

# Oil and Gas INNOVATION<sup>®</sup>

Spring 2017

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# Goodwin's Axial Journey; Breaking a Monopoly

With the global reduction in hydrocarbon investment caused by deflated oil and gas commodity pricing, end users and plant operators are presented with an exceptional opportunity to utilise time wisely on both rationalising and strengthening supply chains, in preparation for industry recovery.

Where vendor lists have excessive overlapping capacity, these areas can very effectively be pared back to include only high quality, high performing vendors ensuring end users are match fit and ready when business booms again!

On the flip side, where end users have vendor list items which are supplied by 1 or perhaps 2 vendors, there is an opportunity to spend time to bring in competition and break monopoly situations.

For savvy buyers and engineers, the opportunities are there to ensure new technologies are brought in and relationships strengthened with key suppliers with the skills, willingness and ability to support future growth and prosperity.

As a supplier of great repute into the global hydrocarbon industry, Goodwin identified a

de-facto monopoly market for Axial Isolation, Control and Choke valves. 3 years ago the journey began to develop innovative products to address this niche market area. These new products are now actively being adopted where previously there was no credible competition to the existing market incumbent.

## Goodwin Axial Isolation Valve

The first product to be developed, the Goodwin Axial Isolation Valve (AB series), is designed for use in critical applications, where rapid operation and tight shut off are required even after extended periods in service.

The AB series valve can fully close for process shut off or fully open for process blow down in less than 2 seconds. These opening /closing speeds can even be achieved on large diameter high pressure class valves.

Despite the rapid movement, the AB series valve is capable of operating thousands of times whilst maintaining high integrity sealing. The same cannot be said for alternative isolation valve technologies such as ball, gate and globe which will see performance deteriorate much sooner, in many cases after a few cycles in service.

As well as the high durability of the seat, the AB series valve is fully pressure balanced, and therefore requires low actuation forces. This allows compact actuation to be specified, reducing the overall installed envelope.

Whilst not claiming that axial valves are a replacement

for every ball, gate and globe isolation valve, there are many demanding, critical areas of process and production plant which should make use of this technology for higher levels of endurance and performance.

## Goodwin Axial Control Valve

The second product to be developed, the Goodwin Axial Control Valve (CB series) are high performance valves used in critical process applications. Axial Control Valves are specified in areas requiring high Cv per inch, high rangeability and precise control.

Goodwin Axial Control Valves share the advantages of the Axial Isolation Valves, in that they are fast acting, precise and durable. The Axial style Control Valve has unrivalled performance when it comes to achieving the optimum balance of key performance factors including: capacity, pressure let down, rangeability and noise.

With careful design and increased ruggedisation of the trim, choke valve variants of the control valve can also be offered for very severe service conditions such as media containing solids and ultra high pressure let down.

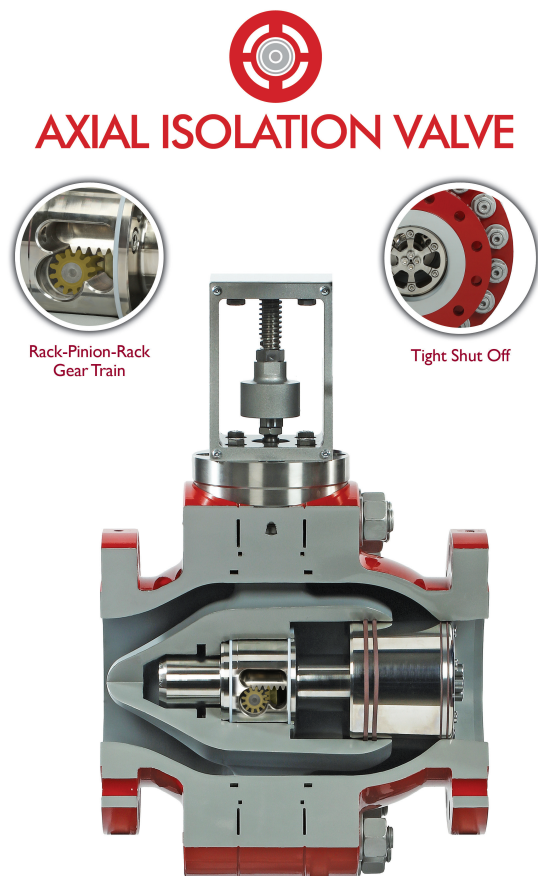
## Innovation

Goodwin first and foremost is an engineering company, taking pride in innovating rather than imitating in all new development projects. With the AB & CB series valves, several technical features have been engineered in which give the products a significant edge.

The Goodwin Rack-Pinion-Rack actuation mechanism (patent pending) is the heart of the AB and CB series valves. By offering a linear-rotary-linear gear train, actuation forces can be reduced compared to the 45 degree rack offered in existing designs, whilst maintaining accuracy of movement.

The Goodwin 3 piece split body (patent pending) has the following advantages over single piece body designs:

- Lower complexity results in reduced costs & production lead times
- Improved internal accessibility permits 100% surface NDT
- Pressure envelope can be made from forged or cast material



- Improved dimensional stability due to central flange (permitting closer running clearances)

#### Platform Commonality

In order to maximise testing resources and test program efficiency, the AB series (Isolation Valve) and CB series (Control Valve) share the same actuation mechanism, body construction, sealing technology and principle of operation. The design has been optimised for maximum streamlined flow capacity in order to ensure that Control and Choke valve variants are ultra competitive with existing market offerings.

By ensuring functional commonality across the 2 valve variants, type testing can be conducted on one design to qualify both types. This being the case, the Axial Isolation and the Axial Control Valve can be used as the final element in High Integrity Pressure Protection System (HIPPS) applications. This allows end users the flexibility to select either option for standard processing, knowing that the same valve can also be used in an emergency situation.

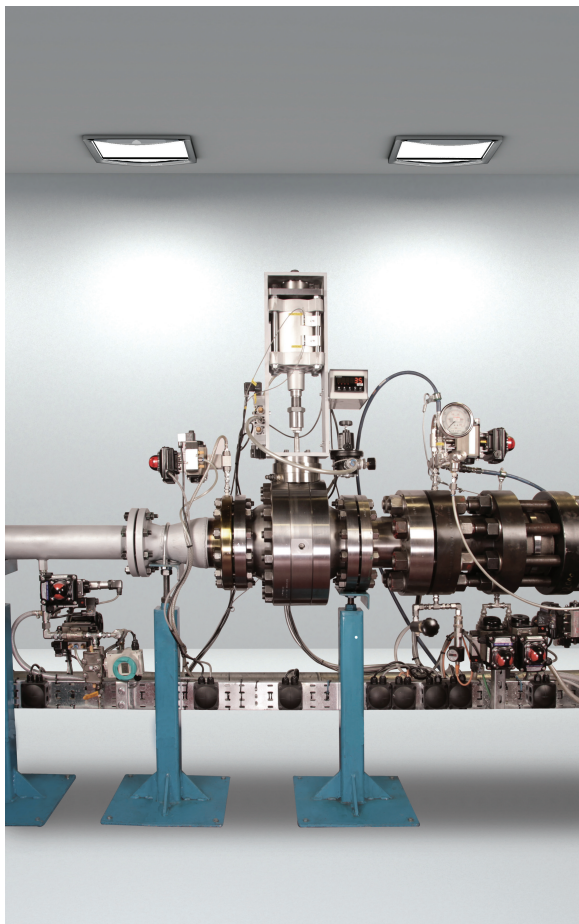
#### Extensive Testing Regime

A rigorous type testing program ensures that the Goodwin Axial Isolation and Axial Control Valves have been really stretched, giving confidence that the designs are high performance and robust.

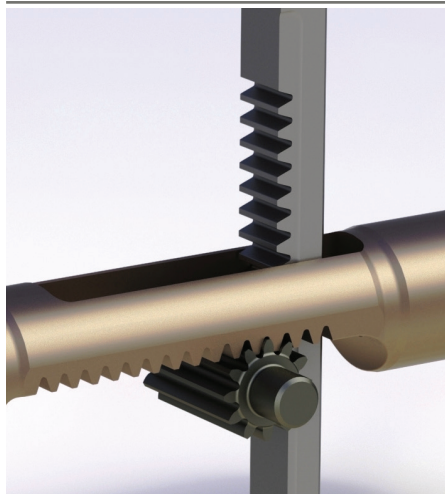
#### Endurance

An endurance test rig has been designed, manufactured and operated in house to test the durability of the Axial Isolation Valve under as close to service conditions as practicable.

Goodwin endurance test rig.



#### Goodwin Rack-Pinion-Rack mechanism



The test simulates flow through the valve with cyclic operation from open to closed within 2 seconds. With the valve in the closed position, pressure is applied to the seat and the valve is opened against full differential pressure. This test is repeated thousands of times, during which measurement of actuation forces and seat leakage is conducted to detect any signs of degradation.

The aim of the test is to determine the duty cycle of the valve. Testing continues until failure so that failure modes for the valve can be confirmed. With this information maintenance intervals and scope are set to ensure optimum product performance in service.

Test valves have to date successfully achieved a very substantial number of cycles with excellent results. Using this test data as the basis for Design Failure Mode Effects Analysis, the Safety Integrity Level (SIL) of the valve is determined, as described in IEC 61508. This is mandatory when for safety critical applications, including High Integrity Pressure Protection Systems (HIPPS).

#### Fire Safety

3rd party fire safety tests check valve shell and seat integrity in the event of a serious fire. Tests are conducted in accordance with API 6FA and ISO 10497 (dual certified) and involve the valve being subjected to intense flames for 30 minutes. To pass, the valve has to maintain both shell and seat integrity before, during and after the burn test and be in sufficiently good condition to open against differential pressure. As the Goodwin Axial Valve is bi-directional, the test has to be conducted in both forward and reverse direction. These two tests were conducted with the same valve and same seals with no maintenance in between tests and still passed easily, demonstrating how robust and safe the design is.

#### Pressure & Temperature Cycling

#### Goodwin Axial Control Valve



In house pressure & temperature cycle testing is conducted in the manner of API 6A PR2. This test assesses the elevated and reduced temperature / pressure performance of the valves to assess the operability of the valve after thermal and pressure shocks. These are some of the most demanding conditions for the axial style valve as it pushes sealing performance to the limit as well as checking that the running clearances of the mechanism are sufficient to cope with the expansion and contraction caused by differing pressures and temperatures.

#### Control Valve

Additional to the previous tests, the Axial Control valve is tested in accordance with IEC 60534. The test plan focusses on prediction of valve performance in service, particularly regarding flow capacity and acoustics.

Goodwin designed, installed and commissioned a bespoke blow down test facility with acoustic measurement capabilities in order to conduct the aforementioned testing. By doing this in-house, Goodwin gains a deep understanding of control valve performance. Extensive experimentation on trim design is possible as both the time and costs required are greatly reduced.

Optimisation of flow capacity, pressure control and acoustic performance for a given set of installed conditions is the key to ensuring that a control valve is correctly selected. By conducting extensive testing and capturing detailed performance data, Goodwin control valves will be accurately sized per application.

Goodwin are proud to bring to market valves which have been thoroughly tested and robustly designed to address weaknesses in previous versions of the axial flow valve. With extensive testing, engineering know how and a straight forward business approach, the Goodwin Axial Isolation and Axial Control Valves represent a logical choice for industries which require high performance, safe valves from a reputable and cost conscious manufacturer. •

By Goodwin International Ltd.

+44 (0)1782 654000 /

[www.goodwininternational.co.uk](http://www.goodwininternational.co.uk)



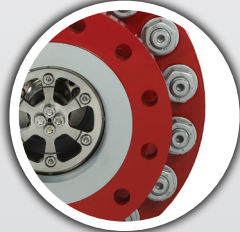
# THE ESTABLISHED NAME IN CHECK VALVES

## NOW

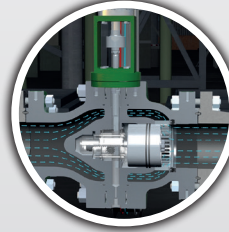
# THE NEW NAME IN ISOLATION & CONTROL VALVES



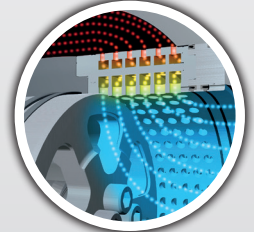
Rack-Pinion-Rack  
Gear Train



Tight Shut  
Off



High Capacity Single  
Stage Trim



High Pressure Drop  
Multi-Stage Trim

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VALVE SUMMIT**

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BAYSON STAND



**AXIAL ISOLATION**



Goodwin Axial Isolation and Control  
Valves provide durability, reliability and  
control, with the exceptional service  
that Goodwin is renowned for.

**AXIAL CONTROL**



LEARN MORE

✉ [flowcontrol@goodwingroup.com](mailto:flowcontrol@goodwingroup.com)

☎ +44 1782 654000

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