Easing the burden of flow cytometry sample preparation

Flow cytometry (FCM) is a powerful analytical tool with applications spanning a variety of disciplines. Sample preparation prior to cytometry, however, is traditionally slow and prone to human error, which can drain precious time and resources from laboratories already under constant pressures. Sysmex has developed a unique automation solution to rapidly accelerate sample preparation for FCM applications – heightening efficiency and flexibility to ease the strain on laboratory professionals.

Sysmex's mission is to shape the advancement of healthcare by providing instruments, reagents and software for *in vitro* testing of blood, urine and other bodily fluids. The company's integrated R&D, manufacturing, sales and support network supplies products to more than 190 countries throughout the world. Over recent years, the company has expanded its FCM capabilities in response to customer demand, ensuring it continues to provide for the needs of the hematology market. Its FCM portfolio now covers various applications, including clinical testing for leukemia, malignant lymphoma and HIV/AIDS, as well as providing instruments for quality control testing of water and beverages, and for research.

As the clinical testing market expanded, Sysmex recognized that sample preparation was an obvious bottleneck in the clinical FCM testing workflow, slowing the entire analytical process. Shogo Takatani, Vice President of FCM Business Development at Sysmex, explained: "Many of our clinical FCM customers were struggling with the burdensome process of sample preparation. Leukemia and lymphoma testing are especially arduous, as you need to add up to 100 types of monoclonal antibody reagents to multiple tubes. This is really time consuming and, because of the tedious nature of the work, there is a high chance of error, which can greatly impact the accuracy of results. Seeing the burden this was on our customers, we realized there was a need for greater automation in these steps, not only to increase throughput, but also to minimize manual labor and limit the chance of human error. This would then allow the highly skilled laboratory professionals to focus more on clinical data analysis and interpretation."

"Our FCM application specialists understood our customers' pain points, but we needed a partner with the knowledge and experience to develop an appropriate automated solution. We approached Tecan and, using its Cavro® Omni Flex platform as a starting point, we developed an innovative sample preparation system, the PS-10,
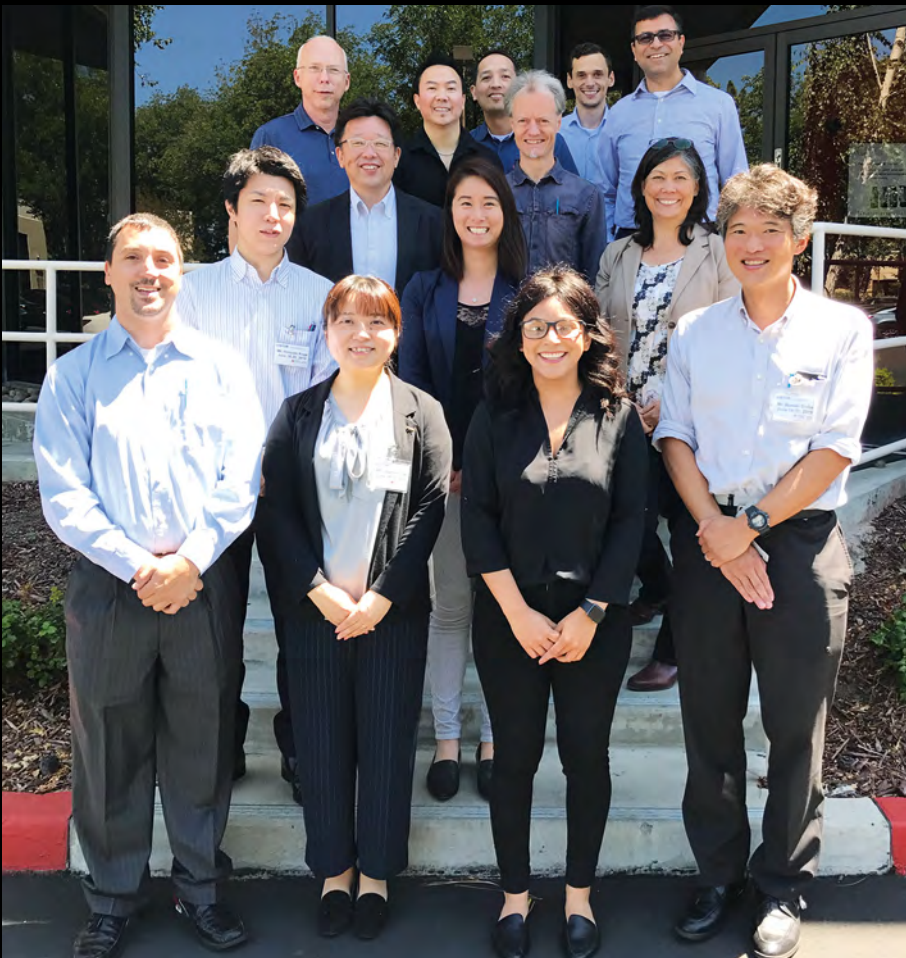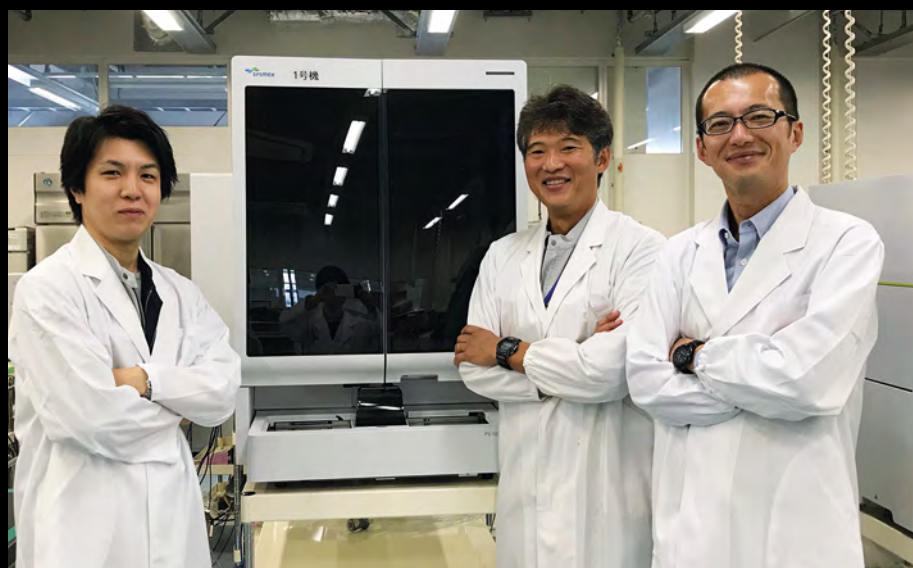

PS-10 team members from Sysmex and Tecan pictured outside Tecan's facility in San Jose, CA (NOTE: Photo taken prior to social distancing)

(Left to right) Hiroyuki Koga, Masaki Shiba and Yoichi Nakamura from Sysmex in front of a prototype PS-10 instrument (NOTE: Photo taken prior to social distancing)

specifically for FCM. Some existing technologies were integrated directly into the new instrument, including the Cavro Omni Robot for general purpose pipetting, and the Cavro Centris Pump to provide the precise flow rate control needed in FCM preparation. These form the main operating components of the PS-10, with other modules from both Tecan and Sysmex completing the design."

"The new sample preparation system has proven the perfect solution to the labor-intensive FCM testing workflow. The PS-10 automates antibody cocktailing and sample preparation, which vastly increases throughput and cuts down the chance of human error, giving our customers more confidence in the results of their work. Using Tecan's Freedom EVOware® software, the system simply produces a file to export, ready for FCM analysis, and stores all the information regarding reagents and procedures to ensure full traceability. The instrument can also be tailored to match specific laboratory needs, and is compatible with antibody reagents from various manufacturers."

"We contacted Tecan first because of its proven experience in innovating liquid handling automation. The company's long history and established reputation as an OEM partner further cemented the decision to collaborate. Getting this instrument from idea to market was a true global effort between our teams, involving communication over the entire

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product development cycle between our head office in Kobe, Japan, Tecan's hardware team in California, USA, and its software development team in Mainz, Germany. This combined experience proved crucial to the success of the project. We set out to help our customers to increase their efficiency and get more consistent results by eliminating user variability. That's exactly what we've done with the PS-10 and, since its launch in 2019, many laboratories have chosen the instrument, which now plays an integral role in their FCM testing workflows."

To find out more about the Cavro Omni Flex, visit
partnering.tecan.com/omniflex

To find out more about Tecan Synergence™ OEM systems engineering, visit
www.tecan.com/synergence

To learn more about the Sysmex PS-10, go to https://us.sysmex-flowcytometry.com/ps-10-sample-preparation-system