



HC4 Bio-Block Customised Design Solutions



Almost every process system includes a unique piping challenge that does not lend itself to conventional solutions. Saunders custom designed HC4 Bio-Block valves replace welded clusters, manifolds and valve/fitting combinations and offer the most compact, minimum deadleg design for optimum process integrity.

Computer Aided Design Capability (CAE)

Bio-Block Standard & Compound Valves

Our design teams work closely with customers to create unique machined valve designs that we call Bio-Blocks. These ‘outside of the box’ solutions may be driven by process, space constraints, regulatory issues or other specific requirements.

The key element in producing Bio-Block valve solutions has been the development of advanced CAE (Computer Aided Engineering) design and manufacturing tools that enable our engineers to convert concept into reality. This approach to manufacturing provides custom machined valve products with the shortest possible lead times in design and production. We work closely with customers to co-ordinate solutions to unique application challenges.

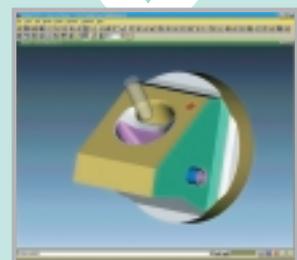
All custom Bio-Block valve bodies accept Saunders standard diaphragms, bonnets and actuators without modification or adaptors. The compact design of the EC actuator range enables us to produce the most space-efficient solutions in the industry.

Machined Bio-Blocks have the advantages of reduced wetted area and dead-legs, no internal fabrication welds and reduced documentation for installation and validation. Faster and easier installation of process manifolds can be achieved using advanced “machined from solid” valves.

Converting vision into reality



Engineering team with client



Tool path verification

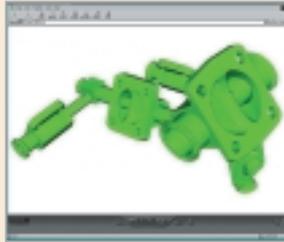


Five axis machining centre

Advanced Valve Design Tools

It is important that all aspects of the application be properly communicated between customer and designer to ensure that the resulting design meets expected performance criteria. Saunders has adopted advanced electronic tools to configure unique and often complex concepts such as compound Bio-Block designs.

Foremost of these is the use of 3D modelling software. This program produces a 3D model of a proposed valve complete with a viewer in an e-mailable format that can be shared easily between the Saunders design and applications engineering teams and our customers. The 3D representation of the valve design is derived from the same program file that is used to design and manufacture the final product.

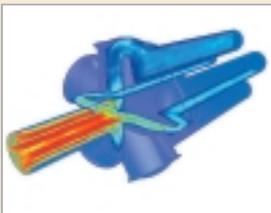


Using this software our customers can select from five isometric 3D views, or freely rotate the valve to confirm flow paths or drainability.

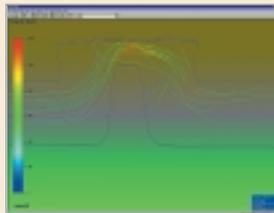
Additional features include zoom and the facility to 'wire frame' the view and access the internal configuration.

Computational Fluid Dynamics (CFD)

We routinely use Computational Fluid Dynamics software to ensure that flow characteristics including Cv (Kv), pressure drop and flow paths meet client requirements. Actual flow paths can be viewed to eliminate low flow areas or potential cavitation.



⬆ CFD analysis of Bio-Block five-way diverter



⬆ CFD analysis of standard AFP forging

Trained and experienced sales and engineering staff are ready to work with you to develop unique Bio-Block valve solutions. The Saunders brand delivers excellence in the application, design and manufacture of custom machined valve solutions as reflected in its innovative and evolving range of Bio-Block valves.

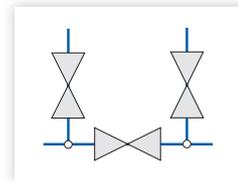
Conceptual Approach

Bio-Block Compound Valve Solutions

Many of today's most challenging applications cannot be addressed by one valve configuration. Instead, a combination of two or more valve concepts must be machined from a single block of stainless steel to meet system requirements.

The resulting valve types are a hybrid or compound solution that entails the use of more than one valve concept. For example combining a tank bottom valve with an access valve, a multi-port valve with access valves to perform as steam and condensate port or a point-of-use valve together with a sample valve. Highly trained and experienced engineering staff and modern CAD design tools combined with our manufacturing expertise result in custom valve configurations that combine utility and performance.

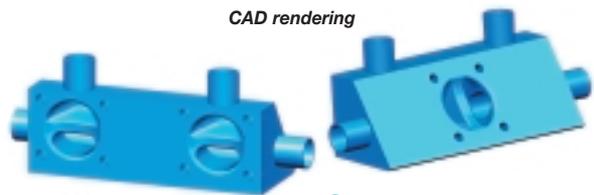
Converting vision into reality



Customer pipework schematic



CAD rendering



⬆ Double tandem valve machined from solid barstock. Main weir inclined at optimum drain angle.

There are some key considerations when configuring custom "machined from solid" valves.

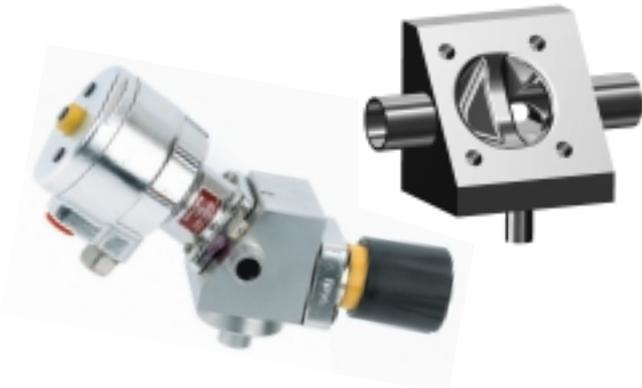
- Valve centrelines
- Drain point of body bore and any associated tubing
- Drain point of weirs
- Centre to face dimensions
- Allowance for bonnet or actuator assembly and diaphragm maintenance
- Internal flow patterns and drain paths
- Minimise deadleg area
- Meet cGMP requirements

Conceptual Approach

Bio-Block Machined Tandem Valves (Serial Weir)

This design is a solid version of the welded valve-to-valve or tandem valve assembly. Machined from a single block of wrought stainless steel it provides several benefits.

- Absence of internal fabrication welds enhances product integrity
- Hold up volumes can be reduced
- Dead legs minimised
- Reduced number of material certificates required



These advantages are especially realised in the smaller sizes where valve geometry makes it difficult to achieve cGMP requirements for minimum dead legs.

Bio-Block Integral Steam, Purge and Condensate Porting (Tank Weir)

Rather than control steam supply and condensate drain by means of 'stand off' welded access valves that may entail large design envelopes or dead legs, Saunders Bio-Block valves can be machined with integral weirs and/or ports.

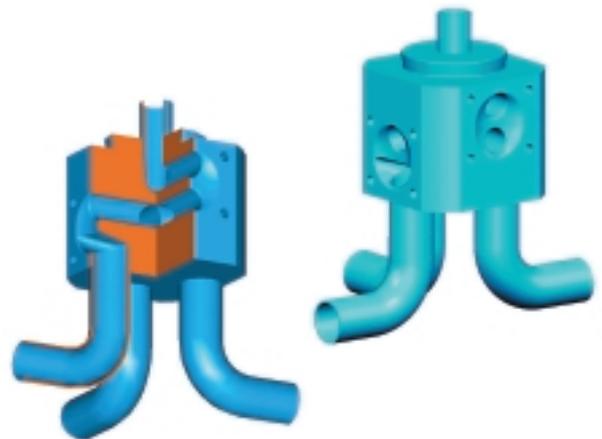


- ✦ *Bio-Block tank manifold arrangement. Combining conventional tank bottom and ZDT technology into a high integrity machined block configuration for bio-pharm vessel applications. Cleanability, is facilitated by purging into offset weirs (sterile barrier).*



Bio-Block Serial Weir Option

This concept puts two weirs in line, but 180° apart and sharing a common chamber. This allows the common chamber to be sterilised and form a barrier between two process flow streams. Our customers have incorporated this concept in requirements as diverse as Point-of-Use, Tank Outlet and in 'Mix-Proof' applications.



Bio-Block Controlled Inlet Option (Multiple Weir)

Generally associated with multi-port designs, this option involves machining a weir at the inlet to the common chamber of a Bio-Block valve. This design permits control of flow entering into the multi-port valve. The controlled inlet option can be included in any number of compound Bio-Block solutions to comply with specific system requirements.

Conceptual Approach

Bio-Block Chromatography Valves (Multiple Weir)

This Bio-Block option incorporates a central control weir to permit the division of flow into distinct process streams or to allow flow to pass through the valve as required during resin regeneration or cleaning cycles.



⊕ Typical chromatography Block arrangement

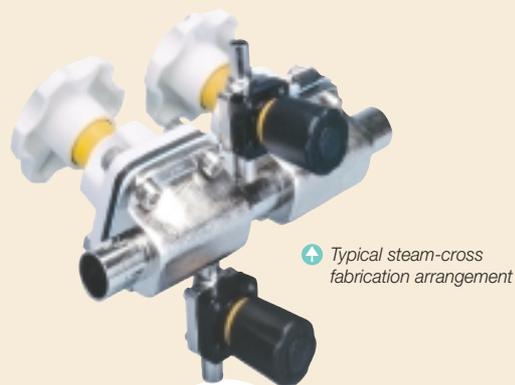
Bio-Block Specification and Selection

Our unique Bio-Block design and specification manual is available on request. This provides a mechanism for rapid, efficient and accurate communication of Bio-Block designs. It allows the customer to specify and select a fully-coded 3D design to meet P+ID system requirements without an on-going exchange of 2D drawings, rough sketches and data which may be confusing. Containing over 100 product designs in coded 3D representation, the manual includes a detailed explanation of design principles and valving terminology, P+ID coding structure and categorised 3D design options. Bio-Block specification/selection data sheets are also available.

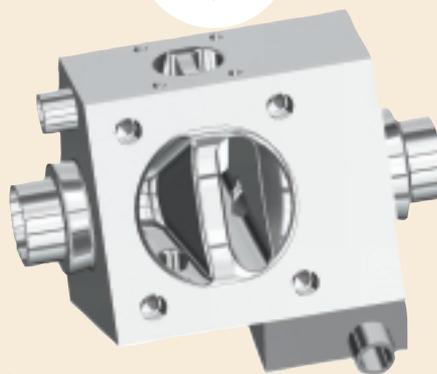
Design and Installation Advantages

Bio-Block machined valve solutions are the ideal compliment to modular component design and construction.

- One Bio-Block valve can replace a welded piping manifold comprising several valves and fittings
- Reduced design envelope and installation times giving overall cost savings
- Fewer welds and less documentation required



⊕ Typical steam-cross fabrication arrangement



⊕ Bio-Block Steam-cross arrangement machined from solid barstock