



COVID-19

# Innovation in COVID-19 testing by Dutch public-private partnership

**When the SARS-CoV-2 pandemic hit in 2020, researchers from the Hubrecht Institute in Utrecht, Netherlands, felt compelled to support the national COVID-19 testing strategy, which was suffering with limited capacity. Recognizing that the gold standard PCR test worked well to identify SARS-CoV-2 positive patients, the institute's challenges lay in the logistics and a need to automate the process. A fortuitous introduction to an automation expert from Genmab was the start of a successful collaboration, which grew to involve a number of additional partners, and has significantly increased the capacity of SARS-CoV-2 testing in the Netherlands through the development of the STRIP-1 robot.**



Day-to-day, scientists at the Hubrecht Institute are focused on pioneering research in developmental and stem cell biology. However, during the first COVID-19 lockdown in the Netherlands in March 2020, two group leaders from the Institute – Wouter de Laat and Marvin Tanenbaum – set about using their molecular biology expertise to support the national SARS-CoV-2 testing strategy. Wouter explained: “An

intensive manual process, together with the requirement for large volumes of liquid reagents – which were suffering global shortages at the time – were limiting the number of tests that could be processed. We initially investigated potential alternatives to standard qPCR testing, but quickly realized the assay itself was very sensitive, and the biggest challenge was the logistics of carrying out the tests.”



The Hubrecht Institute's location on the Utrecht Science Park proved essential to collaborative efforts

Identifying the need to automate the workflow, a chance meeting in a local park led the Hubrecht scientists to be introduced to Martijn Bosch, an automation expert from Genmab – a biotechnology company coincidentally situated opposite the Hubrecht Institute on the Utrecht Science Park. Wouter continued: “The Hubrecht and Genmab are very different organizations and, although we are across the street, we don't normally interact. However, in this unusual circumstance, it quickly became clear that we had the exact same attitude – we wanted to do something useful, and we had the complementary skills to try and make a difference.” Martijn added: “As an antibody company we do a lot of very high throughput screening, and so I knew that there should be potential to apply a similar set-up to COVID-19 screening, with the



possibility of being able to process tens of thousands of samples a day.”

Martijn set about designing the STRIP-1 – initially nicknamed ‘The Beast’ – and chose a Fluent® Automation Workstation. He explained: “I had worked with Tecan automated systems for about 15 years, and immediately knew they would be able to produce the platform we needed, so I worked closely with a team at Tecan Labwerx™ to realize the system. We built it around a Fluent 1080 with two LiCONiC incubators at either side, but what made our system different to other Fluent workstations was that we used two Robotic Gripper Arms™. This allowed us to set up two different processes on one workdeck, increasing the overall speed of the workflow. To make sure that the magnetic beads used for the RNA isolation step were kept in suspension, a V&P Scientific SpinVessel® was introduced. We ensured full traceability throughout the process by using barcoded sample tubes and plates, which were scanned using a Ziath DataPac™ Mirage scanner integrated into the system.”

“One of the big challenges we faced was getting the samples from the patients into the system. We worked with Micronic – which supplied sample tubes prefilled with a lysis buffer and controls – so that any virus present was deactivated as soon as the patient swab was collected, making the sample handling safer for staff. We also built an IntelliXcap™ decapper into the system with a special adapter for the Micronic caps.”

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“The Fluent system allows the whole RNA extraction process to be carried out in 384-well format, increasing the speed and reducing the quantity of reagents required. Plates are then manually moved for qPCR analysis, and the barcodes allow automatic digital return of the results to the right person. We worked with IT company Bodegro to manage the sample tracking and integrate the data management throughout the process.”

Following this successful installation and validation of the STRIP-1 platform at the PAMM medical diagnostics laboratory in Veldhoven in December 2020, the team that collaborated to bring it about were finally able to meet in person when Hugo de Jonge, the Dutch Minister of Health, Welfare and Sport, visited STRIP-1 at the PAMM laboratory in January 2021. The Dutch government has since ordered five more systems, with each platform capable of processing more than 10,000 samples in 24 hours. Martijn finished: “Through this extraordinary collaboration and the use of Tecan laboratory automation platforms, we’ve produced a very flexible system.

It’s delivering results for COVID-19 testing now, but can be repurposed for other large-scale testing. In addition, we will be prepared should we face a future pandemic.”

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**For more information on Tecan Labwerx customized automation solutions, visit**  
[www.tecan.com/labwerx](http://www.tecan.com/labwerx)

**To learn more about the Hubrecht Institute’s STRIP-1 platform, go to**  
[www.hubrecht.eu/strip-1-test-robot-for-covid-19-testing](http://www.hubrecht.eu/strip-1-test-robot-for-covid-19-testing)

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