

Nao is the time

Solving the pumping challenges in pharmaceutical applications requires innovative solutions

The main factor driving the market of pumps today is the increasing use of sophisticated devices both for individual and industrial use. The challenges faced by the industry are two-fold, including the high level of accuracy in delivery with pulseless flow whether delivering a small or large dose of fluids, and the cost of the disposable pump head and driving unit. Simply put, the market is asking for the best solutions to overcome issues encountered when using peristaltic and syringe pumps. Therefore, modern pumps have to be easy to set up and to use, be accurate, and of low cost.

Within such context, Switzerland-based consultancy and industrial engineering company Swissinnov Product has set to meet today's market challenges and increasing demands. Swissinnov develops different proprietary technologies of disposable pumps to provide solutions for very specific technical requirements, sometimes termed as "technological challenges", from various industries, including medical, pharmaceutical, veterinary, and food.

What makes it tick

To provide a solution to these challenges, Swissinnov has developed the NaoPump. The pump possesses fairly simple technical characteristics, allowing it to be easily fitted into any device or equipment requiring pulseless flow delivery at a certain level of precision, whether in small or large volume.

The pumping system consists of two pistons moving specifically and alternatively into a rotor, ensuring a linear and constant flow rate. The flow delivery correlates proportionally with the speed of the motor and the delivered volume to its rotation angle. The system is similar to the peristaltic pumping system, but the differences become relevant when looking at the results. One motor revolution in a NaoPump gives +/-1% accuracy of delivery independently of the inlet and outlet pressure and over time.

Masterflex drive in an open position with a NaoStedi pump



One of the main advantages of the NaoPump is that there is no need for a flow sensor or any controlling balance in the system. Furthermore, the flow delivery remains constant during the lifespan of the pump parts. Several

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tests conducted on the NaoPump have confirmed that it does not suffer from any drift, which usually appears in pumping system after a certain amount of time and operation. Designed to be fitted in any pumping device, the NaoPump can be mounted with any standard motor, offering the possibility of use in a large variety of applications.

Good medicine

Recent applications of the pump technology have been specifically in medical and pharmaceutical fields. For a medical application, the NaoPump has successfully achieved the technical challenge requested for a drug dosage

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in a blood circuit. Swissinnov's client was faced with an issue of finding a pumping system able to deliver accurately and constantly small and large flows that change intermittently. The whole system had to be capable of working without any sensor installed into the dosage circuit. Additionally, the pump itself had to be of a compact size, easy to set up, and able to deliver a drug accurately into a blood circuit during a couple of hours. Finally, the solution had to come in the form of a disposable pump that could be integrated into a portable device.

Against this backdrop, peristaltic pumps were considered but found to not be the best fit for the application. Certain shortcomings in the peristaltic pumping system did not allow an accurate delivery of drug dosage, therefore requiring a dosage sensor, which had been ruled out by the application requirements. Diaphragm pumps could not match the technical challenge either, since diaphragm pumps not only produced a high level of noise, but they also could not ensure proper dosage when pressure in the main circuit varied.

NaoStedi, a NaoPump model, on the other hand was found to be a suitable solution for the medical application. It delivered the requested accurate dosage without a flow sensor for calibration, and the torque required to operate the pump remained relatively low as compared to peristaltic pump. The pump's adaptability to different motor types was seen as an advantage, offering many options to the client when integrating the system into a portable device. The NaoStedi was found to be compact, lightweight, silent, simple to set up and use, and – most importantly – economical.

The pharma filler

For a pharmaceutical application, Swissinnov has successfully provided a full and complete solution, including the design of an associated fluidic circuit to a pumping system within a

very short time frame and low cost. The challenge faced by Swissinnov's client was to find a disposable pump able to rapidly fill multiple vials simultaneously during several hours of operation, while ensuring accurate dosage in each vial.

The client selected the NaoStedi as its preferred choice solution due to its ease of use and compatibility with Masterflex drives. These features allowed testing to be carried out within a short time. Subsequently, the client was able to capitalise on its existing training system, which has resulted in reduced integration costs for NaoStedi. The solution also offered the possibility to remove the calibration phase, which is usually required in peristaltic pumps. The elimination of this start-up phase can further reduce the cost of operations and subsequently increase the overall productivity of the whole process.

In order to offer a complete solution for this specific pharmaceutical application, Swissinnov also provided its services in designing the fluidic circuit to simultaneously fill multiple vials. Only one specific component had to be added to deliver a prototype in just few days.

These two recent cases illustrate the application spectrum offered by the NaoPump. The flexibility in the pump design and confirmed performance of the pump, combined with the additional services, are the key factors in solving specific technical challenges or issues faced by a diverse industry looking for pump solutions. ■

For more information:

This article was written by Florent Junod, managing partner at Swissinnov Product. Visit: www.naopump.com



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