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Cryogenic Tank Monitoring and Reporting System

A leading mid-west manufacturer of cryogenic tanks was looking to improve the safeguards and monitoring capabilities of the vessels they were providing to their customers. Cryogenic tanks are used to store biologic material such as sperm cells, ova, embryos, stem cells, and tissue. Obviously, the temperature controls on these tanks is critical to preserving the viability of their contents. To enhance the value and reliability of their product, our client asked us to work with them to develop a monitoring and alarm system which would continuously observe and report on the condition of each tank.

Our client has thousands of these tanks all over the world, so we had to come up with a system that would work in all countries and under all conditions. The internet was a likely choice: a common platform, and a common method of instant communication. So we assisted in developing their specifications, which were used for development of a special circuit board to monitor each bank of tanks in a given location, and to communicate with the outside world.

Two web sites were established: one to communicate with the takes through their specialized circuit boards (the machine web site), and another to handle the human interface (through which humans could set the parameters for each machine, and see historical results). A key component was that both of these machines must be able to communicate with each other constantly - updating each other with information. There is a lot of data redundancy, dictated by the critical nature of the application. Both machines are backed up frequently in order to protect the data from catastrophe, or machine failure. And each machine has the capability of assuming the duties of the other. The machines themselves are located in geographically separate locations in order to further protect the system from cataclysmic failure such as a power grid failure, or an earthquake.

The 'human interfacing' machine accepts parameters from its user such as reporting frequency, and identification protocols particular to each freezer. Once established, these are communicated to the 'data machine', and then to the controller of the individual freezer. The freezer will then communicate to the data machine at the prescribed intervals its conditions such as temperature, fluid level, battery strength, and other critical factors. If any of these factors are outside the parameters set by the user, the data machine will immediately transmit an email or text message to the supervisor of the errant freezer advising of the freezer's condition which needs attention.

At the same time, all data received by the data machine is translated and conveyed to the human machine in a separate location. The 'human machine', in addition to being able to set permissions and parameters, maintains a timestamped record of all data for each freezer, which can be produced in tabular or graphic form on demand.

Once the freezers are registered, and their parameters set, our application will monitor thousands of tanks on a minute by minute basis, if required, with absolutely no human intervention in a secure redundant environment for just a few hundred dollars a month.