Shifting Direction on High Flow Cartridge Valves

Cartridge valves and hydraulic integrated circuits (HICs) are not known for high flow, but the latest family of Comatrol directional control valves brings new high flow solutions in proportional, on-off solenoid and pilot control cartridges.

It is 38 degrees outside as a bridge inspector is suspended 125 feet in the air, verifying the structural integrity of a freeway overpass. The aerial lift holds steady, even in the midst of a seasonal wind, as he completes his analysis and is safely lowered to the ground using a combination of counterbalance and proportional directional valves within the hydraulic integrated circuit (HIC) designed, tested and manufactured by Comatrol. This simple application is just one of the many real world scenarios the Comatrol engineering team in Italy and the US considers as they develop high performance machine control solutions for mobile, on-highway, energy and industrial equipment markets.

Over the past year, Comatrol’s commitment to innovation has been demonstrated through their steady flow of product development initiatives with a focus on higher flow products for directional flow control, including proportional, solenoid and mechanical piloted cartridge valves. The company’s recent efforts have culminated in the release of one product family per month since April 2012, including 09 Series Pilot Control Valves, SV15 High Flow Solenoid Valves, PSV12-34 Proportional Directional Valves, RFDE-80 Fan Drive HICs and DV15 piloted directional valves.

“Optimization through creative circuit design is the name of the game for HIC applications,” said Jamie Neuburger, Team Leader, Product Application and HIC Engineering (US). “Our engineering team is focused on innovative cartridge design that goes beyond solutions that have long been used by the industry, such as stackable sectional spool valves or CETOP valves, for flows greater than 50 LPM. We have based our product development efforts on helping our customers complete the most amount of work with the least amount of loss in the smallest most efficient packet size.”

PSV12-34 Proportional Directional Valves

In an industry where some customers see cartridge valves and HICs as flow and pressure limited, Comatrol is ready to convince them otherwise by introducing a twelve size proportional directional valve that will compete with traditional industrial CETOP products, while providing
an alternative to higher end proportional sectional valves. Although many customers are familiar with putting proportional CETOP valves on their HICs, Comatrol is hoping the market will consider an equivalent proportional cartridge valve for their applications. For those machines that use proportional stack valves today, Comatrol provides a new solution where many of the sections are over-applied in terms of cost and weight per function.

Responding to the demand for precision hydraulic controls with a focus on customization, compact size and flexibility, Comatrol developed the PSV12-34 proportional directional valve, building off the popular PSV10-34 design. This new design, optimized using computational fluid dynamics, is capable of industry-leading flow of 60 LPM (16 GPM), which is higher than any other direct acting proportional directional cartridge valve in the market today.

The PSV10-34 and PSV12-34 products include both closed center and float center schematics with flows ranging from 3 LPM up to market-leading 60 LPM. The flow capacity allows the flexibility of cartridge technology to be applied on a broad range of applications and machines, including larger machines that require higher flow for cylinders and motors. For applications that do not require high pressures, Comatrol’s 260 bar valves offer high levels of performance while reducing vehicle cost and weight. For load-independent control, a pressure-compensating logic element can be applied in the manifold circuit.

“We are providing customers an alternative to higher priced directional valves on the market. Compared to other proportional directional technologies, Comatrol’s cartridge products provide machine designers more flexibility, a smaller space claim, lighter weight and reduced power consumption,” said Mike Stoltenow, Account Manager (US). “If you want to see how much vehicle weight can be saved per section all you have to do is hold a CETOP D05 (NG10) in one hand and Comatrol’s PSV12-34 in the other and the 5 kg (12 lbs) weight difference is significant. Not only is the PSV12-34 lighter, smaller and more cost-effective, but the proportional performance is equal or better. What’s not to like?”

**SV15 High Flow Solenoid Valves**

Continuing the theme of high flow directional flow cartridges, the SV15 family features a collection of 11 cartridge valves that offer flows up to 60 LPM (16 GPM), providing customers with a technical alternative to some on-off CETOP D03 (NG6) valves. Additionally, the SV15 collection enhances Comatrol’s existing portfolio of spool-type solenoid valves, now with 46 different valves to choose from, for on-off directional flow control. The larger cavity provided by the 15 size allows for higher flow capacity than many similar cartridge and CETOP D03 products in the market.

“We recognized that the market was lacking a range of high flow valves that cover 2-way, 3-way, and 4-way solenoid valves,” said Ulrich Maurmann, Account Manager (EU). “We
are introducing a solution that provides our customers with higher flow capacity for their bigger machines using larger cylinders and motors. Comatrol’s high flow solenoid initiative featuring the 15 size cartridge cavity allows our HIC designers to make larger passageways in the manifolds over CETOP, thus reducing pressure losses in the system.”

With this industry-leading range of 11 high flow, spool-type solenoid valves with maximum flow capacities of 50-60 LPM (13-16 GPM), customers have the flexibility to apply the right product for each application. The SV15 valves have a rated pressure of 210 bar (3000 psi), based on NFPA test standards.

Solenoid valves have long been a strong part of Comatrol’s portfolio, now with millions of valves in the field. Comatrol’s release of the SV15 High Flow Solenoid family in the Spring of 2012 was a continuation of the company’s proven products in mobile and industrial application with over 50,000 valves already applied on many applications around the world. Comatrol’s full complement of spool-type solenoid valves now come in four cavity sizes - 08, 09, 10 and 15 – and max flow ranges from 6 LPM (1.6 GPM) to 60 LPM (16 LPM).

**DV15 High Flow Directional Piloted Valves**

Another example of Comatrol’s innovation is its 5-way piloted directional control featured in DV15-P5-24, with flow capacity of 70 LPM at 7 bar pressure drop (capable of much higher, with higher pressure drop). This new 5-port design is a 2-position, 4-way directional valve that is available in various schematics, and is shifted by applying a pilot pressure to port 5.

“We designed the DV15 to help us create a more compact, efficient and cost-effective reversing fan drive solution. In the end, we have an exciting new product that quickly extends beyond fan drives and provides our customers with a new way to control the direction of flow on their vehicles with a very low pressure drop,” said Enzo Soncini, Product Development Leader (Italy). “An additional benefit of the piloted design is that customers are not limited to piloting the DV15 using a solenoid valve as they can also pilot with other valves, including sequence, relief and manual valves.”

The DV15-P5-24 is an innovative solution in the market that allows customers to use them in place of some 2-position, 4-way CETOP D03 or D05 valves, reducing space and increasing the circuit efficiency. In stark contrast to CETOP valves that do not have environmentally robust coils, the 5-way piloted directional control valves can be piloted using one of Comatrol’s 08 size solenoid valves, allowing use of their Robust Coils that were designed to withstand the extreme ambient temperatures when mounted in an engine compartment.

With a total length of 106 mm (4.2 in), the DV15 provides a compact design, ensuring a much slimmer and lighter design than CETOP alternatives, which is needed for fan drive
systems near engine compartments where space is limited. The valve’s rated pressure of 260 bar (3770 psi) is a perfect match for these fan drive applications.

**New Slimmer Reversing Fan Drive Solutions**

Over a year ago, Comatrol launched a portfolio of six pre-engineered Reversing Fan Drive HICs, four of which were designed using CETOP D03 or D05 valves for the reversing function. With the recent advancement of the DV15-P5-24 valve, the portfolio has been revamped to replace these four HICs with updated designs, providing the market with much slimmer, lighter and cost-effective HICs.

“Our customers were seeking a more efficient and compact designs than our existing 40 and 80 LPM HICs using CETOP valves,” said Rocco Marella, Account Manager (EU). “They needed lower pressure drop through the HIC to improve the efficiency of the fan drive system and a much slimmer design to fit around the tight space constraints in the engine compartment. We worked closely with product development, leveraging Comatrol’s computational fluid dynamic capabilities, to design and optimize a solution that met these stringent requirements.”

The result of this development work includes a 500 percent reduction in pressure drop of the 40 LPM HIC, from 24 bar (348 psi) to 5 bar (73 psi) at 40 LPM (10.6 GPM), while reducing the overall HIC size by 30 percent. The pressure drop for the 80 LPM is equivalent to the previous design, but comes in a more compact design with an overall reduction equaling 60 percent.

“As a result of the demands of continued emission regulations, Comatrol is focused on meeting the needs of our customers who are looking for products which assist in improving overall machine efficiency,” according to Dave Duvall, General Manager. “Our updated family of fan drive HICs allows the engine to run more efficiently thus improving fuel economy and reducing emissions. Comatrol will continue to help customers meet emission regulations while addressing productivity and cost requirements.”

**Raising the Bar**

The company plans on continuing its rhythm of innovation with a steady flow of product releases in 2012 and beyond, focusing heavily on high pressure (350 bar) and high flow 10 size solenoid valves in the year to come.

“When we set out to establish Comatrol as the most responsive partner for Cartridge Valves and HIC solutions, we knew that actions would speak louder than words,” said Dave Duvall, General Manager. “Our engineering team took responsive to the next level by
considering not just what our customers need now, but what they will need two to three years down the road. Our customers are asking us for higher flow and higher pressure products, challenging us to push the envelope on technology. The focus of 2012 was high flow products and we look forward to building on that in 2013 by bringing high pressure products to the market.”

Comatrol, a member of the Sauer-Danfoss Group, offers both manufacturing and technical support locations in Europe, the Americas, and the Asia-Pacific regions. With sales and partner distributors around the world, Comatrol stands ready to not only serve the needs of its customers but also help pave the way for cartridge valve and HIC innovation for years to come. Additional information about the company can be found at www.comatrol.com.

Images to support the article:

High flow directional cartridge valve portfolio – each capable of at least 60 LPM (16 GPM) @ 7 bar pressure drop
Size Does Matter: The more compact and lighter weight PSV12-34 (top) compared to Proportional D05 (bottom) – both with the same 60 LPM flow capacity.

The new slimmer and more efficient fan drive HIC design RFDE-80 – using the new DV15-P5-24 valve.

Darren Magner
Director of Marketing & Product Development, Comatrol
www.comatrol.com
marketing@comatrol.com