



Optimux Control Valves
Analysis of Severe Service Applications & Technologies

Coral Springs, 2010

Trimteck is a family-owned American company with over thirty years of experience in engineering, manufacturing, and marketing flow control solutions and equipment for a variety of industries. Our application engineers and certified representatives are **committed to personalized customer service** and have an extensive line of products and technologies to draw upon when designing and specifying a solution.

With a comprehensive line of **Optimux control valves** – and an array of actuators, positioners, severe service trims, and other accessories – our engineers and representatives **can solve the most complex flow control problems quickly and economically**. Moreover, our organizational focus on implementing highly efficient sourcing, engineering, manufacturing, assembly, and distribution processes enables us to **guarantee world-class quality, competitive pricing, and rapid delivery** to anywhere in the world.

Welcome to **Trimteck**.

Agenda



I. What constitutes a “severe service” problem?

II. What types of solutions are out there?

III. Trimteck Custom Engineered Severe Service Solutions

Common Problem Valves

In general, there are five major types of valve problems for which a severe service trim is a solution

- Corrosion
- Noise
- Cavitation
- Vibration
- Erosion

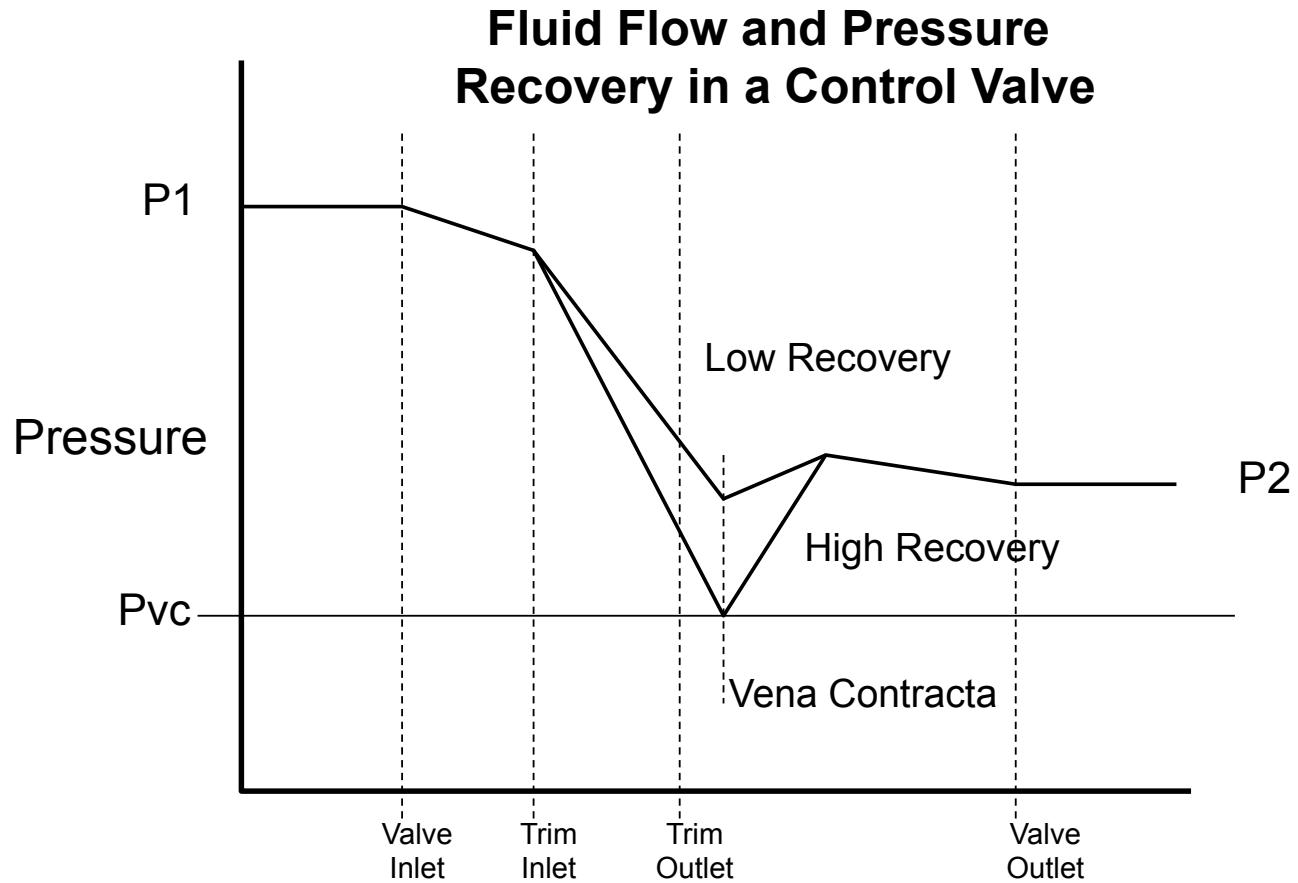


Root Causes

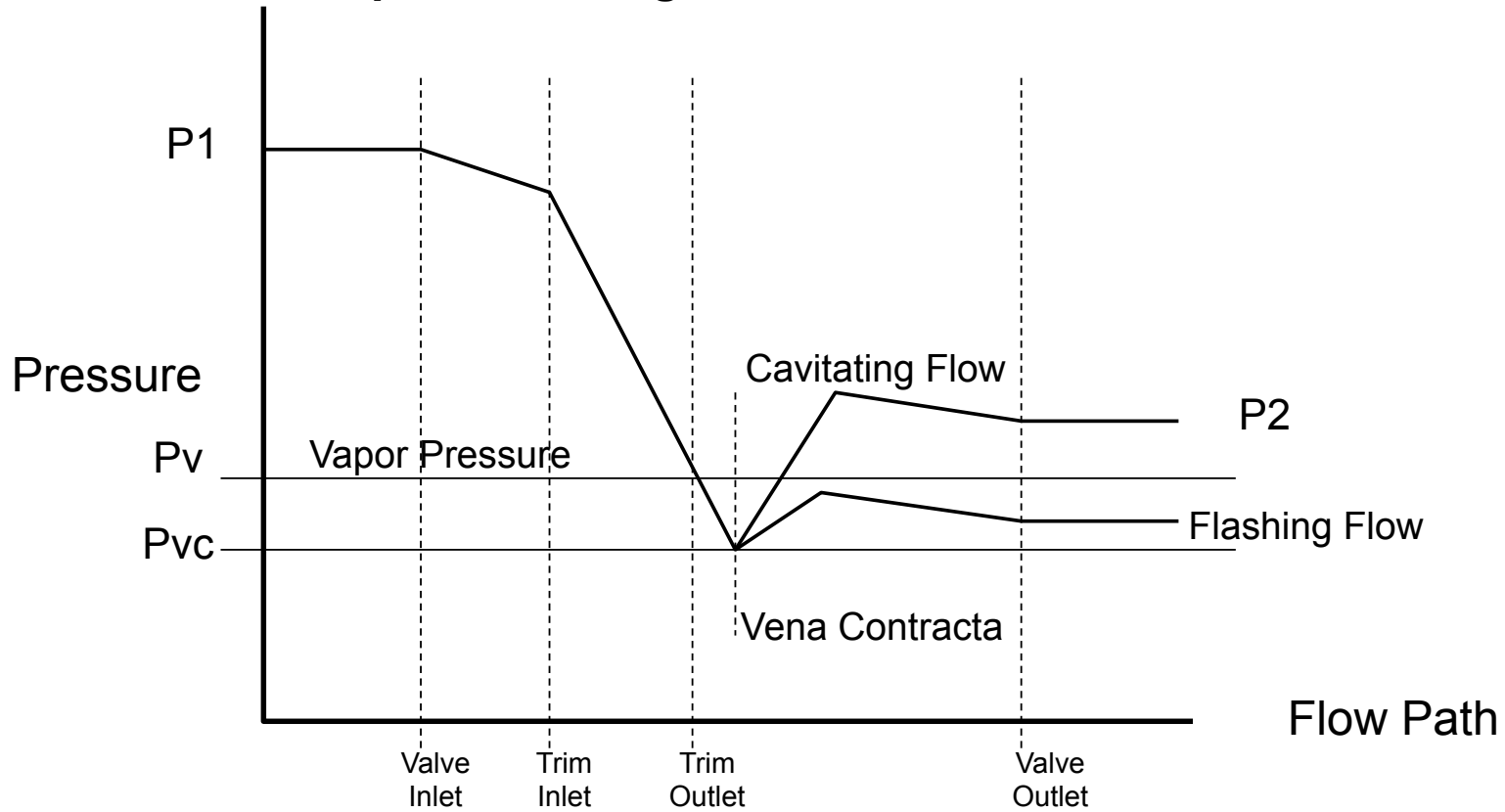


As such, the presence of the aforementioned symptoms can be largely attributed to five major root causes

- Excessive fluid energy along the flow path
- Inadequacies in actuation system
- Design details
- Valve-piping interface
- Poor maintenance and/or incorrect calibration

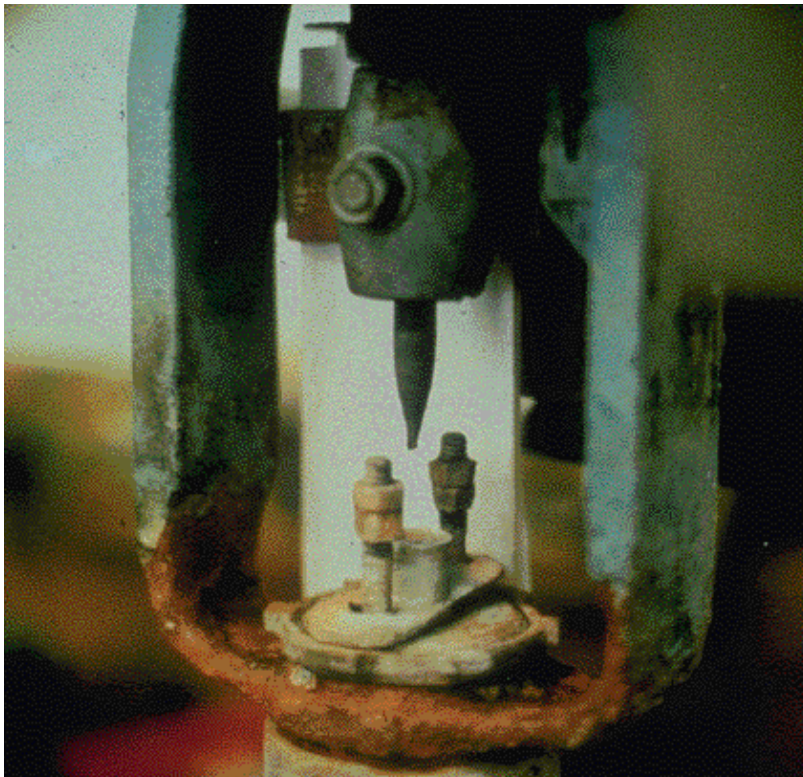


Liquid Flow Regimes in a Control Valve



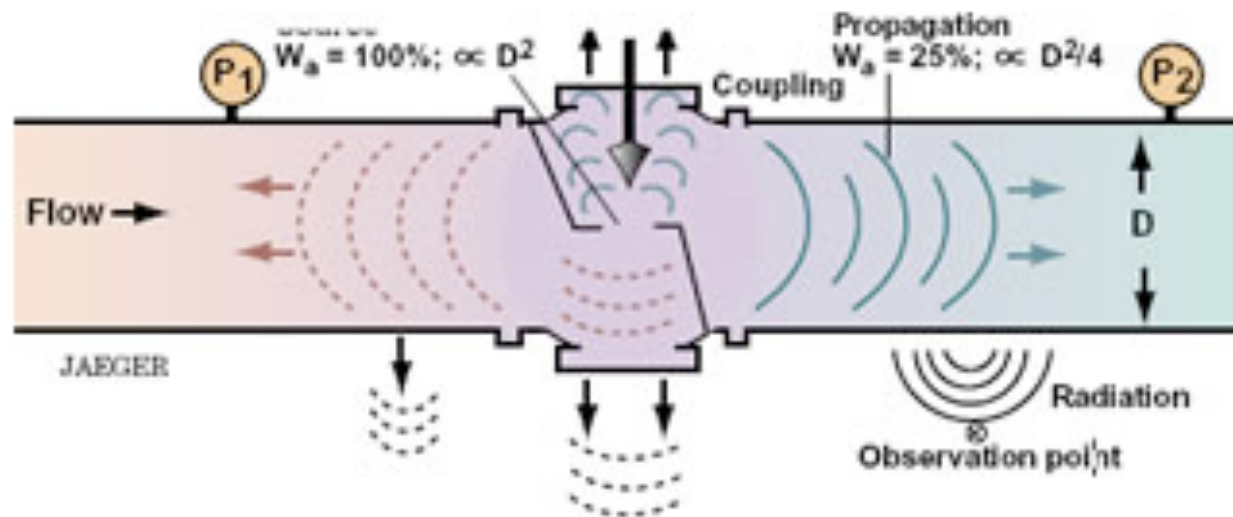
Corrosion

If the fluid contains certain chemicals, often O₂, CO₂, or acids, they can waste away the metal components of the valve.



Noise

As pressure drop is taken in a control valve, most of the resultant energy is lost as heat and the remainder is converted to noise.



Cavitation

If upstream pressure is just above the vapor pressure, then it is possible that the pressure will drop below the vapor pressure as the fluid flows through the valve.

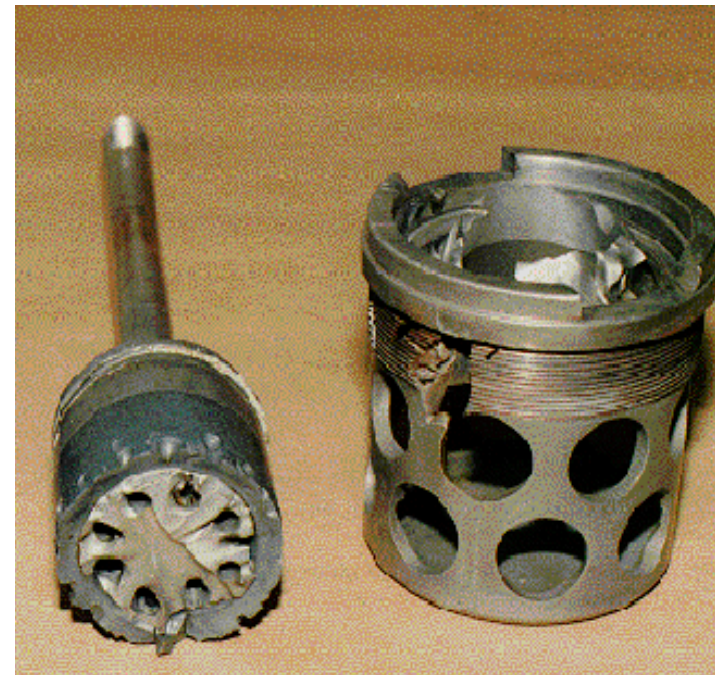
Cavitation will occur if the pressure recovers downstream of the valve to a pressure that is once again above the vapor pressure.



Flashing

Similarly to cavitation, if upstream pressure is just above the vapor pressure, then the pressure might drop below the vapor pressure as the fluid flows through the valve.

Flashing, however will occur if the pressure does not recover downstream of the valve, but rather remains below the vapor pressure.

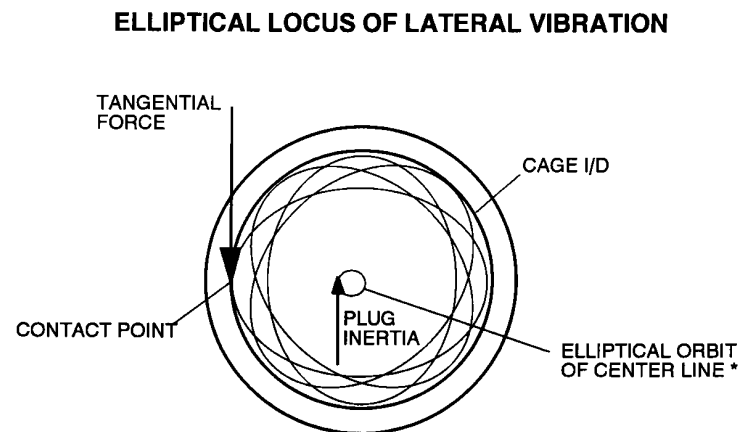


Vibration

Shockwaves and turbulence, often caused by the control valves themselves, sometimes create vibration in the pipeline.

If the plug stem is not rigid (i.e. is a two-piece threaded stem), properly aligned, and well-actuated, the plug could oscillate around the seat and eventually crack the stem.

Trimteck's standard piston-cylinder actuator and single-piece plug drastically reduce the risk of vibration causing damage; other manufacturers are more susceptible.



* Plug & Stem Assembly may rotate causing unscrewing of threaded connections and shearing of plug stem pins.



Agenda



I. What constitutes a “severe service” problem?

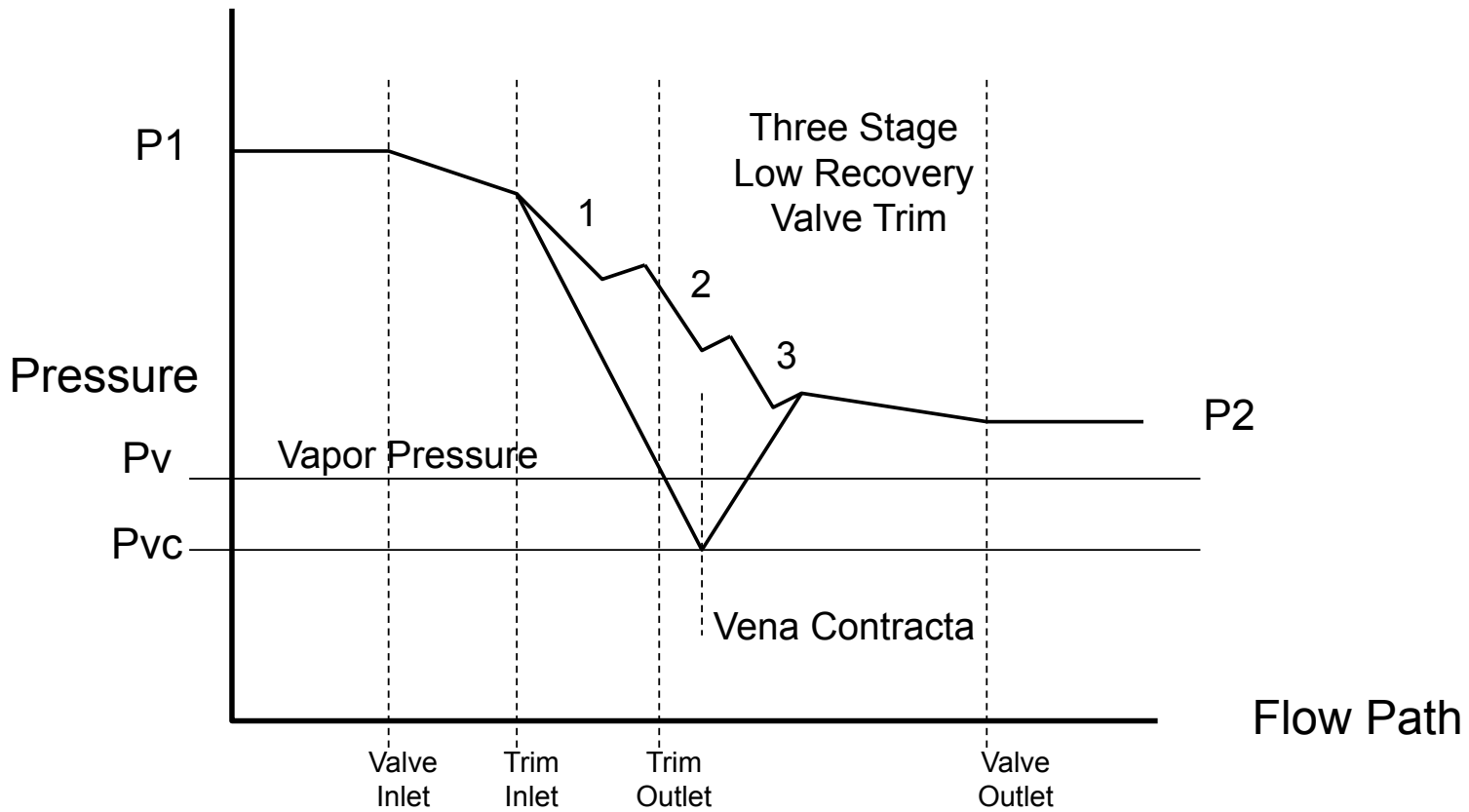
II. What types of solutions are out there?

III. Trimteck Custom Engineered Severe Service Solutions

The differing methods and technologies for solving severe service problems all involve one or more of the following:

- Utilization of **low recovery trim packages**, which break down the mass flow into a multiplicity of small flow streams
- Introduction of **multi-stage pressure-reducing trims**, which create a torturous path to further reduce velocity, pressure, and energy levels
- **Optimization of flow direction** to take further advantage of the design mechanics

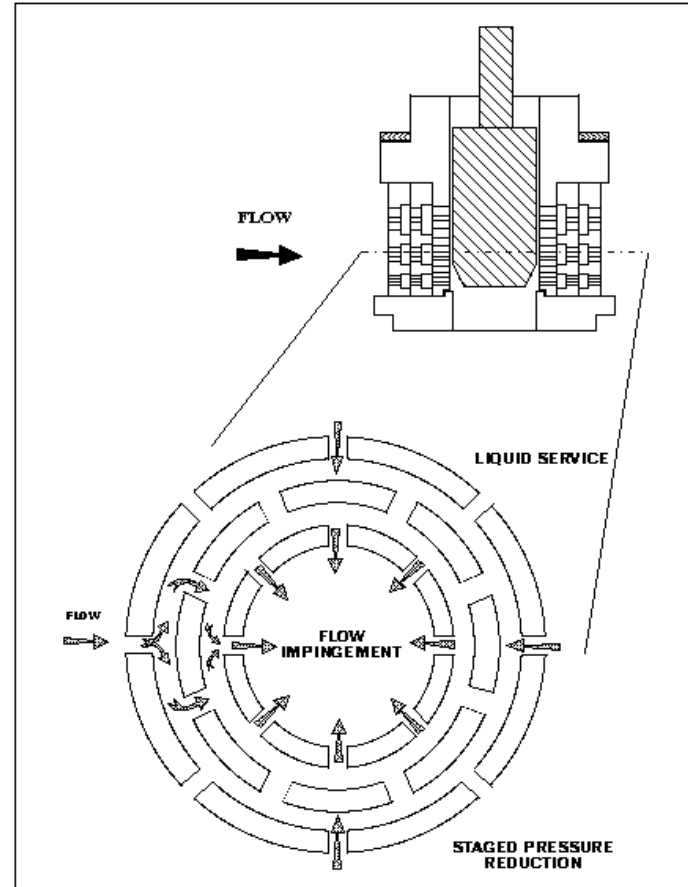
Staged Pressure Drop through a Control Valve



Staged Pressure-Reducing Trim



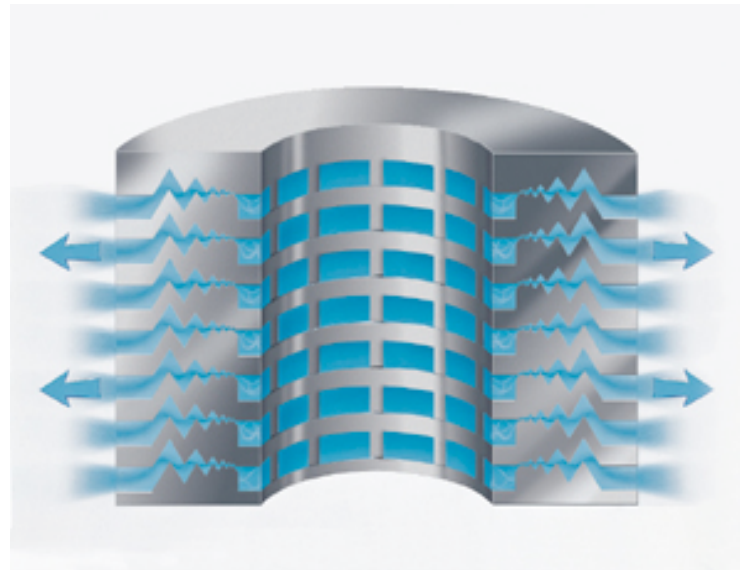
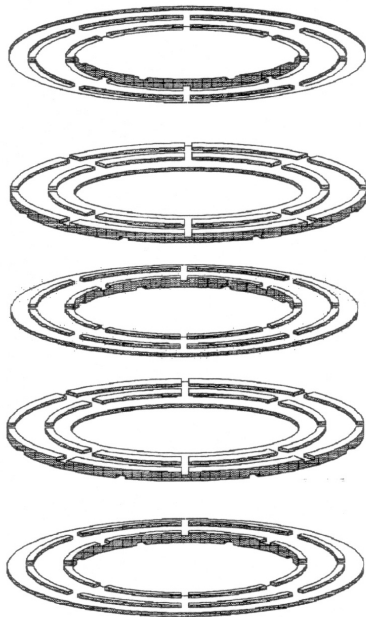
Optimux ST2 Concentric
Cylinder Trim



Cage Stacked Trim

In a more elaborate and expensive solution, a cage stack is formed by individually engineered discs to suit both flow control and characterization

Co-mingling of flow streams promotes velocity control and pressure distribution



Utilize application guidelines that introduce limiting factors for the following:

- Pressure Drop
- Trim Velocity
- Internal Velocity
- Approach exit velocity i.e. vapor flow

Utilize application guidelines that introduce limiting factors for the following:

- **Valve body materials**

 - Pressure

 - Temperature

 - Corrosion

 - Etc.

- **Trim materials, seals, packings & gaskets**

- **Use of hard facings**

 - CVD-5B

 - Stellite

- **Use of carbide and ceramics**

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Trimteck's Severe Service Philosophy

Severe service applications vary in degree of severity, so without over-engineering, Trimteck offers its customers timely, cost-effective products to enhance performance while driving down operating costs

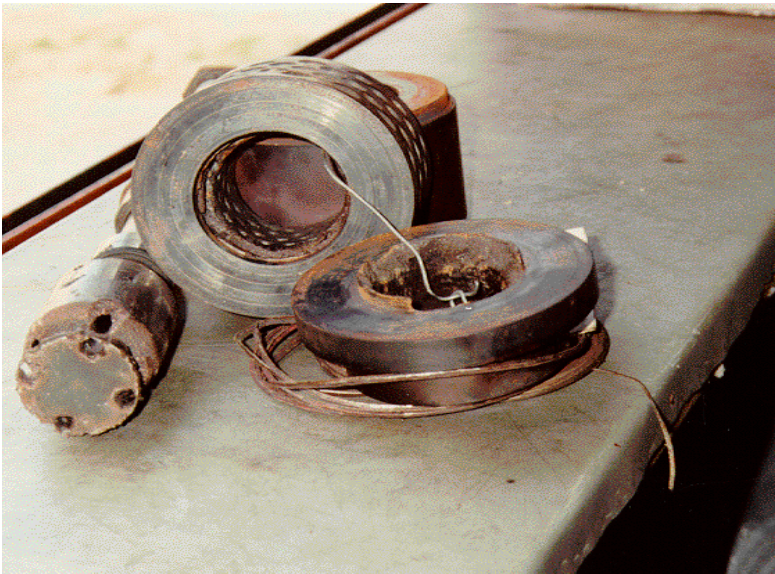
Our rationale is simple: invest in a reasonably-priced custom-engineered solution and enjoy extended performance combined with a dramatic reduction in operation and maintenance costs caused by failures and untimely shutdowns



Summary of Problem Valves

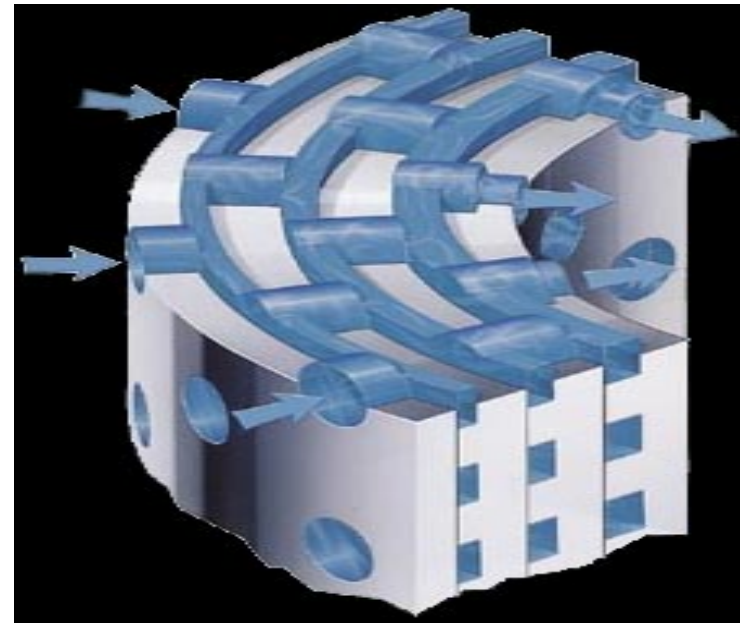
Problem valves generally suffer from extreme service conditions, including: erosion, cavitation, flashing, vibration, noise, and corrosion

Multi-phase fluids, some of which may contain contaminants, contribute further issues with regard to velocities to offset potential fluid impingement and particle erosion



To overcome these challenges, Trimteck considers three definitive tactics

1. **Solve problems using multi-stage trim technology**
2. **Utilize application guidelines defining design criteria**
3. **Ensure correct application of materials**



Optimux ST4 Trim



Thank you for your attention, and we hope you will give Trimteck the opportunity to solve your severe service applications.

