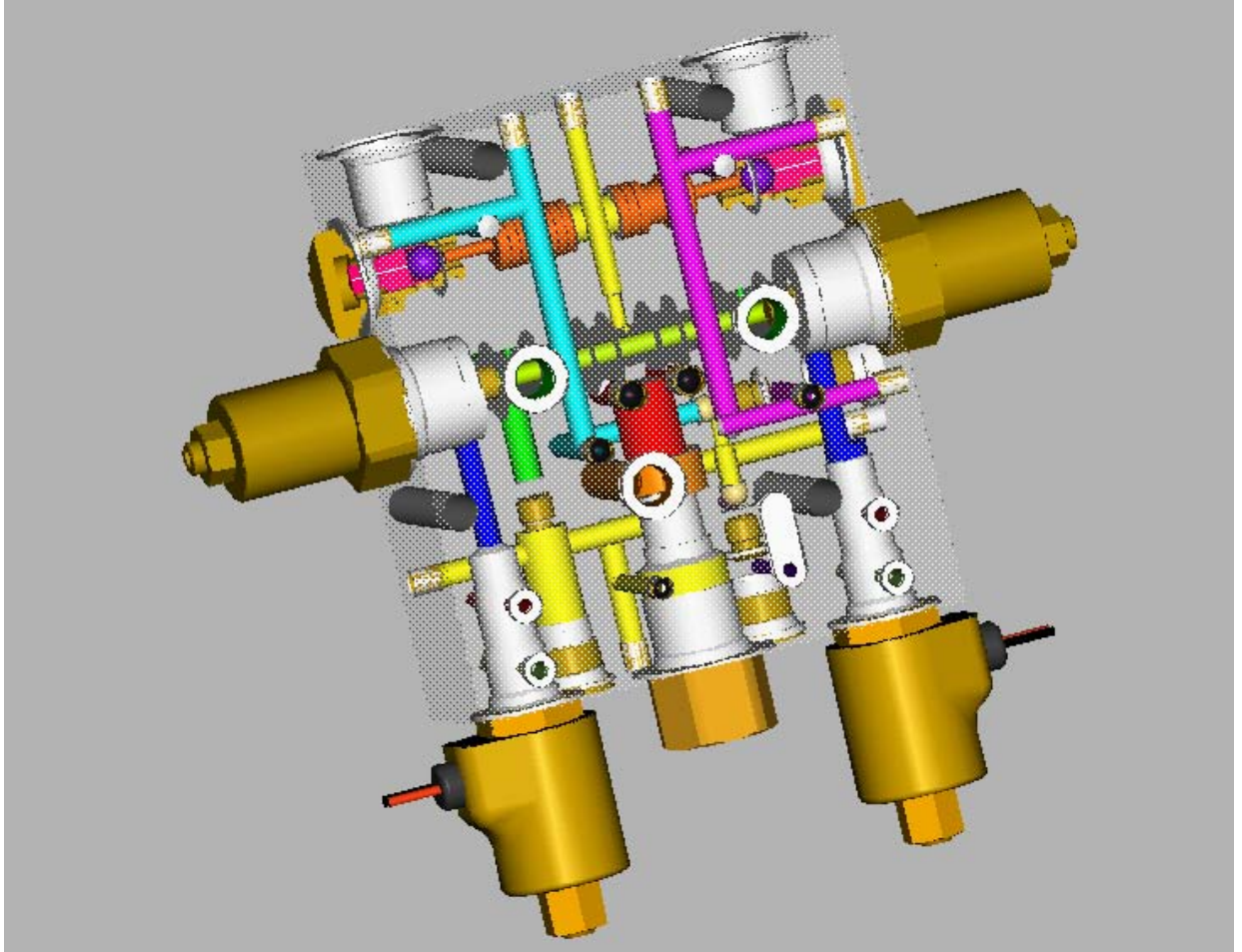


Delta Power Company

INTRODUCES

“Valve In Manifold”

The Next Evolution in Cartridge Valve Systems Technology



VALVE

/N

MANIFOLD

For years the use of cartridge valves has been standard practice throughout the hydraulic industry. Integrating cartridge valves with manifold design has proven to have many benefits such as modular designs that reduced size and improved serviceability. Cartridge valve manifold system components are easily serviced individually, and provide reduced maintenance with fewer leak-prone fittings to contend with.

Evolution of “VIM” Hydraulics

The Old Solution - Leak prone due to lack of multifunction integration (many connections)

The Old Solution - Expensive due to large quantity of fittings and plumbing (expensive to buy and build)

Today's Typical Solution - Multifunction integration solved many of the old problems but sometimes led to large (unmanageable) units that added to assembly cost.

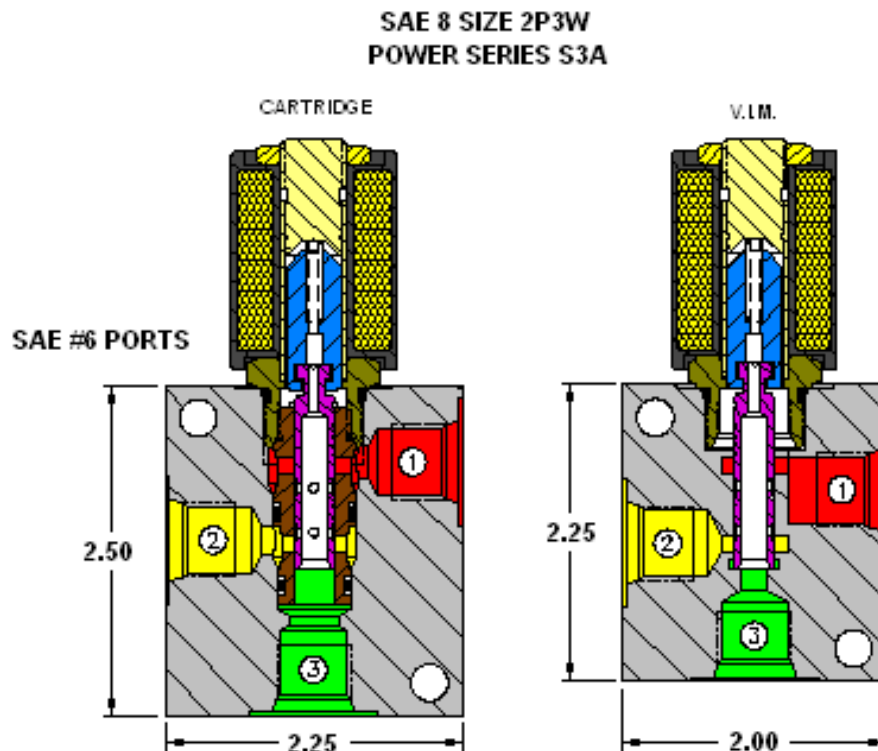
Tomorrow's Solution - New VIM/Cartridge multifunction products provide for smaller packages that improve service features, economies and ease of assembly.

Cartridge valve integration technology continues today with Delta Power Company being a front-runner in the industry. In an effort to meet the pressing economic demands of our customers, Delta Power Company continues to advance the technology with the latest evolution being Valve In Manifold or “VIM”.

What is a “VIM” Package?

An “improved value” valve package that contains new “feature” cavities,

**Figure 1
VIM/Cartridge Valve Comparison**



and “components” used in concert with conventional cartridge valves.

Typical Features of a “VIM”

Relocates into the manifold or casting, “surfaces” typically found within conventional Cartridge Valves for the purpose of sliding, sealing and or metering.

Compatible with today's cartridge valve technology and still provide for key advantages only possible through the combined technologies.

Compatible with different pressure range materials (Aluminum, Steel and Iron) along with material types (Bar & Castings)

Leverages high volume parts and interface knowledge to create a better value product.

What's inside a “VIM” Package?

The “VIM” cavities contain sliding surfaces, metering flow passages, and/or sealing surfaces that, when coupled with the new “VIM Valves” perform various hydraulic functions.

Common “VIM Cavities” are a combination of valve features and new cost effective machining techniques that have only recently become available to manifold manufacturers.

“VIM Valves” contain many features, and even complete parts, utilized in cartridge valves already manufactured in high volumes and at low costs today (Figure 1 & 2).

“VIM” Logic & Analogies

Leverage commonality and volume for cost savings - Common Cartridge Valve Cavities = New common VIM Cavities and sub-VIM Cavities.

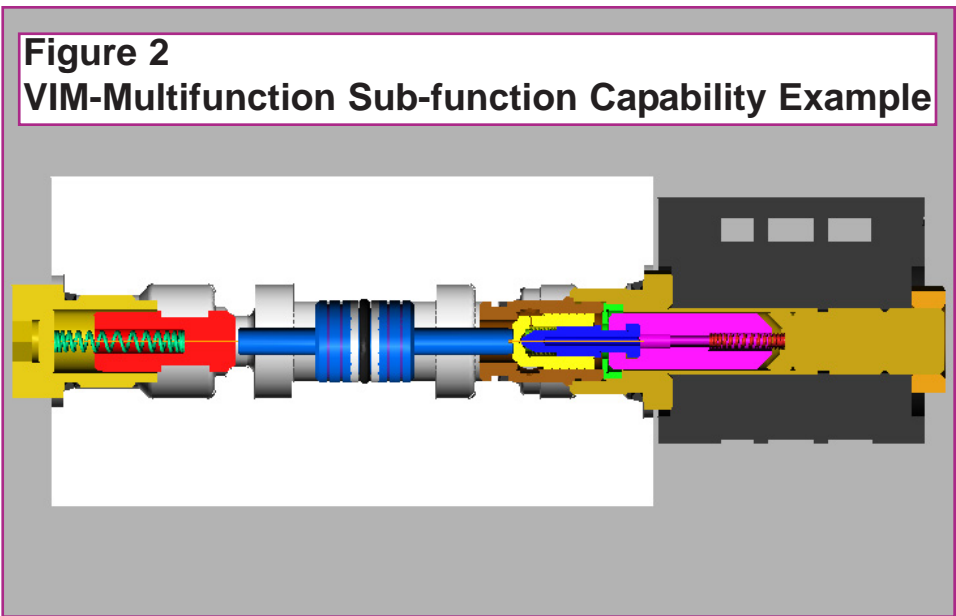
Leverage Mature Knowledge - Utilize sliding bore products, Tractor Spools as an example, cartridge valves as another.

Leverage Flexibility - Takes Manifold and Casting Machining to the next level - Combines Technologies not previously available to a flexible machined product.

Common Cavities, and Economies of Scale

Delta’s approach is to create Standardized Bore Diameters and lengths that parallel cartridge valves in the two way, three way & four way configurations thereby leveraging flexibility for various functions.

Use of Feature based metering styles that will allow for most hydraulic functional requirements.



VIM Service Options (Figure 3) VIM-What can it do for You?

VIM Provides for Easy Cleaning.

VIM provides the option for partial valve function replacement.

In some cases VIM implies that it makes better economic sense to replace the entire package rather than service the individual components. VIM’s nature is to reduce the package size and initial cost.

In Most Cases it Can:

Complement or replace historical solutions in smaller spaces, with lower weight and or with better efficiency (Lower pressure drops).

Leverage the use of high volume parts already in use in Cartridge valves. (Economies of Scale)

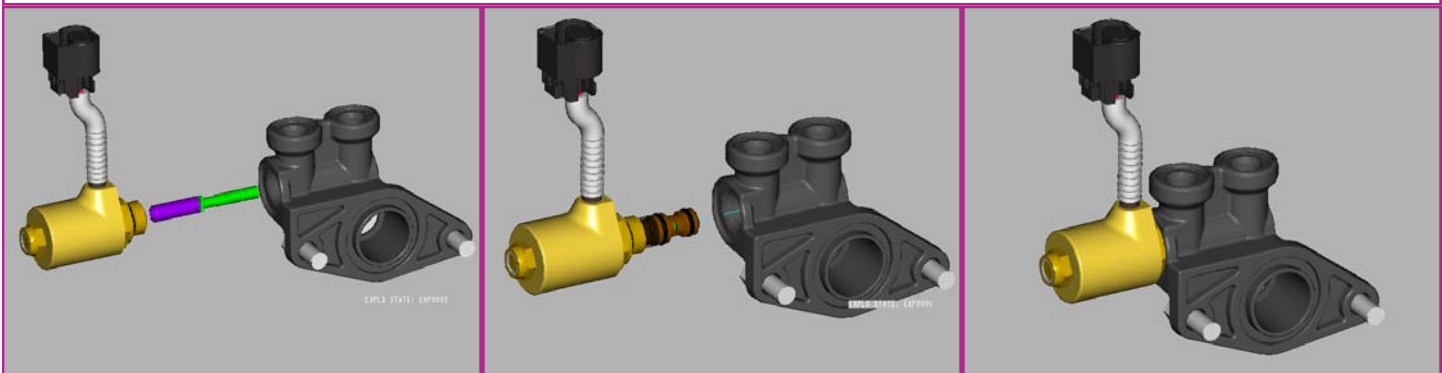
Take advantage of Delta’s interface knowledge to create custom function products at lower costs than possible using only conventional cartridge valves or other technologies.

Figure 3

VIM Service Option

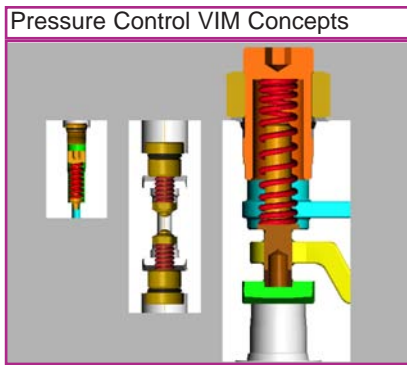
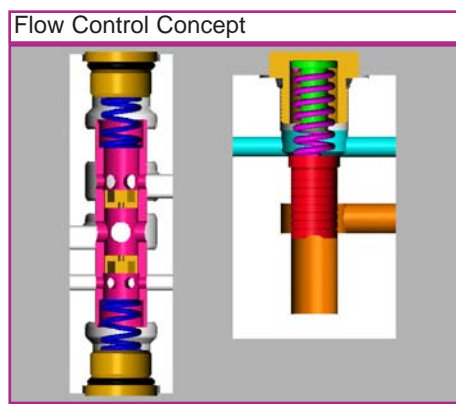
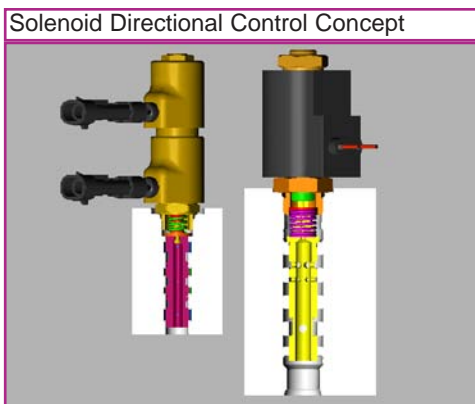
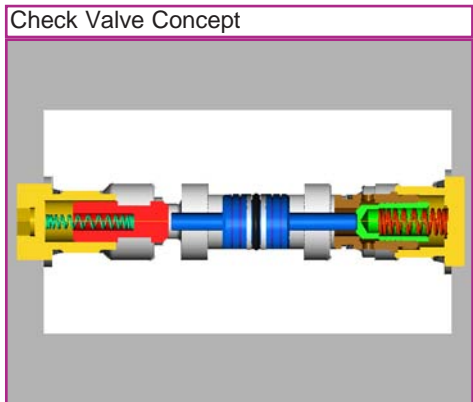
Cartridge Service Option

Service as Unit

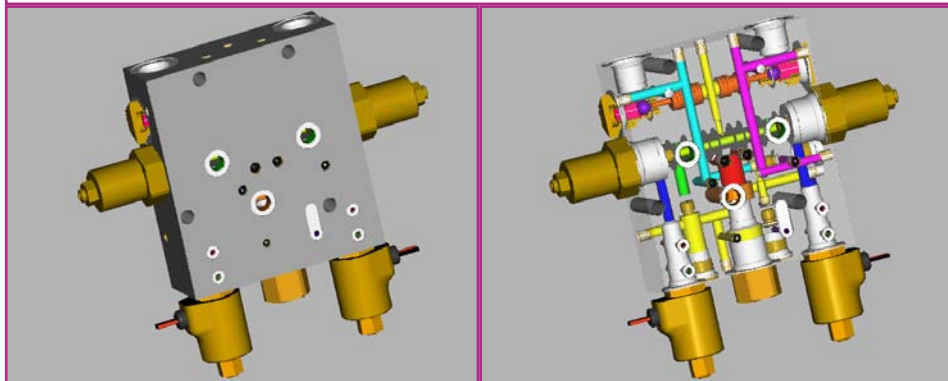


Pictures worth a thousand words:

- Concepts & Work in Process
- Electro-Proportional control concepts
- Solenoid Directional control concepts
- Pressure control concepts
- Flow control concepts
- Check Valve concepts
- Packaging ideas...but just the tip of the iceberg.



Package Concept-Pressure Compensated Electro-Proportional Directional Flow Control with Load Holding/Load Sensing Option-Sandwich



MANUFACTURER OF HYDRAULIC CARTRIDGE VALVES AND SYSTEMS



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