

SOLUTION PROFILE

Fluid Routing

Maximizing equipment usage, reducing waste

Issues

- Complex plant routing
- Production flexibility
- Smaller production orders
- Increased number of SKUs
- Increased number of vessels
- Large valve matrix
- Product quality
- Contamination
- Transfer time
- Asset utilization

Results

- Reduced maintenance and lifecycle costs
- Increased operational efficiency and quality
- Increased plant productivity
- Reduced system complexity
- Increased equipment availability
- Reduced losses



Overview

The routing of fluids through a plant is just transferring material from one vessel to another. Simple, right? Unfortunately not, given today's demand for production flexibility, smaller order quantities and proliferation of SKUs. Transferring material from one area to another has increasingly become more complex due to these demands, resulting in what has become in many cases the most complex control challenge within a plant. In recent years, companies have increased the number of production vessels, size of tank farms, and replaced flexible hoses and manual valves with hard piping and large valve matrices. Automated cleaning systems have been implemented, and sometimes multiple products and cleaning operations are simultaneously running through the same valve matrix. With such an intricate process, there can be many challenges.

Challenges

Manufacturers need an efficient and cost effective way to transfer materials to a variety of destinations. The transfer must be accomplished with the least amount of waste, in the least amount of time to provide the greatest throughput. It is complicated to prevent cross contamination in each step of the transfer process. Oftentimes, operators must choose which paths and sequences should be used depending upon the type of materials and cleaning requirements, process logic which is complex and difficult to maintain.

To address the complicated process, companies have automated the procedures used in operations with process controllers and PC based systems to manage the pumps and valves used in every transfer path. Custom coded logic is often required to successfully manage the transfer of product, while protecting product integrity.

Hard coding of custom paths into controller logic requires a higher level of skill sets. It's time consuming, prone to error and lacks flexibility. When process piping is added or new procedures implemented, the code must be rewritten to handle the increased functionality.

With complex operations there is a need for a more robust solution. Today in many cases, operators are responsible for determining if the route is clean for the transfer of product and avoiding routes that have incompatible liquids on the other side of a valve or in adjacent paths. Based upon this, plants become highly dependent on operators to reduce or eliminate the risk of product contamination, a risk which could result in waste and damage to brand equity.

Solutions

Rockwell Automation helps companies solve these challenges by applying deep industry domain expertise across geographical boundaries, backed by exceptional project management skills. This experience and knowledge provides a solution that can be rapidly deployed and replicated anywhere in the world in a consistent, documented process. The scalability of the solution enables it to be deployed in simple-partially automated production facilities to complex-fully automated piping networks. Preferred applications include plants with:

- Multiple paths with simultaneous material movement
- Extensive path/pipeline networks
- Frequent conversions or modifications to piping to accommodate new products or process changes
- Regularly changing material in common piping systems
- Complex business logic that may dictate path selection or process logic based on product sequencing, material compatibility, or time since path last used
- Extensive cleaning requirements
- High value material where waste from product transfer can significantly impact finished product profitability

The solution is delivered by Rockwell Automation on the Integrated Architecture System. Device control is done on the Logix platform, and visualization and information management is provided by the FactoryTalk® suite of products. Capabilities of the solution include:

Static Routing – Each potential path is pre-defined. The control of the path is then developed leveraging pre-developed controls modules for each device in the system (tanks, valve,

pumps, etc.) The different paths are configured using a HMI faceplate or configuration tool to define the devices in each path. This eliminates the need for custom programming to develop the route control. Operators initiate transfer of material using the route manager faceplate in the HMI application. Besides having all the applications running in the controllers, the solutions also provides:

- Visualization/control of paths
- Flexibility and scalability to easily add new paths or modifications for piping changes
- Control of system with Logix controllers as a layer above an existing control architecture
- Path availability based on device rule set (not faulted, in service)

Static Routing with Business Rules – In addition to the static routes already defined, the plant can define business rules that restrict paths based on material to be transferred, status of cleaning, previous material in path, and material on the other side of valves (to prevent possible mixing). This provides the following advantages:

- Reduced product contamination by constraining devices if incompatible material is on either side
- Ability to easily add rules
- Alarm annunciation of rule violations

Dynamic Routing – The solution can also provide the capability to dynamically choose the path for material transfer. The path chosen is based on the availability of devices, process piping, and business rules. The system could also determine a configured number of alternative routes and present them to the operator to select. This provides the following advantages:

- Improved flexibility, increased throughput, and reduced cycle time
- Capability to handle in-process faults and re-route according to real-time events

Achieving consistent quality while optimizing equipment usage is a recipe for success. Our vast routing knowledge can help you improve your operations and protect your brand. Let us show you how.

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