the bottom of the gear-adapter and one also can see in Figure 23, there was a leak indication hole in the bottom of the gear-adapter which allowed water to leak in between the adapter and the press-gland. Figure 24 shows how it looked like after taking away most of the corrosion on the top of the gland-plate, and Figure 25 shows the corrosion on the inside of the gear-adapter towards the spindle.
You don't have to be a rocket scientist to understand why the six valves were stuck and impossible to operate. After cleaning the valves there was no problem operating them with a handle and the whole gear-adapter was filled with grease from the bottom to the top to prevent the same situation occurring in the future.
The six valves had been in service for between seven and eight years and had never experienced any trouble before all becoming suddenly stuck. This story is not unique, there are a lot of valves in the same situation all over the world, and the valve manufacturer still produces valves with carbon steal gear / actuator adapter and carbon steel press-gland, and there's nothing wrong with that. What's wrong is that there are NO lubrication fittings in the neck of the adapter, and there is NO recommendation from the manufacturer to fill that adapter with grease.
There has always been too much money in the oil industry and the policy has been to run to failure. The solution to failure problems has been to replace the valves when they cease to work like they should. I don't care about nice words such as life cycle cost, because the only things that matter are the investment cost and the cost of running the plants. I know that maintenance costs, it's the same with your car. Why do you take your car in for service? I think it's about time that this industry started thinking about valve maintenance which will save you billions. But, as I have tried to explain in previous articles, the valves MUST be equipped to be able to maintain them.
In recent years I have been working on big 36", 30 year old valves that were planned for replacement due to operational and leak problems. I have heard so many times: *It's time to replace them, they are old and have done their job!* After maintenance that takes just a day, the valves work like new with no operational problems and a leak rate well below that of new metal sealed ball valves. I have stated many times that more then 60% of all replaced valves could have been saved by the correct maintenance IF they were equipped with lubrication fittings in the right places and auxiliary valves in the bottom of the cavity. Maintenance does cost, but replacement is normally far more expensive.

You don't have to be a rocket scientist to understand why the six valves were stuck

Fig. 25

To be continued...