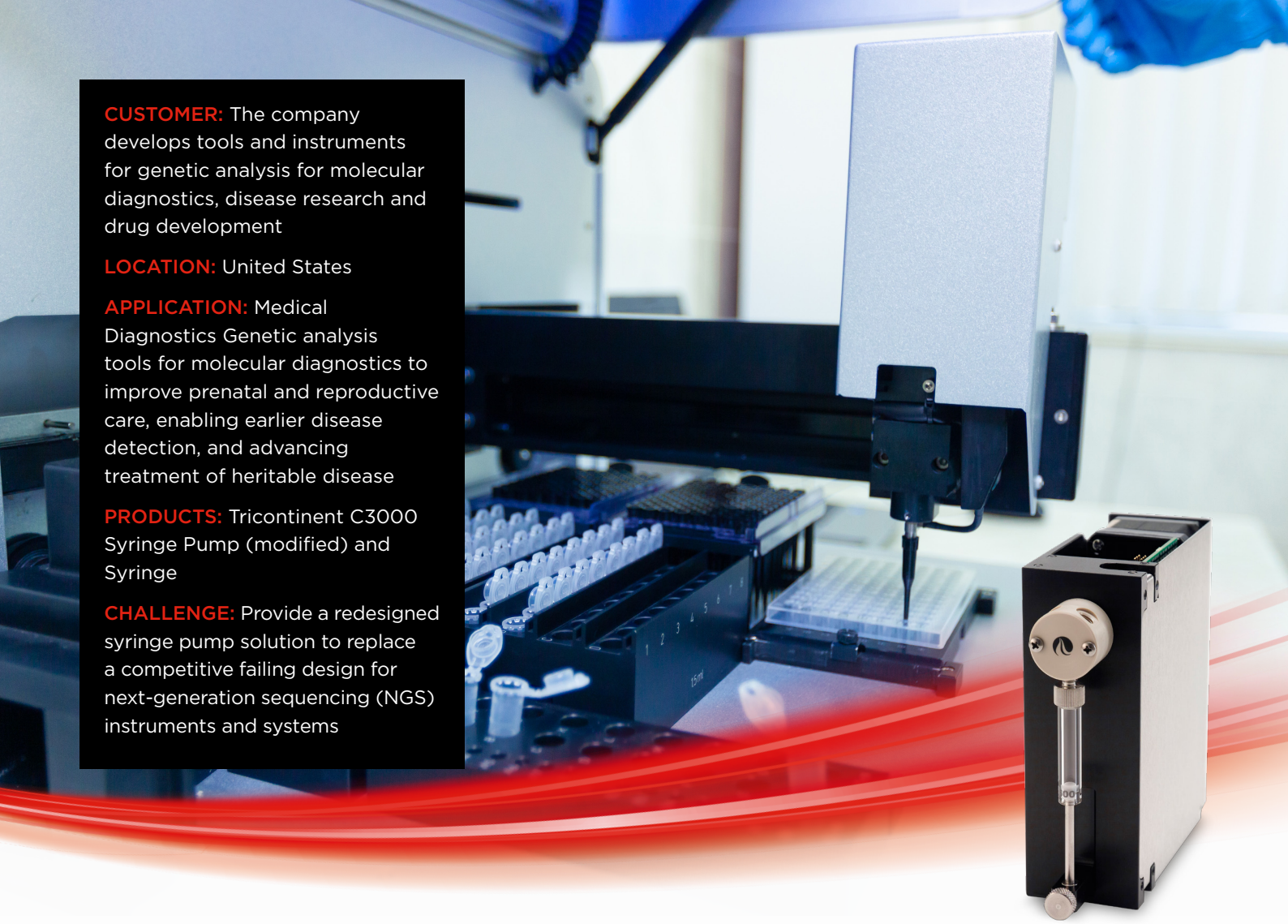

CUSTOMER: The company develops tools and instruments for genetic analysis for molecular diagnostics, disease research and drug development

LOCATION: United States

APPLICATION: Medical Diagnostics Genetic analysis tools for molecular diagnostics to improve prenatal and reproductive care, enabling earlier disease detection, and advancing treatment of heritable disease

PRODUCTS: Tricontinent C3000 Syringe Pump (modified) and Syringe

CHALLENGE: Provide a redesigned syringe pump solution to replace a competitive failing design for next-generation sequencing (NGS) instruments and systems

Case Study

Tricontinent takes a collaborative approach to provide reliable, custom solutions for next-generation sequencing provider.

Our customer, a leading developer of next-generation sequencing technologies, is dedicated to protecting the global community using innovative, cutting edge analysis and diagnostic technologies. The company specializes in developing tools and instruments that allow medical and research facilities to use genetic analysis and molecular diagnostic techniques to efficiently track and trace infectious diseases, as well as develop effective therapies and vaccines.

The company's products and solutions have a wide range of applications within the medical and research industries; from improving the quality of prenatal and reproductive care, to enabling early disease detection and advancing treatment. To achieve their goal and develop truly innovative solutions, the customer relies on a range of precise, efficient, and reliable components; as well as building long-term, collaborative partnerships with its suppliers and OEMs.

INNOVATION LEADS TO SUCCESS

To cement their position at the top of their industry, the customer developed a new range of next-generation sequencing instruments that would enable clinical laboratories to quickly, easily, and precisely perform targeted resequencing, small-genome sequencing, and in-vitro diagnostics (IVD). These instruments utilize a streamlined three-step workflow consisting of library preparation, sequencing, and data analysis steps, as well as cartridge-based 'plug-and-play' components to enable rapid analysis turnaround times.

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Key to each instruments' ability to perform efficient and accurate analysis is a high-precision syringe pump that is used to handle patient samples and reagents at various stages of the workflow. Fully automated, the pump ensures the integrity of samples by preventing or minimizing the sample's contact with potential contaminants. The pump also ensures that required reagents are added in precise doses at the correct points in the workflow while eliminating or reducing the risk of carryover.

RELIABILITY POSING CHALLENGES

Despite the success of the instruments in the market, the company began receiving increasing reports of ongoing pump quality and reliability issues. In addition to valve leaks, end-users reported issues with the pump's valve motor stalling. The company's in-house and field service team reported that the pumps used were exhibiting a failure rate of approximately 28%.

After extensive testing and analysis, the company's engineers traced the root cause of the issue back to the pump's use of a ceramic rotary face seal valve. The team identified that certain types of buffered reagents would crystalize and stick to the ceramic sealing surface, causing the pump valve to seize, which in turn stalled the pump motor, rendering the entire system inoperable.

Having identified the cause of the issue, the company's engineers worked to qualify the basis of a solution; incorporating two solenoid valves instead of the standard rotary valve that was being used. With their existing pump supplier unable to accommodate the proposed change, the company turned to Tricontinent. While Tricontinent had provided long-life valves utilizing inert polymers proven to stand up to crystallizing reagents in similar applications, the customer opted to have Tricontinent develop a customized solution using the customer's proven solenoid approach.

COLLABORATING TOWARDS SUCCESS

Working in close collaboration with the customer, the team at **Tricontinent began designing a customized solution, based on their successful proprietary C3000 syringe pump platform.** To incorporate the solenoid valve, Tricontinent engineers needed to design a brand new manifold to interface with the solenoid valves, including all internal porting and a new pump controller PCBA with custom firmware that would **allow the pump to operate as an exact drop-in replacement to the old pump so no instrument changes would be required**. Following a number of face-to-face visits, online meetings, and technical phone calls, the team was able to quickly develop 3D solid models and functioning prototypes of the modified pump.

Preliminary testing using typical reagents and protocols was conducted by Tricontinent to validate that the new pump functioned as expected in the customer's instruments. The customer then began testing the new design to ensure that the C3000 platform and new manifold valve assembly not only met their exacting standards, but also helped them overcome the issues faced with the previous pump unit.

DRIVING POSITIVE OUTCOMES

Following two design iterations and successful testing, **the customer was satisfied with not only the performance and reliability provided by Tricontinent's solution, but also by the level of commitment, knowledge, and expertise shown by the team**. The modified C3000 was successfully incorporated into the customer's instruments in 2018 with a quick ramp up to their well-established high volume production quantities.

Tricontinent's willingness and ability to work closely and collaboratively with the **customer, resulted in a solution that provided significant improvements in reliability and helped the customer reduce the total cost of ownership of their instruments**. Crucially, the solution was able to help our customer **reduce the failure rate of their equipment from approximately 28%, down to virtually zero (0.2%); minimizing downtime and maintenance** for their end-users, allowing them to dedicate more time and resources to the search for vaccines and cures.

Tricontinent is a leading manufacturer of liquid handling solutions for Original Equipment Manufacturers (OEMs) in the medical, pharmaceutical, biotechnology, and laboratory industry. With its experienced Engineering, Technical, and Operations staff and capabilities, TriContinent designs and manufactures standard and customized syringe pumps, rotary valves, syringes, and liquid handling (XYZ) robots that meet the precise needs of its customers. Backed by over 45 years of engineering excellence and innovation, and a global manufacturing network, TriContinent stands out as the reliable choice for OEMs worldwide.

For more information, visit www.tricontinent.com

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