CASE STUDY

MAINTENANCE AND QUALITY:

The intelligent use of valves in industry.

ST-One

CHALLENGE:

To build a project that collects data and enables the analysis of the valves behavior in a plumbing matrix, which are responsible for the movement of supplies from a food industry.

SOLUTION:

The solution embraces the installation of the ST-One® Hardware in the central PLC, to collect data from the cluster valves. Subsequently, START™ is used to classify the main variables of the matrix and, with the help of STRUCT™, these are managed and assigned to the appropriate skills. Finally, the data become available on the dashboard from the STASH™ platform, in a dynamic and intelligent way.

GENERATED VALUE:

- U$ 10 million in savings, due to the yield improvement.
- 93.7% reduction of valves in critical or unstable condition.
- More agility to identify leaks and other malfunctions.
- Monitoring and mapping of all matrix valves, allowing predictive maintenance.
- More productivity, by reducing interruptions in the production line due to errors.

“This solution was a game-changer in our operation.

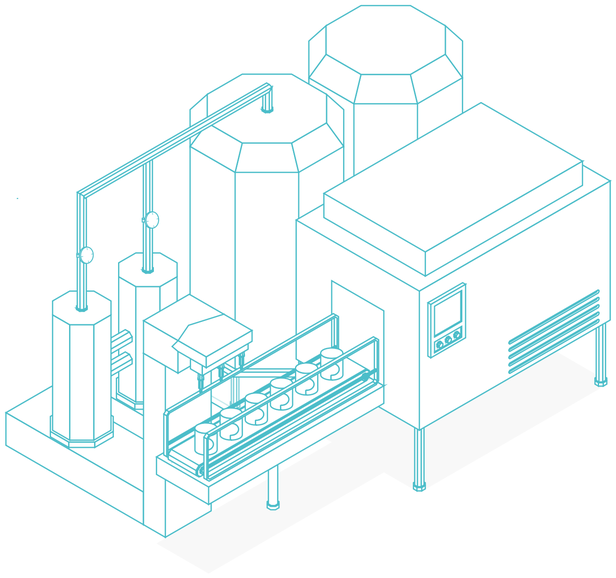
Completely plug & play, it was able to improve our process control, optimizing how we make decisions, in addition to increasing the quality and efficiency of production of the matrix in question.”

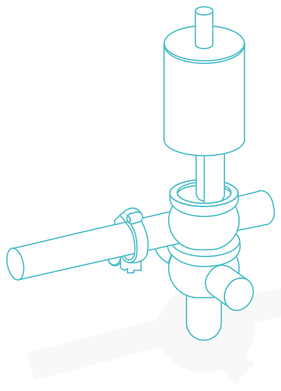
-Industrial Manager,
responsible for the Goiás factory, BR.

PART I

OVERVIEW

The client is a large multinational food industry company, which is a world reference in the field, and has three large factories in Brazil.





The intelligent use of valves in industry.

In the case, the food produced has liquid supplies in its composition. These supplies go from one tank to another, through a complex matrix of pipes. The central PLC is responsible for a command that serves as a guide for the food throughout the line, ensuring that the content arrives at the correct designated place.

These pipes are interconnected by several valves – equaling about 450 units - which direct the inputs from the storage tanks to the mixers, through their multiple intersections, within the appropriate flow rate and speed.

It is important highlight that, for the complete success of the production process, it is necessary to have a valve for each pipe combination. These valves are automatic, and this automation justifies the need for their good performance. That is because even a single mistake has the power to compromise the progress of the entire operation.

The customer's issue was mainly focused on the opening and closing process of each valve, which must occur within a specific duration and with no flaws that result in product leakage.

Among the challenges faced by the manufacturing industry was corrective maintenance, which happened almost every day. The industry’s employee had to adapt his routine, due to the frequent emergencies, having twice as work by having to go personally look and check what happened. In addition, with the high number of valves within the array, the process of identifying which one needed repair was time-consuming and problematic.

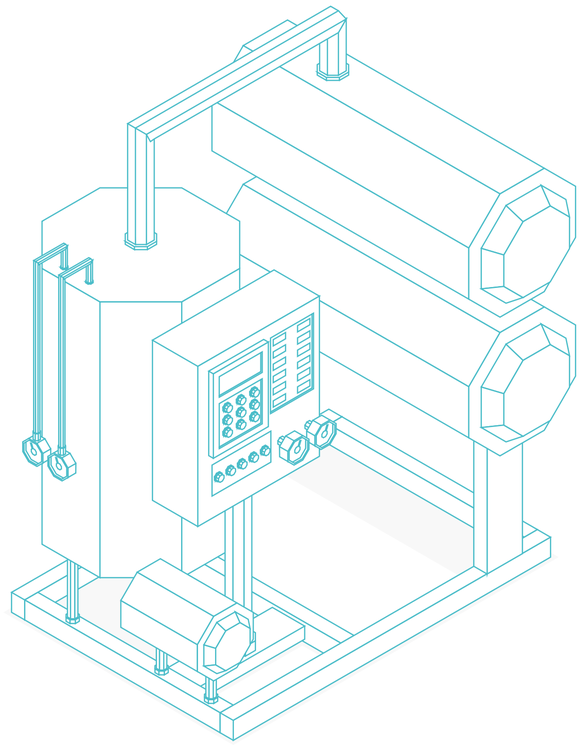
OVERVIEW

In addition, to carry out the maintenance process, it was necessary to pause the food production process. This resulted in an inefficient use of time that should have been focused on production, as well as a lower worker performance. Also, when maintenance happens only after a problem is identified, the industry must deal with damage containment, which takes up even more productive time.

The assertiveness in the opening and closing course of the valves, as well as the guarantee of their proper functioning, also deserves attention. Without this precision, there is a risk of product contamination, because the CIP (Cleaning-in-place) process occurs through the same matrix valves that the food passes through.

This equipment is responsible for monitoring the routes and the alternation between each case, and if these movements are not well performed, the quality of the food is reduced.

Finally, it was the attendance of these events that led the company to seek the ST-One® Solution, which operated using data intelligence.



PART II

ST-ONE DEPLOYMENT

After the installation of the ST-One® Hardware, on the control of the matrix valves, there is the application of START™ a labeling software, which analyzes the designs of the controllers and identifies - from an intelligent algorithm - the main variables of the matrix.

Also, with the help of the STRUCT™, the data is managed and assigned to the appropriate equipment.

With these tools, ST-One's data scientists create a complex formula that solves the industry issue, in a customized way for each situation.

Due to the type of product manufactured, the production line in question deals with liquid goods, used on a large scale (an average of 45 thousand tons of product annually) to meet the programmed demand. As seen, the transport of this supplies is done by valves, of different calibrations and positioned at strategic locations. In addition to being responsible for product transportation through the pipes, the valves are also part of the plumbing cleaning process.

The responsibility to make sure that the cleaning procedures are carried out within the recommended time and in the correct manner is of the organization. In addition to being an indispensable factor to ensure the quality of the product, it also configures the adjustment to the standards required by ANVISA (National Health Surveillance Agency), the government body responsible for the sanitary inspection of all products and services provided.

The valves used in this cluster are the mixproof type, and are widely used in the food industry. It is composed of two seals, because of the liquid material that comes into constant contact, and can be of varying density.

This valve allows the simultaneous flow of two different fluids without risk of cross-contamination.

PART II

Now, specifically about the valve structure, it has independent plug seals, which acts on the separation of liquids. The gap between the two seals forms an atmospheric leak chamber and is the perfect type to be used in sterile process applications.

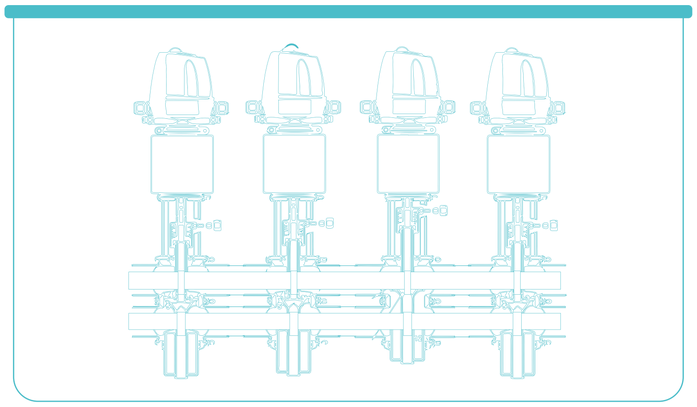


Illustration:
Mixproof Valve

In the process of implementing the ST-One® Solution, only one hardware was installed, connected to the central PLC. Thus, it was possible to map, monitor and collect data from all 450 valves of the pipeline array.

In this case, the ST-One® Solution identifies the main variables of each valve, including the opening and closing time of each equipment, and the correlation between them. This allows the user to identify a possible malfunction in advance. The time used as a parameter may vary, but on average, the right duration is 5 seconds.

If any piece of equipment exceeds this, an alert is triggered, also programmed by the Solution. Based this data, it is possible to identify instabilities, and perform preventive maintenance.

The duration of valve movement can also be differed according to some aspects, such as the viscosity of the material, pressure and temperature. These elements are decisive in predicting the average duration of the type of valve in question.

Still, within the Solution, the managed data is processed following an intelligent visualization mode, which is made available in a dynamic dashboard on the STASH Platform™. This is achieved through the combination of an intelligent algorithm and data scientists, to facilitate understanding and assist in quick decision-making.

In this case, two types of dashboards were presented, one of them with the overview of the matrix, covering all valves, and the other with a specified point of view, dealing with each valve in its unit.

With the implementation of the ST-One® Solution, the manufacturing industry had access to the data 1 week after the installation and start of the analyses, and has already enjoyed the benefits of having an industry integrated with data intelligence.

PART III

VALUE DELIVERED

Using Data Science, the client was able to analyze and map the opening and closing time of valves in the piping matrix connection.

DIRECT ACTION ON EQUIPMENTS WITH LOW PERFORMANCE

PREDICTIVE MAINTENANCE AND TIME SAVING

US$10M
SAVINGS BY REDUCING WASTE EXTRACT IN PRODUCTION.

93,7%
REDUCTION IN VALVE INSTABILITY, GENERATING INCREASED QUALITY.

From the use of the ST-One® Solution in the industry, the manufacturing industry was able to monitor, study, analyze and map - through the data available on the STASH™ platform dashboard - the opening and closing time of the valves that act in the connection of the pipe matrix, where the liquid supplies for the food production pass.

Thus, it was possible to act directly where the problem was, avoiding the physical effort of the maintenance supervisor who had to frequently search for which valve were not fitting the standards. With the implementation of the data culture, it is possible to provide a better quality of life for the maintenance team, with an improvement in the work environment, by making it more automated.

In addition, the use of data science results in fewer interruptions in the production process, since predictive maintenance can be performed.

In other words, it is possible to predict when the valve will fail. This allows for the anticipation and planning of maintenance, making the process faster. At the plant in question, this resulted in savings of $10 million by reducing extract loss, driven by reduction and prevention of failures.

Finally, there was an increase in the product quality, due to greater stability in the production process. In this case, the percentage reduction of valves in critical or unstable state was 93.7%. This quality scenario is intensified when considering that, within the plumbing matrix, the cleaning and food production processes are carried out by the same routes, passing through the same valves. By monitoring and ensuring this proper functioning, it was possible to avoid food contamination and meet the standards required by quality control agencies.

CASE STUDY

ST-One

ST-One was founded with the purpose of transforming the industry to a new leap of productivity.

> The science developed by ST-One is improved with each new challenge, and makes it possible for digitalization, present in different types of industry, to reach the next stage of connectivity and intelligence.

The intelligent use of valves in industry.

UNLOCK**RESULTS**