

**The world's first
self-cleaning
metamorphic
valve trim.**

Operational challenge

As an oil field matures, upstream crude extraction becomes more challenging. As the physical properties of the extracted crude change, your operations face increasing disruption from dirty contaminants that cause unsuitable existing valve technologies to clog and seize.

The growing costs and increasingly frequent interruptions associated with unplanned valve shutdowns are a major headache for asset operators, with unplanned downtime and maintenance costs having a significant impact on production efficiency and profitability.

But IMI Critical Engineering has the solution. Introducing EroSolve Metamorphic Trim (MMT), the patented valve trim solution that successfully mitigates persistent contaminant and flow issues to keep production, productivity, and profitability rolling.

We understand your problems

"I need a new solution that transforms profitability"

Alex, CEO

"There's nothing worse than dealing with a clogged valve"

Daniel, Offshore Reliability Engineer

"I want to free up more OPEX"

Henrik, Engineering Director

"I need reliable minimum flow control"

Erin, Instrumentation Engineer

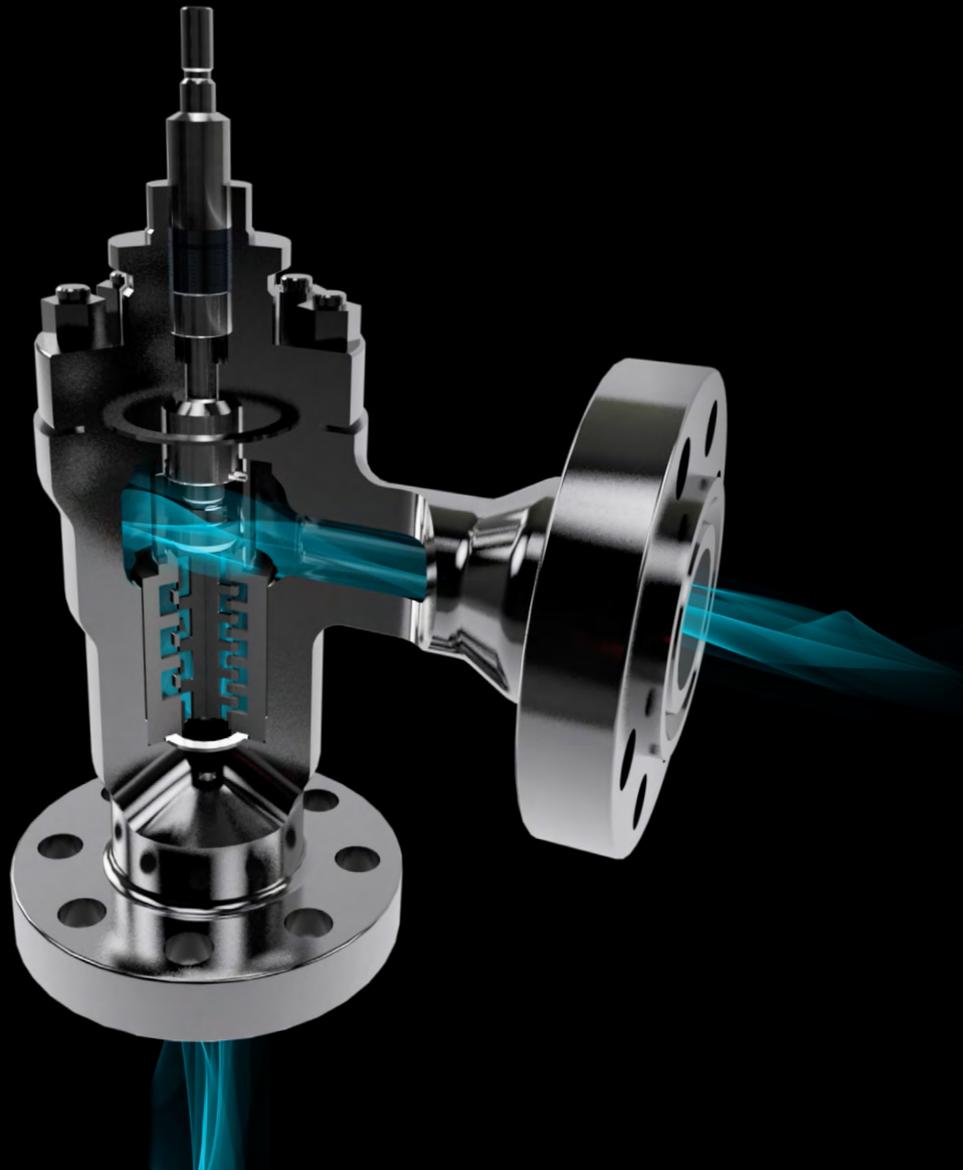
Our revolutionary solution

Utilising a unique self-cleaning design, Metamorphic Trim helps overcome the problems associated with valve clogging, minimum flow control issues, and poor rangeability.

By solving severe control valve problems at the source, the new technology combines the proven strategy of velocity control throughout the whole fluid passage with the beneficial features of a cascade style trim.

By alleviating unplanned downtime, Metamorphic Trim maximises asset production efficiency by enabling users to take control of their process and costs prior to the next maintenance cycle.

This may lower total cost of ownership for producers by millions of dollars annually.



IMI Critical Engineering are global critical flow control specialists with decades of experience in research, development and manufacturing of valves and other flow control solutions.

This expertise has been channelled into our new EroSolve solution, providing a suite of services designed to resolve many of our customers most common erosion issues.



A sustainable choice

The MMT upgrade of existing problematic valves is a cost-effective and sustainable choice.

In most instances, the valve body and actuator can be reused and, in some cases, so can the valve bonnet.

IMI Critical Engineering utilises state of the art technology such as investment casting or 3D printing to produce the trim parts and the design can also be customised to improve the performance of the most problematic valves.

The flexible design allows for printing on demand, minimising waste, reduces costs, and saving time.

A smart combination for severe applications

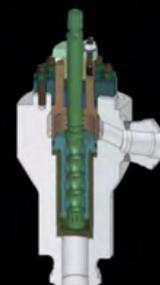
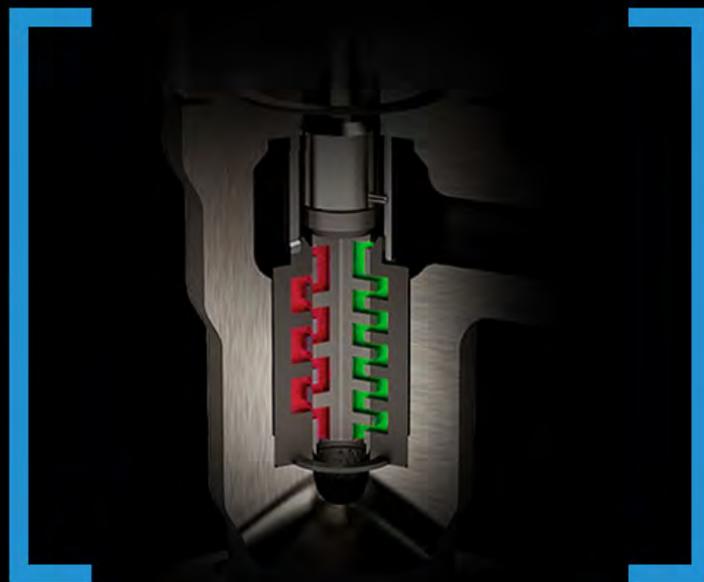
- > **Self-cleaning**
Minimising unplanned shutdowns
- > **Excellent minimum flow control**
For lower maintenance costs
- > **Superior rangeability**
Reducing CAPEX with a one valve solution
- > **Velocity/energy control**
Safer and longer lasting
- > **Protected seat**
Protection from high velocities and cavitation

Multiturn trim

- > Velocity control
- > High pressure drop
- > Custom characterisation

Cascade trim

- > Self-cleaning
- > Tolerating particles
- > Minimum flow control



Get all the benefits of EroSolve Metamorphic Trim

Self-cleaning

The MMT design is especially suitable to handle dirty service, as it's a customisable, self-cleaning (expanding passage) trim, with passage sizes up to 10mm.

This results in enhanced valve performance with the benefits of:

- > Minimised unplanned shutdowns
- > Reduced operating expenses (OPEX)
- > Longer service intervals

Low flow

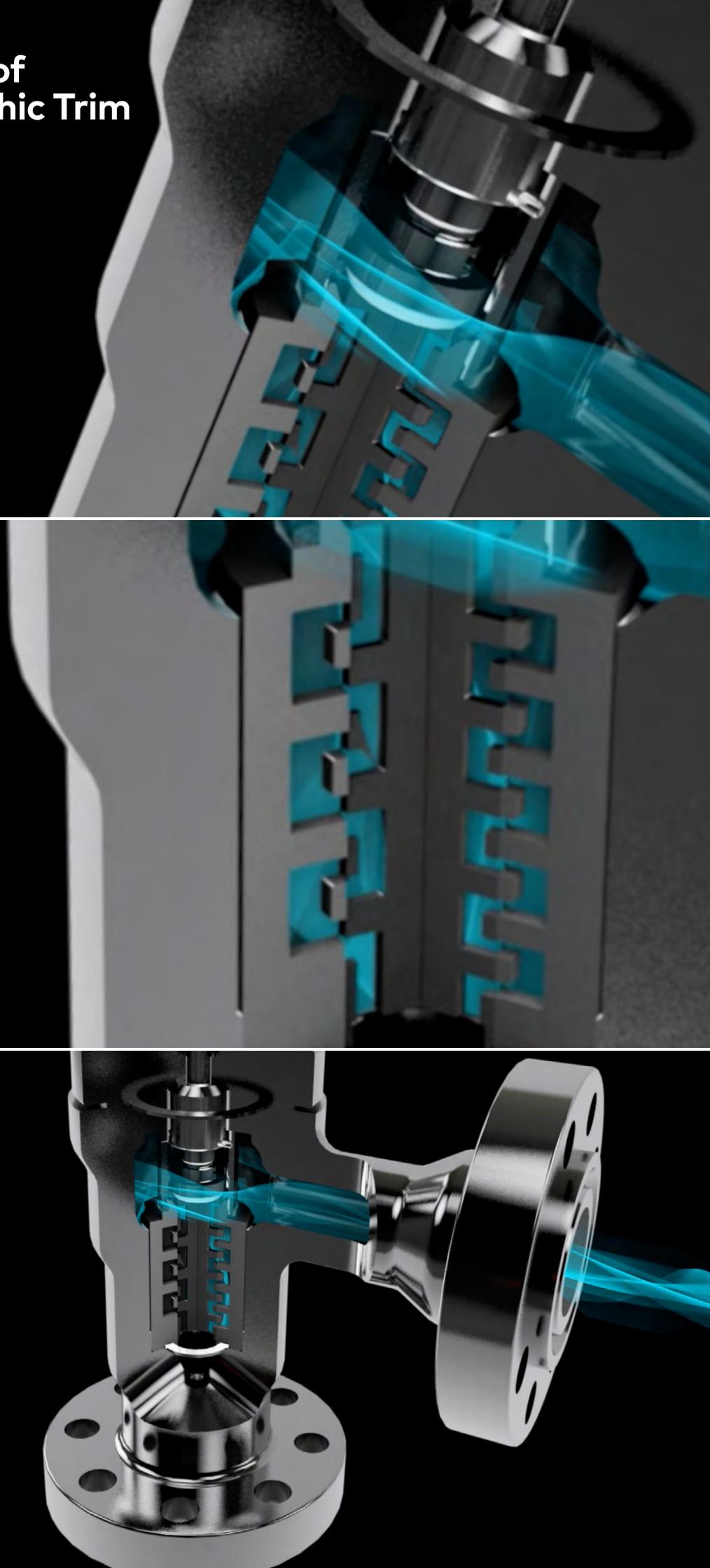
MMT improves process control by providing unmatched minimum flow control. OPEX is reduced by:

- > Avoiding issues due to gap flow erosion
- > Minimising particle erosion through velocity control
- > Lower maintenance costs
- > Longer maintenance intervals
- > No requirements on minimum opening

Maximise rangeability

MMT has extremely high rangeability, greater than 200:1, with excellent minimum flow control and the ability to customise flow passages. The advantages of this are:

- > Easier process control through a single valve solution
- > Reduced capital expenditure (CAPEX) by avoiding split range configuration
- > Decreased plant footprint with less piping, instrumentation, and maintenance



MMT velocity control

Safer and longer lasting

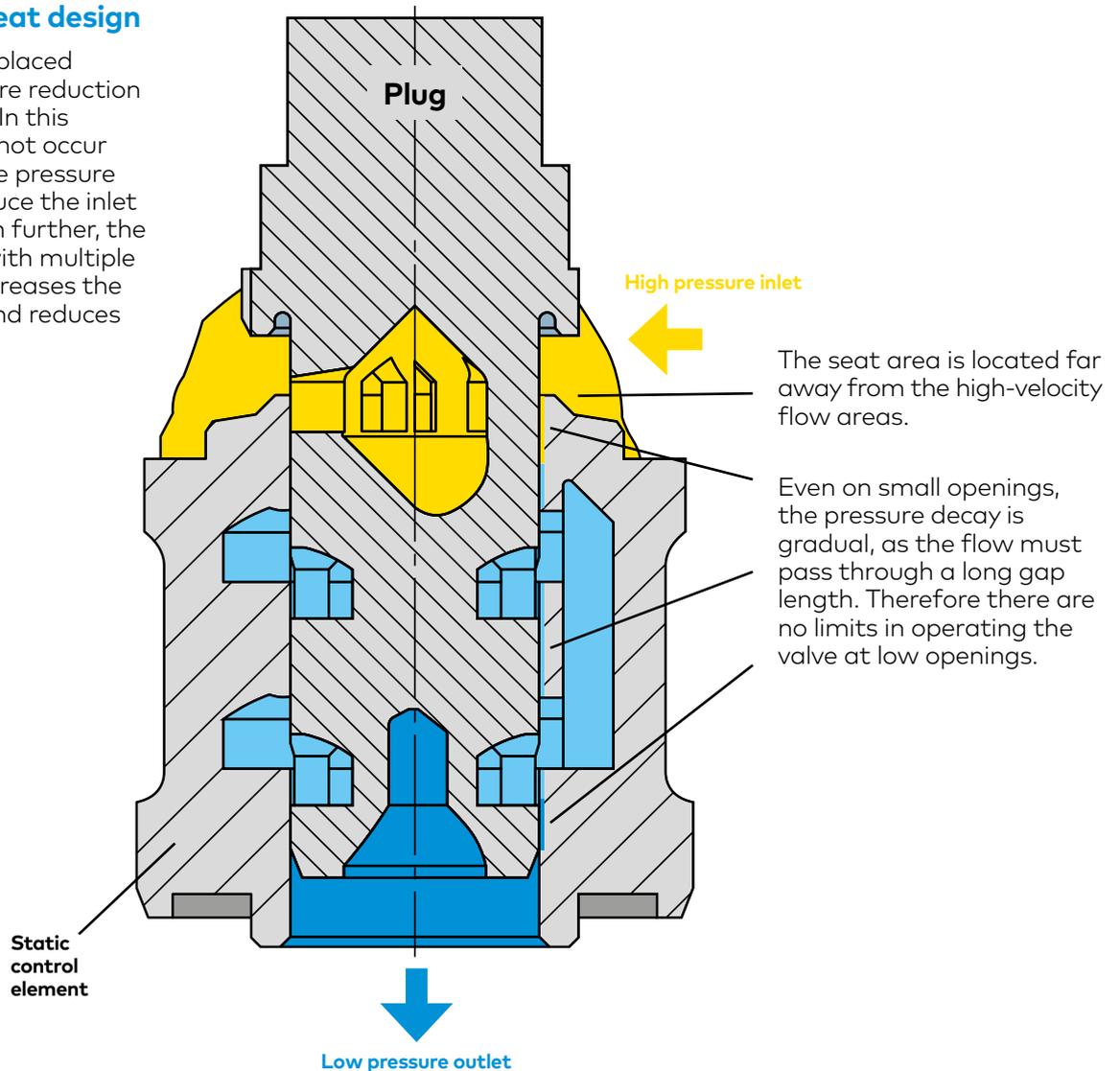
IMI Critical Engineering is an expert in providing velocity control to decrease the risk of vibration, noise, and damage due to cavitation. More stages are provided for a given pressure drop compared to typical cascade style trims. The trim velocity and pressure drop are calculated for each stage and custom stages can be provided.

The table opposite introduces standard MMT staging options.

Pressure drop Bar (psi)	IMI stages
100 (1450)	6
200 (2900)	10
300 (4251)	12

Unique protected seat design

In the MMT, the seat is placed upstream of the pressure reduction at the inlet of the trim. In this position, cavitation cannot occur due to a higher absolute pressure level of the fluid. To reduce the inlet velocity of the trim even further, the flow path is designed with multiple inlet windows which increases the flow area at the inlet and reduces the fluid velocity.



A ten stage MMT provides unmatched performance with less than 40 Bar delta P per stage and trim exit velocity less than 30m/s, as recommended per ISA75 Control Valve Standard. This avoids the risk of cavitation and vibration.

Maximise your performance

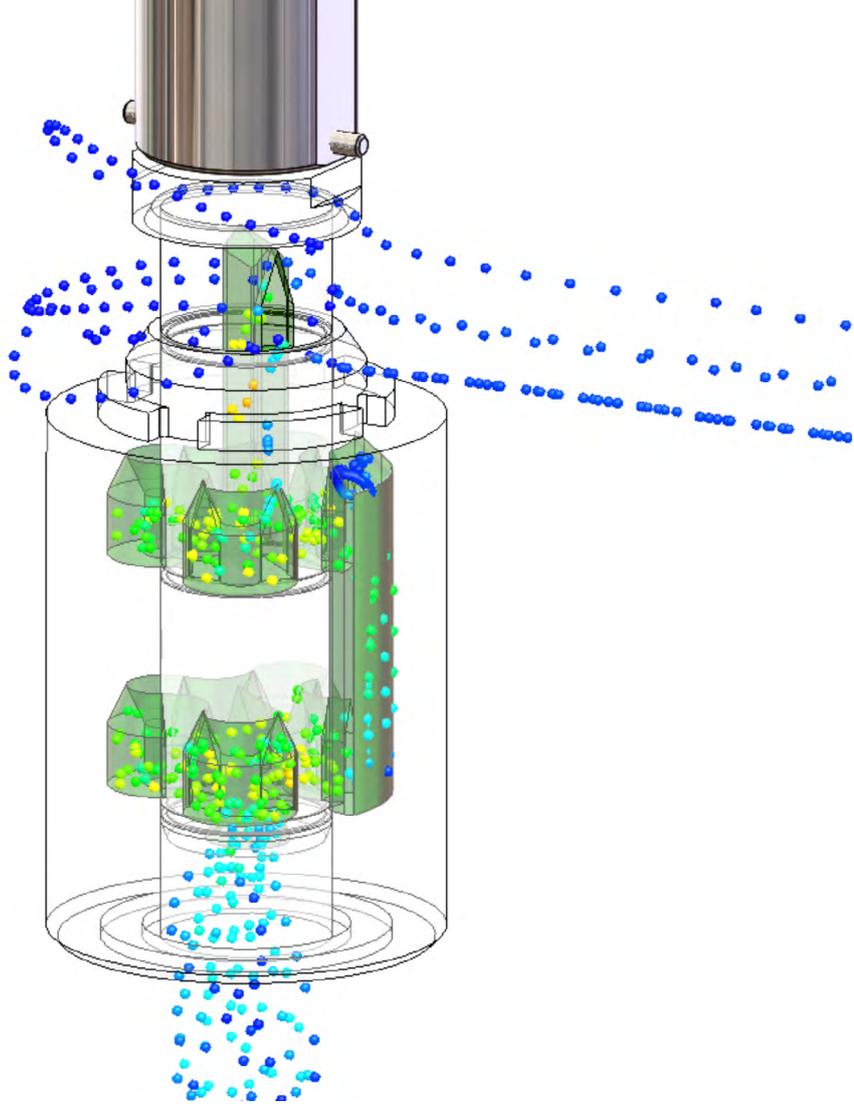
EroSolve Metamorphic Trim is available in two configurations.

[Single axial]

Single axial and circumferential channel to maximise passage size for dirty service.

Flow enters the MMT through the valve plug, travels axially through the plug to the next row of turns. Fluid turns circumferentially within the static control element (SCE) and valve plug.

Customised numbers of turns and rows of turns can be designed for effective velocity control. The single channel design is providing the maximum possible passage size for every given Cv. Additionally, the flow passage is continually expanding to avoid the risk of clogging.

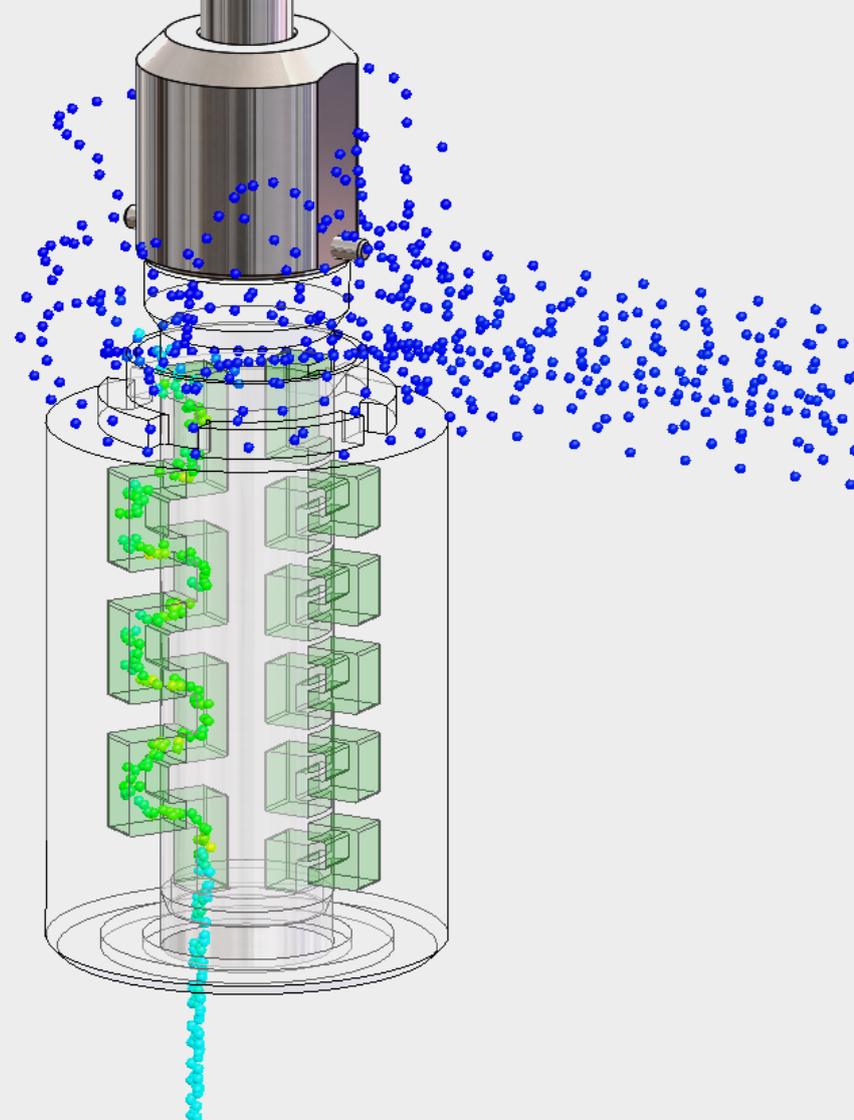


[Multiple axial]

Multiple axial channels/paths with different number of stages to maximise rangeability.

Flow enters the MMT through the valve plug, travels axially through the plug and from the plug to the SCE.

The valve trim is fully customisable including the option of having multiple passages with a different number of turns for maximum rangeability. Passages are continually expanding to avoid the risk of clogging.



Key MMT applications

Power

Water/steam cycle

- > HP feedwater Cv
- > Combined HP feedwater Cv and eco bypass Cv
- > OTC feedwater Cv
- > High turndown spray water Cv

Oil and gas upstream

Production

- > Separator level control and hydro cyclones
- > Glycol dehydration
- > Amine treatment
- > Pump recycle and discharge (e.g. MEG, slurry pump)

Gas processing

- > Glycol dehydration
- > Amine treatment
- > Steam conditioning and spray water

Oil and gas midstream

Gas storage

- > Glycol dehydration

LNG Liquefaction and regasification

- > Glycol dehydration
- > Amine treatment
- > Level control (e.g. Slug catcher)
- > Pump recycle and discharge (e.g. Amine)

Fertiliser plants

- > Glycol dehydration
- > Amine treatment
- > Ammonia letdown
- > Steam conditioning and spray water
- > Feedwater/drum level control valve

Refineries, petrochemical

- > Amine treatment
- > Desulphurisation
- > Pump recirculation (e.g. slurry pump)
- > Steam conditioning spray water
- > Feedwater/drum level control valve
- > Hydrocracking – separator letdown (HHPS/CHPS/HLPS/CLPS)

EROSOLVE
METAMORPHIC TRIM

→ solutions.imi-critical.com/metamorphic-trim

Americas

imiccsales.americas@imi-critical.com

IMI CCI Brazil

Sao Paulo
Brasil

Tel: +55 11 2691 3361

IMI CCI Houston

Texas
USA

Tel: +1 832 467 7200

IMI CCI RSM

California
USA

Tel: +1 949 858 1877

Asia-Pacific

imiccsales.apac@imi-critical.com

IMI Critical Australia

Melbourne
Australia

Tel: +61 3 9213 0800

IMI Critical Japan

Kobe
Japan

Tel: +81 78 322 1220

IMI Critical Korea

Paju-si
Korea

Tel: +82 31 980 9800

IMI Critical Malaysia

Kuala Lumpur
Malaysia

Tel: +60 3 6412 3500

IMI Critical Singapore

Singapore

Tel: +65 6653 7000

IMI Critical Engineering

Lakeside, Solihull Parkway
Birmingham Business Park
Birmingham B37 7XZ
United Kingdom

Tel: +44 (0)121 717 3700

Fax: +44 (0)121 717 3701

www.imi-critical.com

China

imiccsales.china@imi-critical.com

IMI Critical China

Shanghai
PR China

Tel: +86 21 3973 8000

Europe

imiccsales.europe@imi-critical.com

IMI CCI Austria

Wien
Austria

Tel: +43 1 869 27 40

IMI CCI Brno

Brno
Czech Republic

Tel: +420 511 188 288

IMI CCI Italy

Milano
Italy

Tel: +39 02 4345 8611

IMI CCI Sweden

Säffle
Sweden

Tel: +46 533 689 600

IMI CCI Switzerland

Balterswil
Switzerland

Tel: +41 52 264 9500

IMI CCI United Kingdom

Manchester
UK

Tel: +44 (0)161 655 1680

India

imiccsales.india@imi-critical.com

IMI CCI Bangalore

Bangalore
India

Tel: +91 80 4030 3500

IMI CCI SriCity

Andhra Pradesh
India

Tel: +91 85 7639 8000

Middle East and Africa

imiccsales.mea@imi-critical.com

IMI CCI Dubai

Dubai
United Arab Emirates

Tel: +971 4 807 3111

IMI CCI South Africa

Witbank
South Africa

Tel: +27 13 697 3305

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→ solutions.imi-critical.com/metamorphic-trim

→ erosolve-mmt@imi-critical.com

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