Severe service slurry valves & the Porsche 911

What do cars and valves used in the mining industry have in common? Well, both should function perfectly in order to fulfil the users needs without being too much of a hassle. Constant repair and replacement are obstacles for end users who strive for improved reliability and reduced operating costs. And the same is true for a car.

By Tony Buttling, Icon Valve Group

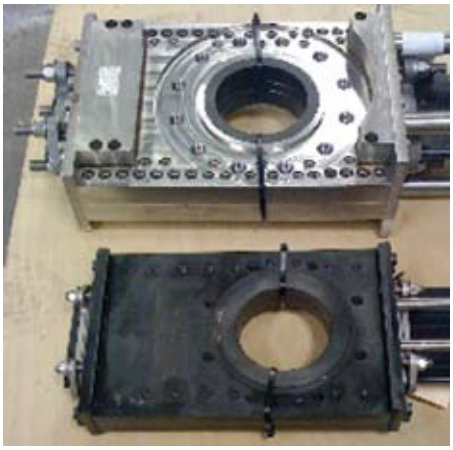
The Carrera 4S is one of Porsche's finest sports cars. Its racing heritage is expressed in its design, precision engineering, appearance and aesthetics. Driving the 4S is a unique experience – I should know – I own one!
And yet, I have to confess - the car is quite useless (useless, adj – having no practical use or advantage).

Let me qualify that…

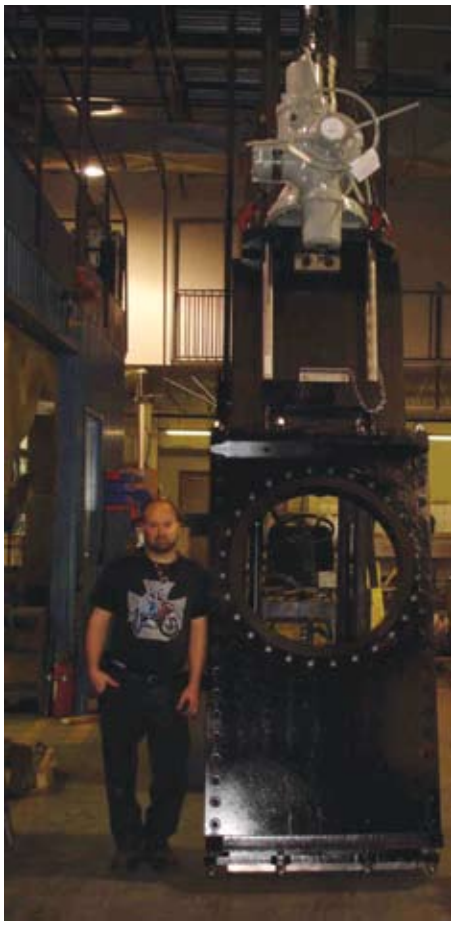
I go shopping with my wife and we can't fit the shopping into the car without performing all sorts of juggling acts. I go to the hardware store to fetch some building materials and again I can't fit anything into the tiny trunk at the front of the car. I want to head to the local golf course with a couple of buddies – we manage to squeeze Bill (he's the shortest) into the back but we can't fit our clubs into the car. How can such a beautifully made, precision engineered exotic sports car be so "useless"?
My buddies keep telling me that I should get myself an SUV for doing all those chores – seating for four adults in comfort and lots of room for shopping and golf. My Porsche, they say, is not "fit for purpose". They should know – they all drive big 4x4 Vehicles.

Cars and valves

This brings me to the reason for telling this little anecdote. You see my buddies are maintenance engineers who work in the mining industry. These guys are intelligent and resourceful and pride themselves on keeping the plant operating – they have a "whatever it takes" mentality which is what is needed in Australia's tough outback.
So why then do they continue to use inferior slurry valves that are not "fit for



The Class 600LB valve shown top left of the photo replaced 3" and 6" Gate Valves on high pressure, high temperature, acidic, scale forming vapor lines as shown on right.



30" ANSI 150LB O-Port Valve fully rated to 285psi working pressure. Used on scale forming vapor lines.

purpose" and that require replacing or repairing on a regular basis. In fact we might well ask why, in the first instance, such plants are designed and built that way? Each year, billions of dollars are spent replacing or repairing unsuitable valves that have failed prematurely, which is great news for valve manufacturers, but not so good for the end user whose ultimate objective is to improve reliability and reduce operating costs. This is especially true of slurry handling valves where inappropriate valve selection often results in premature failure due to erosion and/or corrosion, scale build-up or blockages that prevents the valve from operating (this article does not address Pulp & Paper and other similar non abrasive slurries).
In an attempt to reduce start-up costs, design engineers often compromise when choosing which valves to use. Often it's the "least expensive" valve option that's chosen. However once piping and valves have been installed, it becomes difficult to change to a more suitable valve due to the complexities of rearranging pipe work.

A possible solution

What then is the correct slurry valve? Obviously there are no hard and fast rules when it comes to valve selection, however any valve that does not have a full flow circular bore that matches the pipeline is going to be problematic. In the case of scale forming slurries, valves with internal cavities such as Ball, Gate, Globe & Knife Gate Valves are prone to media build-up that prevents the valve from cycling. Abrasive slurries on the other hand tend to wash away the internals of the valve which prevents shut-off.
Our experience tells us, there are only two styles of valve that successfully handle slurries and provide long life trouble free operation: Full Bore O-Port Valves, sometimes called Thru-Conduit Valves and Full Bore Plug Valves. Both have a full circular bore with full flow characteristics. Available in metal and soft seat, these valves typically incorporate wear protection to appropriate areas to extend life and have been used extensively in severe service slurry or scale forming vapour lines. Applications include Bauxite, Magnetite, Steel, Nickel, Coal and Lime etc… often at high pressures and temperatures and extremes of pH.

Case study

Norilsk Nickel Cawse, Kalgoorlie, Western Australia. Knife Gate Valves were originally installed on all high temperature, H2SO4 nickel slurry lines. The slurry is both corrosive and abrasive in nature as well as scale forming. The Knife Gate Valves would last only about 6 weeks before scale build-up prevented the valve from cycling. In contrast, our first Full Bore O-Port trial valve ran for 14 months before it was removed from service for examination. The valve was still in as-new condition. It was reinstalled and ran for a further two years without any problems. Norilsk purchased a quantity of Full Bore Titanium and Super Duplex O-Port Valves following this trial. Unfortunately, the Norilsk plant was closed due to the WFC and lower nickel prices.
The face to face dimensions of the Full Bore Plug and O-Port Valves are to ANSI standards, but we can also custom build to meet our clients specific requirements. Materials of construction include Carbon Steel, Stainless Steel, High Nickel alloys and Titanium – in fact any plate material that is commercially available. We can supply virtually any size valve to any pressure / temperature rating. For example we recently supplied a number of 24" and 30" O-Port Valves to BHP Billiton Worsley Alumina in Western Australia. These ANSI 150lb flanged valves are rated to 285psi working pressure (412psi Test Pressure) and are used in high temperature scale forming vapour lines (see picture 3)
Yet another of our customers (Kwinana Nickel) was supplied a number of 3" and 6" ANSI Class 600 O-Port Valves for scale forming, high pressure, high temperature, acidic vapour lines. (see picture 1 and 2).

Conclusions

There's an old saying that "You get what you pay for" and this is certainly true of slurry valves. Selecting the correct valve, one that is "fit for purpose", might cost you a little more initially, however the savings you make in the long run will far outweigh your intial purchase price and provide you with the most cost effective long term solution.
So, back to the Porsche. It's not a shopping cart, it's not a light truck and it's not a people mover. It is however a wonderfully engineered sports car and an absolute joy to drive. It is in fact entirely "fit for purpose" when used and driven as a sports car, and if you have ever driven one I am sure you would agree – a very useful "sports car" at that!

About the author

Mr Tony Buttling is the CEO of Icon Valve Group, an Australian company supplying specialty slurry valves to iron ore, nickel, bauxite, coal and many other industries . He is also the CEO of Applied Alloys Australia, a company specializing in providing tribologically engineered solutions to abrasion and corrosion related issues. Both companies work together in designing valve solutions for severe service applications.