

SUCCESSFUL INTEGRATION OF CRYO360^o™ MANAGEMENT SYSTEM USING CRYOXILTRIX IN SÃO PAULO CRYO BIOREPOSITORY OF CRYOFORLIFE



Between 2020 and 2021, CryoForLife projected and built a brand new Cryo360^o™ cryo biorepository designed to store IVF and ART samples in liquid Nitrogen using the highest standards of triple redundancy which mirror **Aérospatiale** operational models. As Chief Operational Officer of the new facility, Dr. Christine Allen was tasked with planning, developing, building, and implementing commercial execution of this model, something that was never done before, not only in Latin America, but anywhere else.

The cryo biorepository provides ultra-secure scalable commercial cryogenic storage with continuous real time control and monitoring measures of triple level that adheres to local & international accreditations. Integrating all equipment and software in one solution that is accessible to all CryoForLife clients in real time mitigates risks, by allowing for global

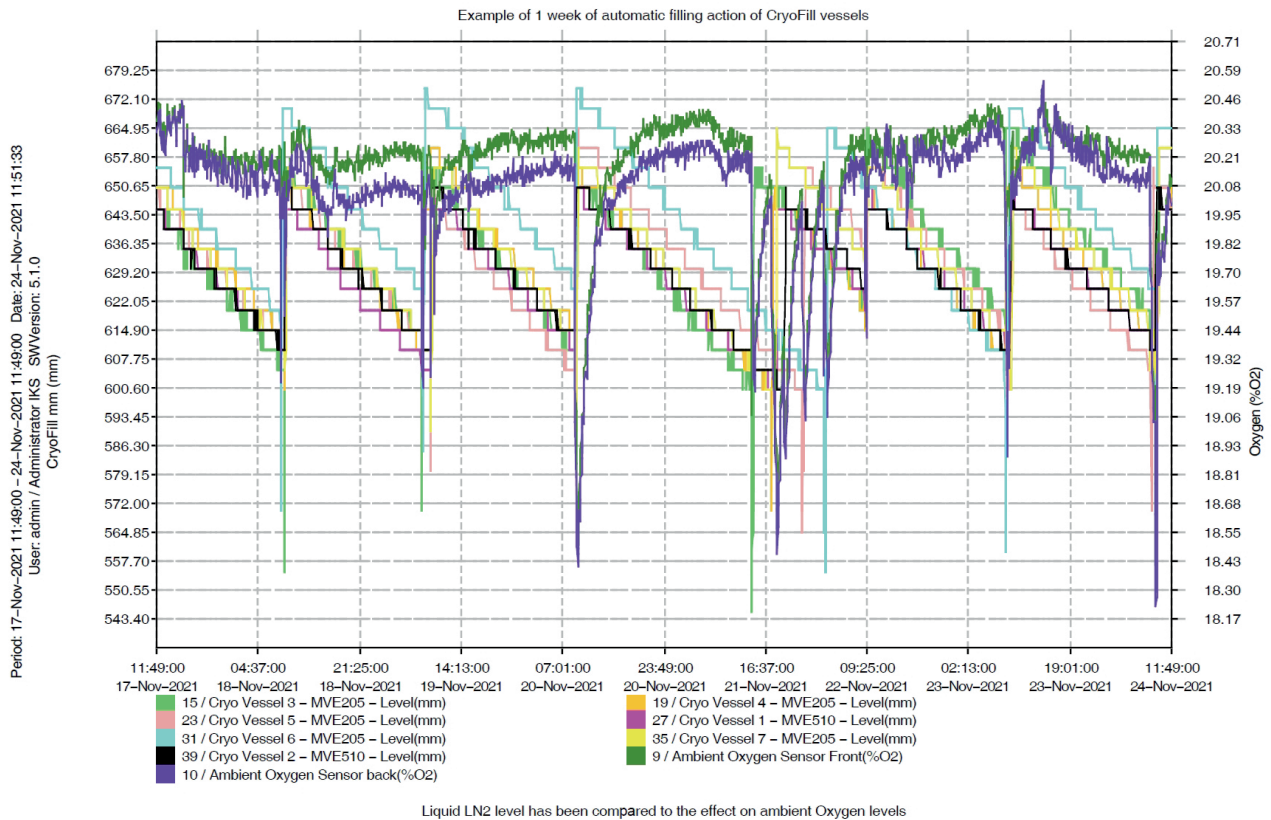
Customer: Dr. Christine S. Allen
Company: CryoForLife, São Paulo, SP Brazil
Industry: Cryo Biorepository
Buyer Persona: IVF/ART/Cryo biobank
Video: N/A

Customer: XiltriX Monitoring and Alarm System, Alpha Mass monitoring & CryoFill controllers
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remote access. To achieve this Dr. Allen's expertise led to the executive decision of using CryoXiltriX as a key development partner in integration of the well-known XiltriX real-time monitoring and alarm system, CryoFill, the most advanced cryogenic controller in the world and Alpha mass monitoring, along with ISO Operational Processes. This premium packet, called Cryo360^o™ cryo management is the first commercially available, validated & integrated Management tool in the market.

The Story of CryoForLife

The global IVF industry is growing at a rapid pace, resulting in ever more samples in need of cryogenic storage. More and more labs struggle with challenges



of storing them correctly, offering minimal investment in mitigating risks of sample loss and transparency, and fall back on veterinary purposed, manually liquid filled dewars that usually have no control and no preventative monitoring in place. The only monitoring commonly seen in regard to these vessels is measurement of temperature, which offers no preventative operational benefit. Once temperature rises, there is no time left to save the samples.

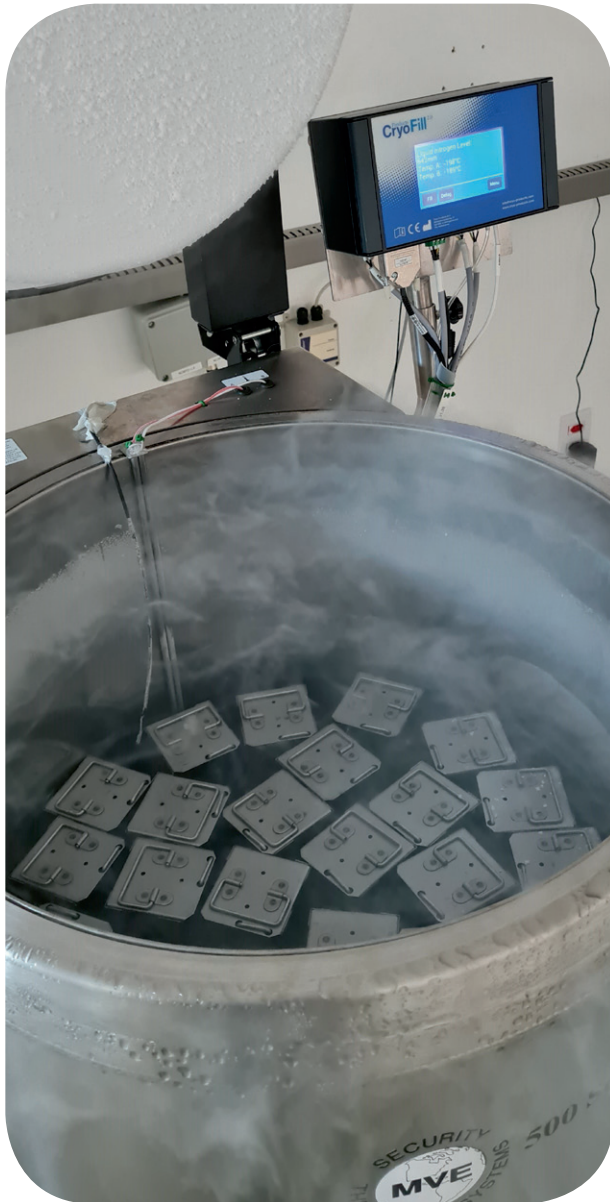
As Dr. Allen uses an analogy: “Measuring the temperature in a veterinarian aluminum tank is the same as calling the coroner’s office when someone died. What we wanted is to run continuous tests that will point out to the possibility of a problem and fix this, like a team of doctors and bodyguards”

Facing floor space limitation, bigger vessels with automatic filling controllers have come onto the market, but most are not reliable and without proper risk mitigation can lead to catastrophic failures. In the USA alone, it is public information that two IVF labs suffered from a catastrophic incident in the same weekend in 2018 resulting in the loss of thousands of embryos. It is estimated that over 100 of these catastrophic events have happened over time without public repercussion.

As a Brazilian national emigrated to US for professional reasons, with multiple decades of firsthand experience of running and consulting for IVF labs, Dr. Allen’s challenge was clear. She would not make the same mistakes as others had done before her. She wanted an integrated solution that would actually help and support the staff in going above and beyond to safeguard these precious samples.

Because the availability of a trustworthy solution in the American market was lacking, and because of incidents with loss of samples, very few labs had already made the step towards migrating into automatically filled vessels with proper risk mitigation measures. Since XiltriX was already a well know monitoring and alarm solution provider in the US, Dr. Allen researched several monitoring systems and opted for XiltriX, inquiring about the possibility to develop a, integrated system to overcome this issue.

XiltriX was able to show that a trustworthy, proven solution already existed for many years in the European market and that dozens of Benelux, German and UK labs had already successfully made the move from manually filled dewars onto cryogenic vessels with the CryoFill controller integrated with the



XiltriX monitoring and alarm system. On top of the reliability, CryoFill is even certified according to most recent MDR medical regulations.

Challenges overcome during implementation

The First major challenge was the fact that the cryo repository needed to be built in São Paulo Brazil. Not many suppliers have a presence in the Brazilian market; due to high import taxes it is difficult to get approval from authorities and customs, which makes already expensive solution more expensive for many labs. **Dr. Allen commented:** *"The process of getting the goods into the country was a difficult one. There was no precedent to fall back on and the customs officers*

had trouble understanding the technical nature of the solution. This process cost precious time and heavy investment but in the end was navigated successfully. We have now paved a way forward for future projects."

Another problem was the fact that CryoForLife had already purchased cryogenic vessels with filling controllers that were on their way to the new facility. At the time of purchase, they were not aware of a better solution than the need to eventually retrofit the new CryoFill controller onto the cryo vessels. During the testing and validation phase of the cryo repository it turned out the existing controller did not work according to specification and presented severe malfunctions that posed risk for loss of samples and employee's lives, making the retrofit to CryoFill the only immediate way forward. **As Dr. Allen explains:** *"I have worked with many solutions in different labs, none of them offered the level of control and security I felt was necessary for my own repository. In CryoXiltriX I found the only solution that lived up to my standards and expectations."*

Another challenge was the availability of skilled technical staff. Because time was a driving factor, waiting for travel limitation to be relaxed because of Covid was not an option. Staff that had technical experience in adjacent fields needed to be trained in retrofitting CryoFill and installing XiltriX without the ability to travel. This was not just a one-time task since the technical staff would need to provide continuous support in case of issues or malfunctions.

Dr. Allen noted: *"Aside from the willingness of everybody to work together, things like the language barrier, time zone differences and lacking technical experience made it difficult to get the project of the ground. I am very impressed with the remote assistance abilities of XiltriX and Cryo Products to get our local staff up to speed quickly and properly trained. Their partnership and cooperation have been instrumental in successfully finishing this project."*

Why CryoForLife Chose XiltriX

Before building her own cryo repository, CryoForLife's COO had experience with XiltriX in the US. She saw how XiltriX provided trustworthy scalable solution for many labs, or one lab with multiple satellite sites.



Quoting Dr. Allen: *"My experience is that XiltriX has become the global Gold Standard in real-time IVF monitoring and alarm systems. The addition of integrating CryoFill with this system has made the solution even more powerful. Before purchasing the solution, we had very extensive and detailed conversations about our needs and desires which were carefully met by XiltriX. This gave me trust in the fact we could navigate any future issue that would arise. Having the data collected and updated 86,000 times per day into our system, translated into statistical analysis and sent directly to me, as well as timed periodic quality control tests that tests all parts of the process, run by itself and sent to me and my supervisors is an accomplishment for us. I can now talk directly to my tanks, by Siri activation. And I do. And it works."*

How CryoForLife uses XiltriX

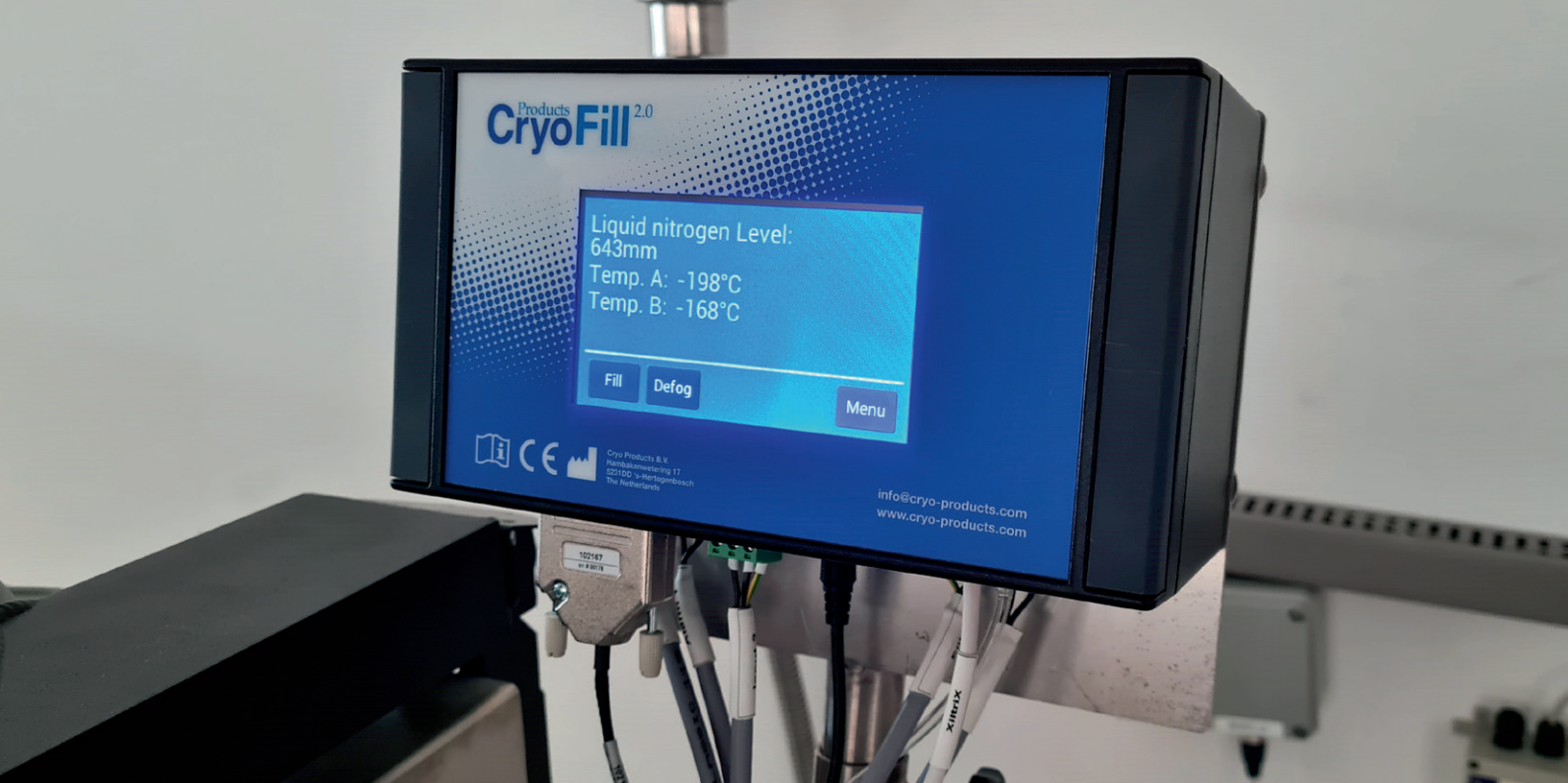
The staff of CryoForLife has the ability to monitor all critical parameters in the cryo repository. Ranging from temperature, ambient Oxygen levels, liquid mass into the tanks to LN₂ level, filling actions, power failure and much more. Since Dr. Allen's team is not always present in the lab, XiltriX offers a remote secure dashboard to login into 24/7. After successfully retrofitting the CryoFill controllers onto the existing tanks, the information coming from XiltriX has been used to fine-tune the LN₂ filling operations. CryoForLife COO explained: *"With the integrated CryoXiltriX solution, I finally get the information I want and need. By carefully using the real-time information*

we have been able to weed out any remaining issues with the liquid Nitrogen supply and now have a stable, easy to work with and safe working environment for our staff. This had never been possible with any of the other solutions existing on the market today!"

During the implementation process, success wasn't always instant. The repository was still under construction and for example network services were not yet installed. Also, the sensors and alarm limits for all vessels needed to be setup carefully. The design of the CryoXiltriX solution is such though that malfunctions are not something that will cause incidents but are carefully planned for and mitigated against during the design and build of the systems. Han Weerdesteyn CCO of XiltriX commented: *"By expecting malfunctions and failures to happen at some point, it is necessary to put in place safeguards to get the alarms out and prevent loss of samples. By using multiple layers of alarms cascading and using for example local flashing light, sirens, SMS, E-mail and telephone alarms in a very clever way, no alarm goes unnoticed. Training of the staff to understand the challenges and risks is done deliberately and meticulously, resulting in a well-balanced operation that produces stable results. By leveraging our years of knowledge and experience the information and control provided in this integrated solution is even more predictable than AI and machine learning results which are not always reproducible and very hard to validate. XiltriX is proud to have been part of this next generation cryo biorepository"*

The Results

One of the factors that came into play in the Brazilian market is that more stringent Anvisa and state sanitary vigilance regulations for IVF labs have come into effect. This means labs are forced to either build a secure facility with proper risk mitigation for themselves. This will cost them a lot of effort, money, and time. Or they can also use the state-of-the-art solution now provided by CryoForLife to solve part of the problem for them. Dr. Allen noted: *"We are planning to start collecting samples from January 2022 onwards. Because of the huge impact the Anvisa regulations have on local laboratories, our available facilities are almost at capacity already!"*



The cryo repository is now finalizing its final validation processes before commencing operations as a trademarked Operational model called 360ultra-secure™. Meanwhile, CryoForLife is already looking for expansion of the facilities, development of safety projects in other cryo facilities and development of the system for IVF laboratories as a whole (not only cryogenics). This is not easy though because of the delivery times of new vessels due to the global supply chain crisis are now more than 1 year. Being able to also use CryoFill on any brand of cryogenic vessels allows for a strategic selection of vessels brand.

Dr. Allen explained: *"By allowing me to select the brand and type of vessels, I can grow my operation more quickly than before. I am already looking at expanding the current number of vessels and cannot wait to open up more satellite labs in the South American market that have the same level of excellence as the one in São Paulo."*

The future:

The future of IVF labs and cryogenics facilities is no mystery for CryoForLife. When asked about what the future holds, Dr. Allen is assertively confident: "Our future is no mystery. We'll never be able to avoid all chances of something going wrong, however, I'm not stopping until embryologists are called by their incubators directly, voice activated, to tell them that 0.5% of some gas is up or down, and asking for voice activated command from the embryologist on hat to do according to the diagnosis analysis and action suggestion, which obviously will be followed up by an update from the system minutes later. Or a call early morning saying all our QC has been competed with no deficiencies. This is where we're rapidly headed to, and myself and my team are honored to participate of this technologic jump in any capacity.



Would you also like to have support in setting up an Cryo repository, IVF labs or other type of laboratory? Please contact XiltriX at sales@xiltriX.com, or visit our websites www.xiltriX.com, www.cryoxiltriX.com and www.cryoForLife.com.