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Dirty Service Trim (DST) is a multi-stage (2, 3, 4, 5 or 6 stage) anti-cavitation trim used with a variety of control valves. It is used in severe services where the fluid may have entrained particulate that could plug the passages in or cause erosion damage to conventional anti-cavitation trims. DST is frequently used in high pressure drop applications up to 4200 psi in the chemical, refining, oil and gas production, and power industries.

Features:

- **Cavitation Control** - 2-, 3-, 4-, 5 or 6-stage DST used in a valve properly selected for flow conditions can eliminate damaging cavitation and associated damage and noise.
- **Versatility** - Available in globe and angle valves, flow up or flow down, from size 1 to size 16 having weld-end or flanged-end connections. Can be used in Design E, EA, EH, EHA, EW, HP, and HPA valves.
- **Longer Trim Life** - The patented trim concept uses a combined axial and radial flow that features large, open flow paths.
- **Easy Maintenance** - In-line trim removal allows inspection of parts without taking the valve body out of the pipeline. DST can pass particles that are 0.25 to 0.75 inch in size without plugging.
- **Trim Materials** - Typical trim materials include

17-4PH SST cages, 440C SST valve plug, or 316/ENC cages with 316/alloy 6 valve plug. Other materials are available to satisfy application requirements.

- **Shutoff** - DST also features a protected seat design where the shutoff function of the valve is separate from the throttling areas of the trim.
- **Characterization** - Special characterized cages are available to provide customer specified rangeability for specific system requirements.

Operational Overview:

A properly sized DST decreases cavitation and the resultant noise and vibration. It does this by staging the pressure drops across the properly determined number of stages. It will also allow for particulate from 0.25" to 0.75" (based on valve size) to pass through the trim without plugging. The large open flow paths and expanded area staging design also compensates for volumetric expansion in flashing fluids thus reducing velocities in the trim and downstream piping.

DST provides a protected seat design where the shutoff function of the trim is separate from the throttling areas of the trim. This is accomplished by a trim design that does not allow any significant pressure drop to be taken until the fluid is downstream of the seating surface. With this trim design, all clearance flow is subjected to a staged pressure drop. Unlike the linear cage-style anti-cavitation trim sets, there are no flowing conditions where pressure can go directly from P1 to P2.

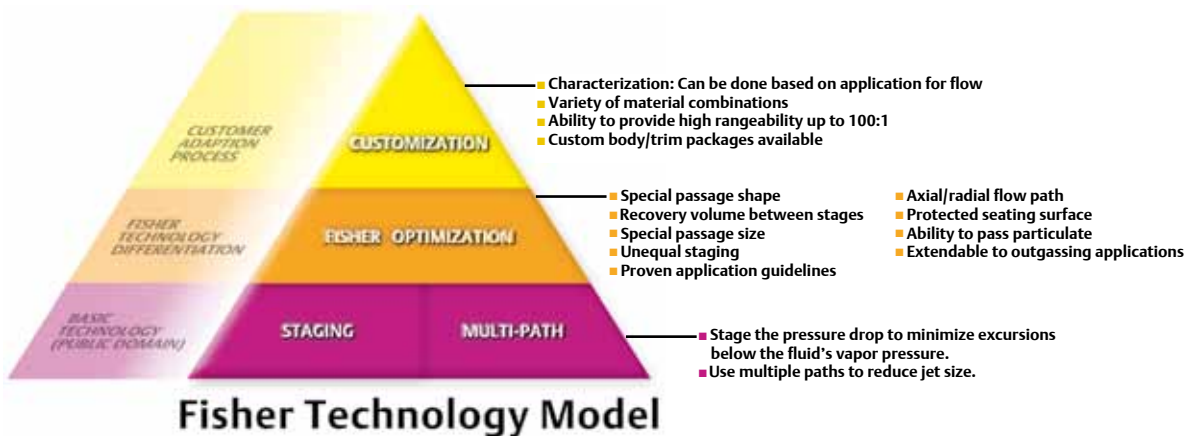
Typical Applications:

Hydrocarbon: Produced Water Injection, Hot High Pressure Separator, Cold High Pressure Separator, Charge Pump Spillback, Transfer Pump, Pump Recirculation, Vacuum Tower Bottoms

Power: Boiler Feedpump Recirculation, Condensate Pump Recirculation

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Optimization Details:

- **Special passage shape** - Eliminates flow separation which is key in reduction of trim area, reduction in fluid pressure and elimination of localized cavitation formation.
- **Recovery volume between stages** - Key for pressure and flow stabilization between stages.
- **Special passage size** - Provides benefits to minimize vibration.
- **Unequal staging** - Ensures majority of drop is taken in the initial stages to ensure lowest pressure drop across last stage.

- **Proven application guidelines** - Fisher's proven experience extends to common process fluids.
- **Axial/radial flow path** - Provides further recovery volume to gain additional staging benefits.
- **Protected seating surface** - Ensures pressure drop is not taken across seating surface.
- **Ability to pass particulate** - Can be used in dirty services while still eliminating cavitation.
- **Extendable to outgassing applications** - Can be used in services where cavitation and outgassing can occur.

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