TurnWise Fluid Management System

TurnWise Fluid Management

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Simplifying Fluid Management for the Next Generation

Relevant IP

- US 11, 680, 955

TurnWise Fluid Management Technology

TurnWise Fluid Management System, Series 2.0

A fluid passing through a standard valve encounters five major events during its journey. They are: a) the entry through a flow-path in the stator, b) a tortuous sharp turn moving out of the stator into the rotor, c) its journey through a flow-path on the rotor, d) a second tortuous turn moving back into a second flow-path in the stator, and e) the exit out of the stator. The tortuosity in the fluidic motion rises sharply at every turns making a valve prone to malfunctioning. The extent of malfunctioning can vary from just clogging, which may be cleared by pumping a large volume cleaning fluid, to leaking, in which case, the inner works of the valve requires manual intervention. As the tortuosity in the fluidic motion rises, the valve becomes susceptible to failing endangering the integrity of the automation workflow. A large portion of the tortuosity comes from the fundamental design of the valve assembly, where the flow-paths on the rotor is at a near orthogonal disposition with respect to the flow-paths in the stator.

TSL's revolutionary fluid diverting technology (US 11,680,955) circumvents this fundamental fluid management issue in the rotary valve technology by replacing conventional two-dimensional rotor technology with a three-dimensional rotor design that allows fluidic motion to experience low tortuosity. TSL's latest valve technology uses gradually bending movable flow-paths inside the three-dimensional boundary of the rotor (as opposed to the sharp bends at the interface where the rotor meets the stator) transforming what a valve can deliver as a fluid diverting tool including the ones that deal with PATs for hazardous process fluids.

Beside the obvious drop in the tortuosity of the fluidic motion, the three-dimensional rotor technology redefines a myriad of unique fluid management operations that were not possible with two-dimensional rotor technology.

Please reach out to communication@turnwise.totalsynthesis.ca to learn more about what TurnWise technology can do for your fluid management workflow.

TurnWise Products

Want to learn more about our technology or the products?

Email: communication@turnwise.totalsynthesis.ca

Visit: https://turnwise.totalsynthesis.ca

X: Coming soon

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Low Tortuosity Motion

The ease of fluidic motion in and out of the TurnWise rotor drastically reduces back-pressure from the fluid management devices lowering the flow-rate restrictions without having to drastically increasing the flow-path cross-sections in fluid management workflows. This, coupled with another enabling technology from TSL that allows for the management of fluids including the ones that may contain solid particulates (US 10,585,071), enables TurnWise systems to serve in the PAT for hazardous fluids that currently sit outside the scope of conventional valve technologies.

To learn more about the handling of slurries using TSL technology, contact us through our website.

Outside-the-box Fluid Communication

The disposition of configurable flow-paths in conventional fluid diverting devices is concentric to the axis of valve rotation and limited to the two-dimensional surface of the rotor. The design severely restricts the maximum number of configurations derivable from available fluid communications to just the half of the number of fluid sources (the number of ports on the stator) in the workflow. The non-concentric disposition (US 11,680,955; US 2021/0,404,998, granted in December of 2024) of the configurable flow-paths sharply increases the maximum number of valve configurations allowing your application to be more responsive to the need of the application.

To learn more about workflow-specific fluid communication using TSL technology, contact us through our website.

Lab-on-a-valve Capabilities

The three-dimensional disposition of the configurable flow-paths makes almost an indefinite number of unique geometric dispositions available for fluid management operations. The spatial form, volume, arc, internal diameter, and connectivity of each and every flow-paths within the three-dimensional boundary creates an opportunity for the TurnWise Fluid Management devices to not only serve as the programmable passage for fluid diversion, but also a programmable temporary residence for fluid processing. TSL's expertise in designing custom flow-path network that is specific to your application workflow provides you a unique opportunity to develop your own exclusive workflow using our TurnWise systems.

To learn more about workflow-specific TurnWise technology development at TSL , contact us through our website.

Multi-functional

TurnWise systems are also available in TSL's single stator, multi-functional models.
To learn more about this provision , contact us through our website.

About Total Synthesis Ltd.

Total Synthesis Ltd. (TSL) is a fine-chemical and contract manufacturing company serving a host of pharmaceutical and fine-chemical manufacturers in their discovery and process development programs. TSL's core expertise involves process optimization both in batch and flow formats, and the development of key PATs for sustainable process manufacturing.

A brief history of TurnWise technology

Total Synthesis Ltd., (TSL) a fine-chemical and contract manufacturing company, has been active since 1998 serving a host of pharmaceutical, agrochemical, and electronics manufacturers in their discovery and process optimization programs around the world. The company enriched its core manufacturing expertise with state-of-the-art fluid manipulation technologies enabling its customer-base to access the latest on-demand manufacturing tools equipped with PAT capabilities. Along the way, TSL identified a technological gap existing between the PAT available to manufacturing sector and the need of the sector. A common ask in all of the technological needs is in the ability to effectively manage process fluids including the ones that are viewed as hazardous for PAT purposes. TSL filed its first patent (US 9,579, 625) in 2013 on a PAT that enabled manufacturers to perform in-process checks (IPCs) from a pressurized flow reactor without altering critical process parameters involved. TSL filed a second PAT patent (US 10,583,432) in 2017 enabling state-of-the-art fluid diverting devices to reliably manage solid particulates, a capability that drew a significant attention of leading instrument manufacturers around the world. In 2021, TSL revolutionized the art of fluid management by introducing world's first multi-functional fluid diverting device (US 11,680,955) that allows non-tortuous passage of hazardous fluids including the ones that are contaminated with solid particulates paving a new avenue for the next-generation PAT for modern manufacturing. In 2025, TSL licensed its key intellectual properties (IPs) to TurnWise Inc., a privately owned subsidiary of TSL to concentrate its effort in commercializing TSL's proprietary IPs as application-focused PAT tools for the next-generation commodity manufacturing.