



Raven™ Trim

RETROFITS & AFTERMARKET



You can now solve your problems and benefit from RAVEN™...the latest advance in Multi-Labyrinth, Multi-Disc, Stack design control valves for severe applications without the cost of purchasing a new valve. Copes-Vulcan has further developed the well proven labyrinth multistage letdown design and made it less prone to blockage and lower in noise. When using RAVEN trim in your valve body, the process fluid is forced through a specially designed tortuous path which keeps its velocity at a low level where vibration and erosion are eliminated. The energy dissipated by dropping a high pressure across the valve is absorbed in a controlled manner over the correct number of 90-degree bends in the fluid path. High velocities in the valve trim are eliminated.

Copes-Vulcan has been providing control valves and desuperheaters for the power, process and nuclear industries since 1903. SPX provides a wide range of valves for the control of pressure, temperature and flow-induced noise in all types of power plants. Products include severe service and general service control valves, variable orifice desuperheaters, Raven™, trim and steam conditioning valves and nuclear control valves, as well as custom designed specialty valves. Copes-Vulcan is recognized worldwide as a leader in valves for severe and critical service applications. Our strength lies in our ability to provide innovative valve solutions for our customers' application needs.

Retrofits & Aftermarket

Copes-Vulcan can fit the RAVEN™ trim into your existing valve body without the need even to remove your valve from the line. You do not need to have a high capital budget approved for complete valve renewal...retrofits can be bought on maintenance budgets as spare trim. Cost is substantially lower than a complete new valve. Guarantee for the entire valve, including old body etc, is identical to a brand new valve.



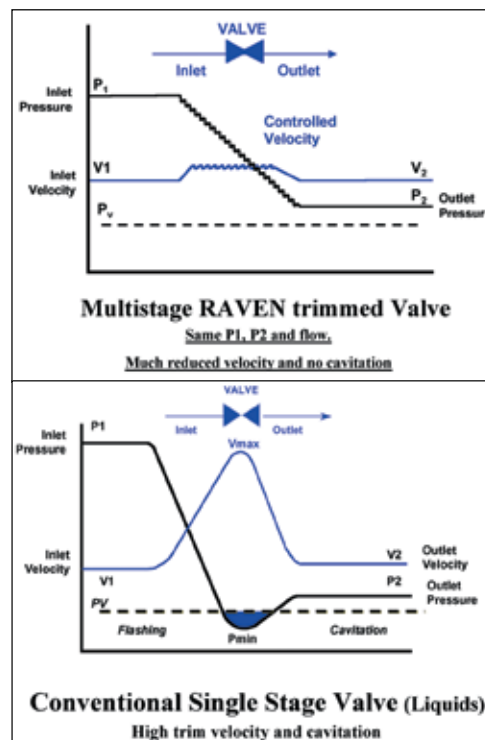
Retrofits are available for almost any make and model of linear motion control valve so you could be benefiting from improved performance, less downtime and reduced maintenance costs in a very short time.

VELOCITY AND PRESSURE

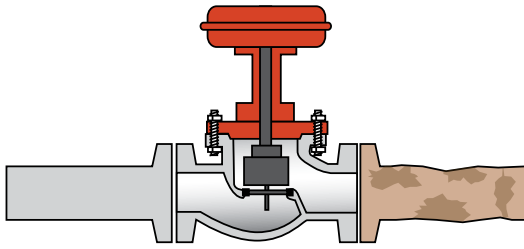
The velocity and pressure profiles shown below are for a single stage control valve and a RAVEN™ multistage retrofit at the same pressure and flow conditions.

It can be seen that the damaging high velocities experienced in the single stage valve are totally eliminated in the RAVEN™ retrofit. Even if the original valve has multiple reducing stages, it is not uncommon for velocities to be at a level high enough to cause vibration, noise and erosion. In this case, a RAVEN retrofit with a higher number of pressure reducing stages will solve the problem. The labyrinth design RAVEN™ trim can package more pressure reducing stages into a given valve body size than any other design.

In the RAVEN™ retrofitted example shown, note that the pressure never drops below the vapour pressure in the trim and hence cavitation is eliminated. In the original valve shown on the left, damaging cavitation is evident.



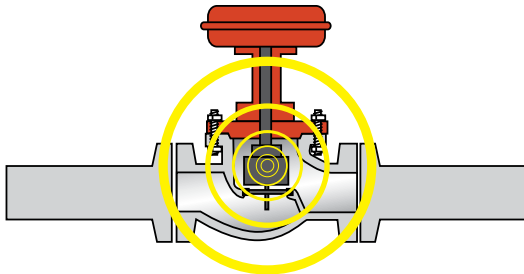
Typical product applications



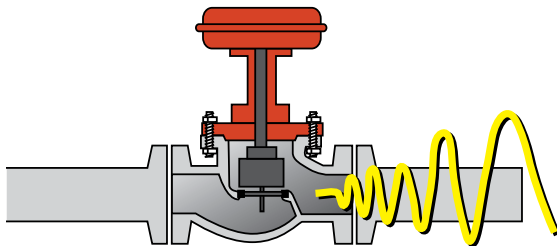
DOWNSTREAM PIPE EROSION



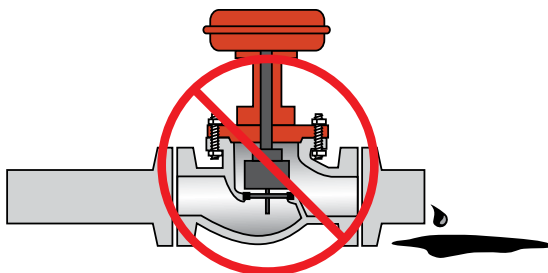
HIGH MAINTENANCE COSTS



EXCESSIVE NOISE



LACK OF CONTROL



SYSTEM SHUTDOWN

Typical applications for a RAVEN retrofit on a liquid service include feedwater control, minimum pump recirculation control, overboard dump valves etc. Whilst gas applications include HP vent valves, compressor recycle (or antisurge) valves, Turbine Bypass Valves, High pressure letdowns and many, many more.

Traditional Coal-Fired Power

- Boiler Feed Control
- Inter Stage Attemperator Water Control
- Boiler Drum Level Control
- Soot Blower Header Control
- Turbine Bypass
- Start-Up Steam Vent
- Pump Recirculation Valves
- First Stage Level Separator Valves
- Depressurising and Vent Valves
- Deaerator Level Control
- Reheater Spray Control



Nuclear Power

- Level Control Valves
- Feedwater Valves



It is not uncommon today for the period between planned shutdowns to be extended and control valves asked to work harder than ever before. RAVEN Retrofits can ensure that you obtain optimum performance from your control valves and unnecessary and unwanted unplanned shutdowns are avoided. You get long trouble free service life.

If you have any valve problems, don't delay, contact the Copes-Vulcan experts and put an end to those problems at the most competitive price. Our field service experts are ready to help in any way possible.



CAVITATION DAMAGED CAGE



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