



# Cold storage environmental control

REFERENCE  
2022

## INTRODUCTION

South Africa has a thriving citrus fruit market as the conditions are ideal for the growing of these fruits. The citrus export business in South Africa is quite a large industry and these products are typically exported to China, Japan, Korea, India, Mauritius, and many others across the globe.

Strict sterilization procedures need to be followed in order to provide a high quality product. Temperatures are a core part of this business, and the Teknik Industries tasked with the **full control and monitor** of all cold rooms based on FPT (Fresh Produce Terminal) facility, located in South Africa.



## ABOUT THE PROJECT

The project entailed the control of 72 double stack cold rooms and an additional 9 chambers, each chamber being approximately the size of 40 double stack tunnels. Danfoss controllers were deployed with propriety control and monitoring systems which were no longer supported or maintained. With mySCADA's large number of communication options, they were able to **easily interface with the devices and provide the control** and monitoring of these controllers. The facility is now running on standard MODBUS TCP communications which are widely available in industrial control systems. In order to accurately monitor fruit temperatures, Schneider and Honeywell chart recorders were deployed and connected to the myPRO server to gather calibrated and accurate fruit temperature data.

## Technical details

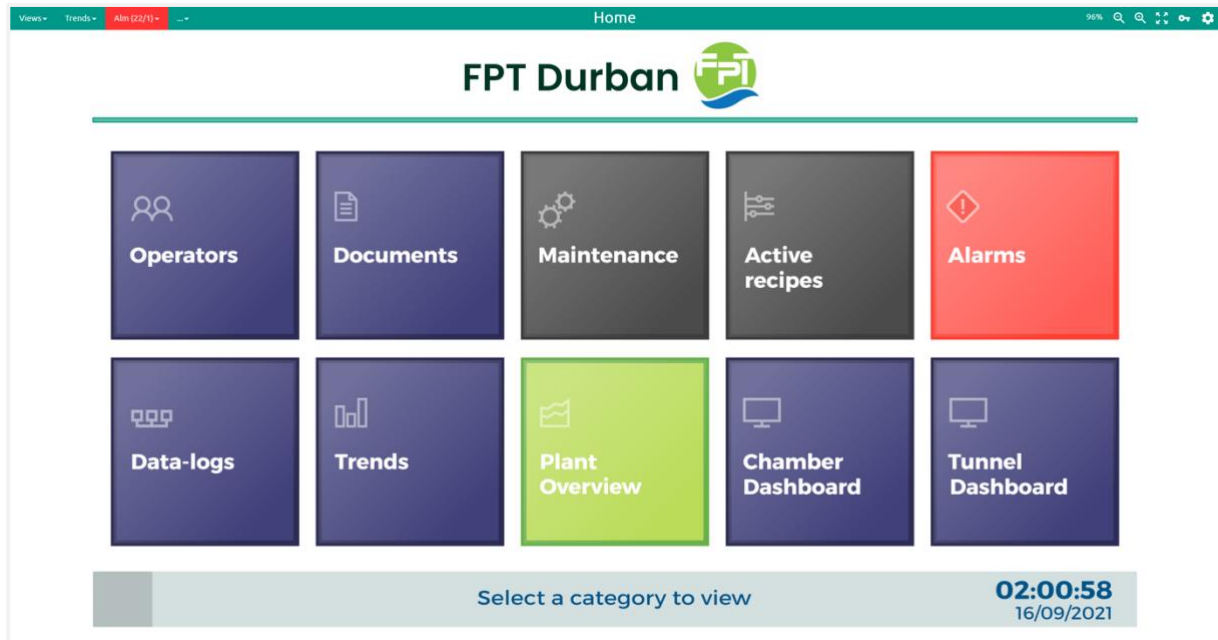
In total, over 1500 points of data are being logged, monitored and controlled, 24/7 by more than two dozen operators simultaneously. Currently, there are 6 PLC's, 20 data-recorders, 3 HMI's, 72 tunnel controllers and 27 chamber controllers, all networked using MODBUS TCP as the chosen communication protocol. The myPRO service is being run on a 12-core Dell Xeon server with 32GB of RAM and 1TB SSD, using Windows Server 2020 as the operating system.

## PROJECT - VISUALIZATION

Using myDESIGNER ENTERPRISE, they were able to quickly **design and program an intuitive user interface** to allow smooth transition from the previously outdated system to a more modern system.

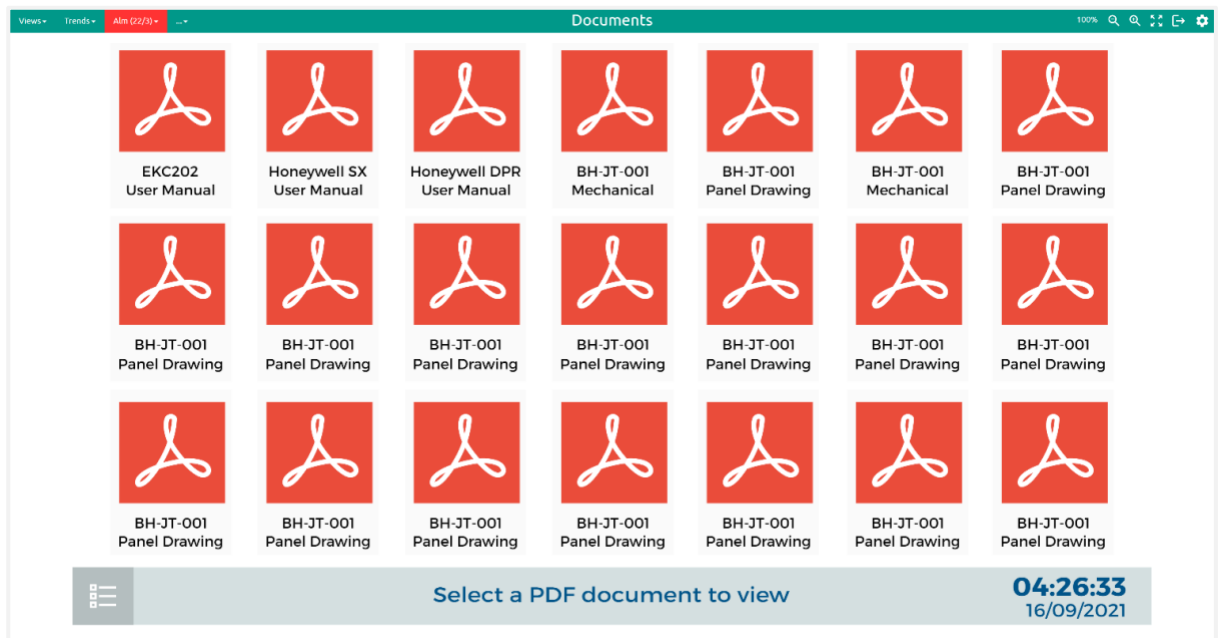
The main screens of the system is listed below:

**Main dashboard** – Provides a single point of navigation to the various other screens and functions of the system.



Picture 1 - Dashboard Overview

**Documents screen** – Allows maintenance teams to have digital documentation and manual on hand at all times. It is an important part of paperless maintenance in modern industrial automation.

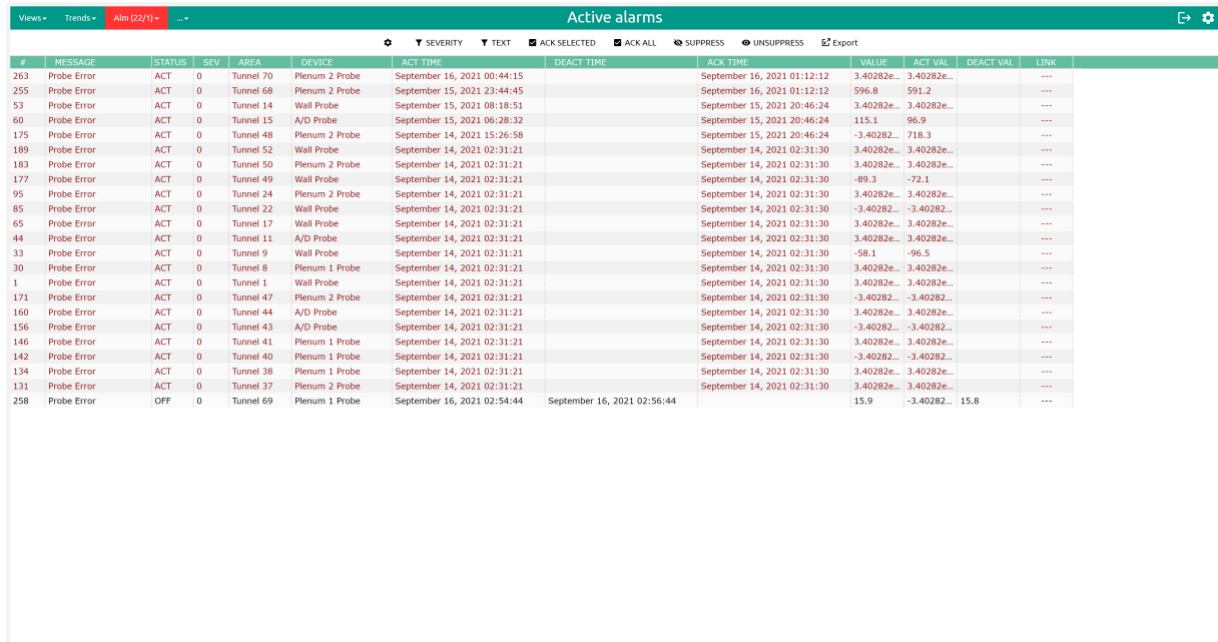


Picture 2 – Documentation Menu

**Online alarms** – The alarms menu item shows a table of currently active alarms. The message column provides information about what type of problem exists. In the image below, we can see a **number of probe error alarms** along with their status (ACT, OFF etc.), **their severity** (higher number correlates to a more critical alarm condition), the area (tunnel/chamber), which the device has been affected and



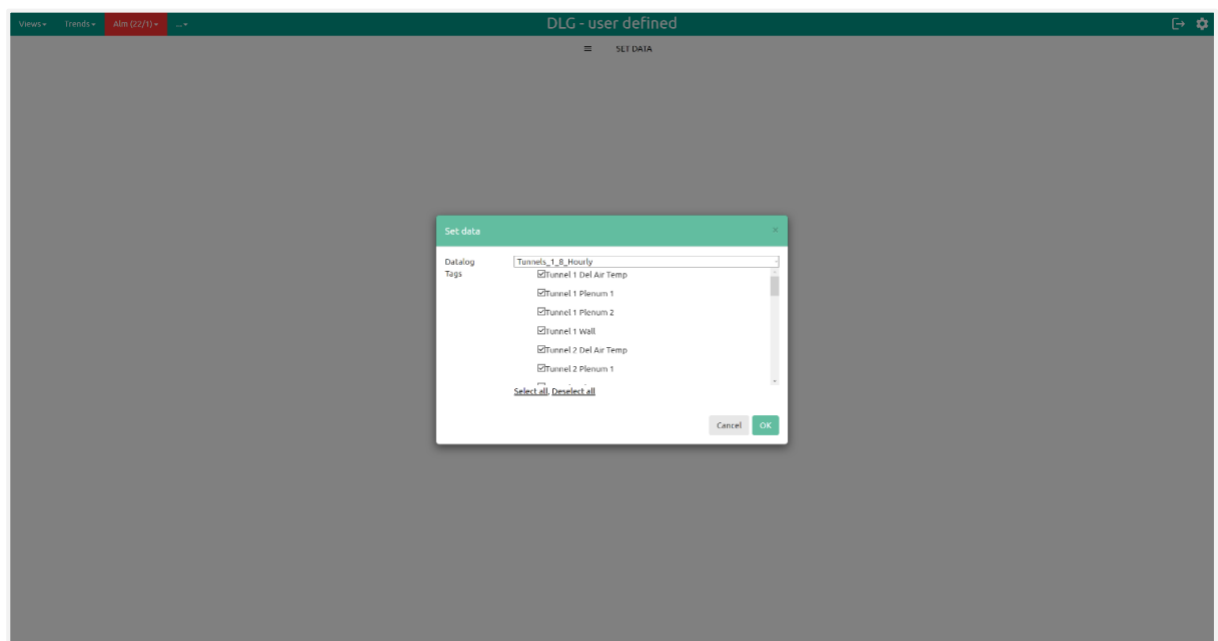
the **activation time and deactivation time** and the acknowledgement time. Activation time is the time the alarm was detected, and deactivation time is the time the alarm was rectified. By acknowledging an alarm, an operator can clear the alarm which states that the alarm has been seen and recourse has/is being taken. If an alarm is acknowledged, the operator details will be captured automatically as per their login details mentioned in the operators and login section above.



#	MESSAGE	STATUS	SEV	AREA	DEVICE	ACT TIME	DEACT TIME	ACK TIME	VALUE	ACT VAL	DEACT VAL	LINK
263	Probe Error	ACT	0	Tunnel 70	Plenum 2 Probe	September 16, 2021 00:44:15		September 16, 2021 01:12:12	3.40282e...	3.40282e...		---
255	Probe Error	ACT	0	Tunnel 68	Plenum 2 Probe	September 15, 2021 23:44:45		September 16, 2021 01:12:12	596.8	591.2		---
53	Probe Error	ACT	0	Tunnel 14	Wall Probe	September 15, 2021 08:18:51		September 15, 2021 20:46:24	3.40282e...	3.40282e...		---
60	Probe Error	ACT	0	Tunnel 15	A/D Probe	September 15, 2021 06:28:32		September 15, 2021 20:46:24	115.1	96.9		---
175	Probe Error	ACT	0	Tunnel 48	Plenum 2 Probe	September 14, 2021 15:26:58		September 15, 2021 20:46:24	-3.40282e...	718.3		---
189	Probe Error	ACT	0	Tunnel 52	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
183	Probe Error	ACT	0	Tunnel 50	Plenum 2 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
177	Probe Error	ACT	0	Tunnel 49	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-89.3	-72.1		---
95	Probe Error	ACT	0	Tunnel 24	Plenum 2 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
85	Probe Error	ACT	0	Tunnel 22	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-3.40282e...	-3.40282e...		---
65	Probe Error	ACT	0	Tunnel 17	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
44	Probe Error	ACT	0	Tunnel 11	A/D Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
33	Probe Error	ACT	0	Tunnel 9	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-58.1	-96.5		---
30	Probe Error	ACT	0	Tunnel 8	Plenum 1 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
1	Probe Error	ACT	0	Tunnel 1	Wall Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
171	Probe Error	ACT	0	Tunnel 47	Plenum 2 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-3.40282e...	-3.40282e...		---
160	Probe Error	ACT	0	Tunnel 44	A/D Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
156	Probe Error	ACT	0	Tunnel 43	A/D Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-3.40282e...	-3.40282e...		---
146	Probe Error	ACT	0	Tunnel 41	Plenum 1 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
142	Probe Error	ACT	0	Tunnel 40	Plenum 1 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	-3.40282e...	-3.40282e...		---
134	Probe Error	ACT	0	Tunnel 38	Plenum 1 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
131	Probe Error	ACT	0	Tunnel 37	Plenum 2 Probe	September 14, 2021 02:31:21		September 14, 2021 02:31:30	3.40282e...	3.40282e...		---
258	Probe Error	OFF	0	Tunnel 69	Plenum 1 Probe	September 16, 2021 02:54:44	September 16, 2021 02:56:44		15.9	-3.40282e...	15.8	---

Picture 3 – Active Alarm Table

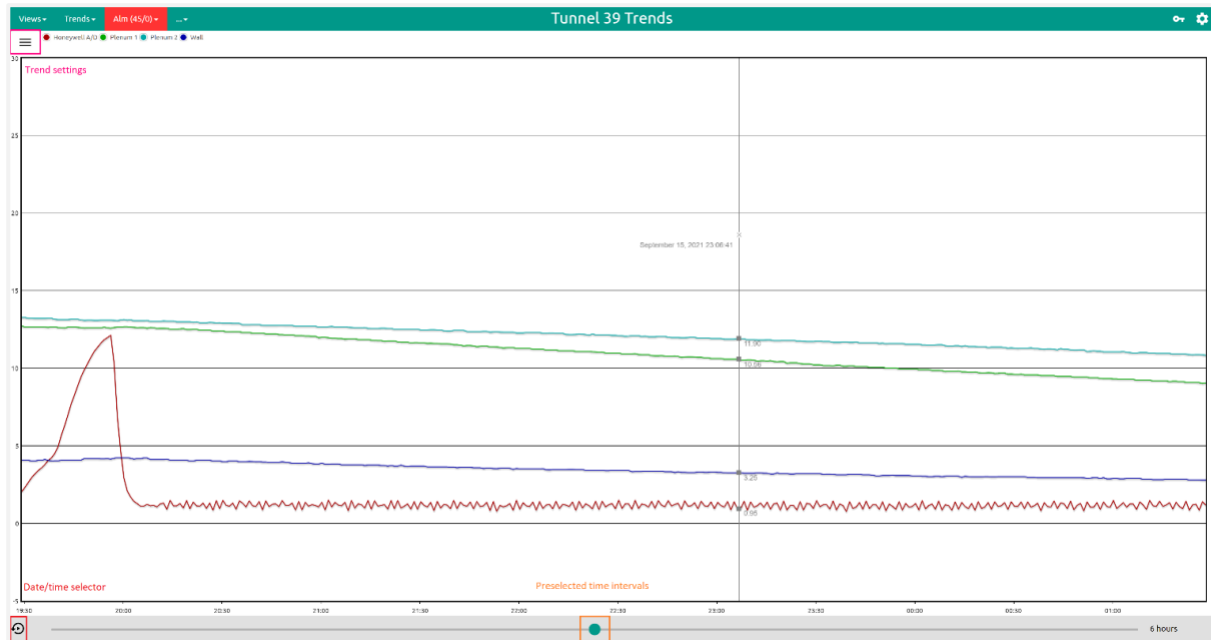
**Data-logs table** – The data-logs menu allows an operator to view a tabular format of the historical temperature logs. By clicking this menu, a pop-up windows appears. The pop-up window allows an operator to select a tunnel/chamber to view by simply clicking the drop down box. A list of all temperature probe points will appear and can be selected individually to include or exclude a specific probe.



Picture 4 – Data-log Selection Screen

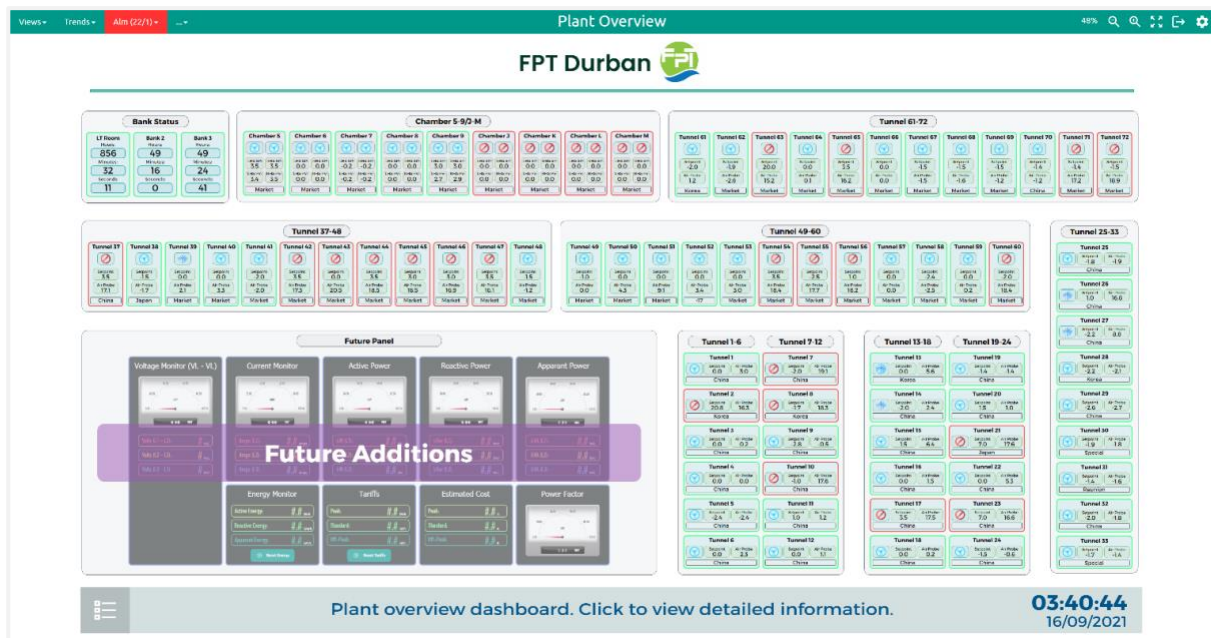
**Trends selection screen** – Allows an operator a full screen view of trends/charts. The trends/graphs can be accessed using the trends menu block located on the dashboard or through the menu bar on the top of the screen (use dashboard to manage data-logs as well).

Using the top menu bar, the operator may view trends for each tunnel/chamber. These trends are updated every minute and provide a live view of pens in a graphical format. The trends also provide historical data.

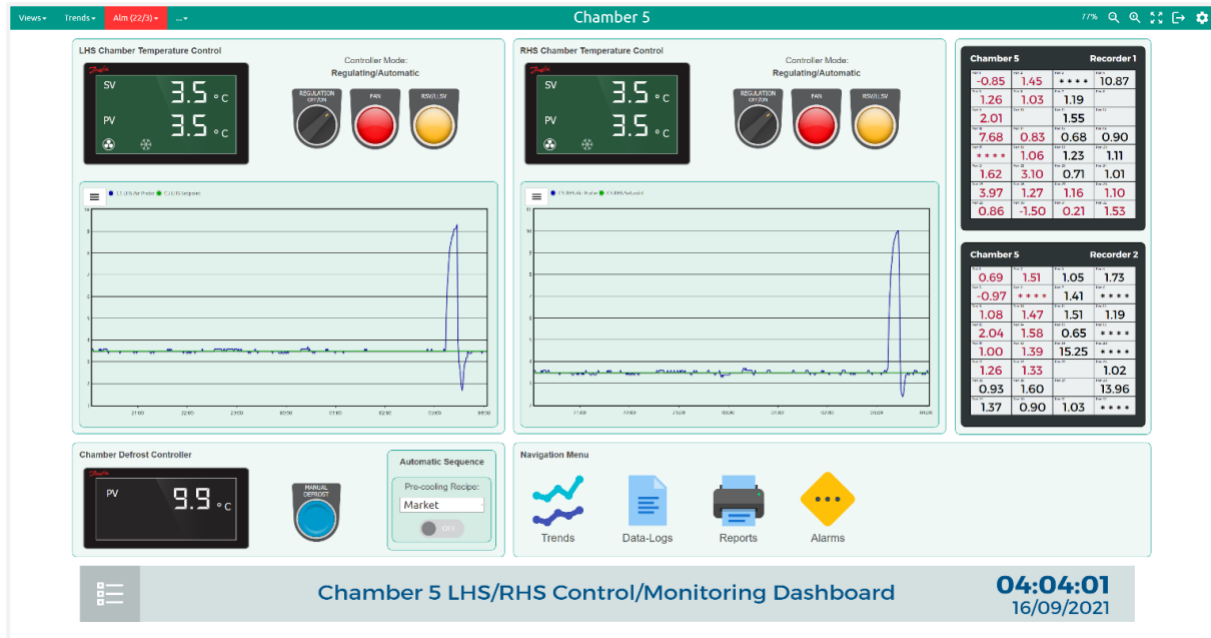


Picture 5 – Trend View Screen With Vertical Measure

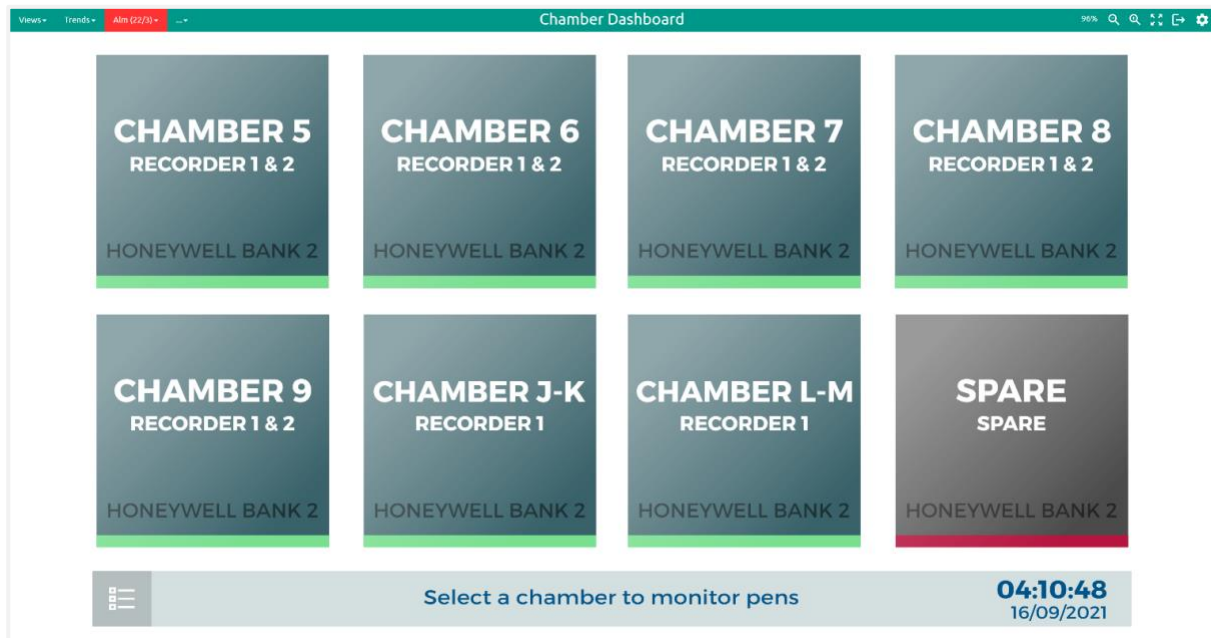
**Plant overview** – The main screen which allows operators to quickly view all operations of the factory on a single screen. Detailed views can be seen by clicking the respective tunnel/chamber. This allows full control of the respective tunnel/chamber.



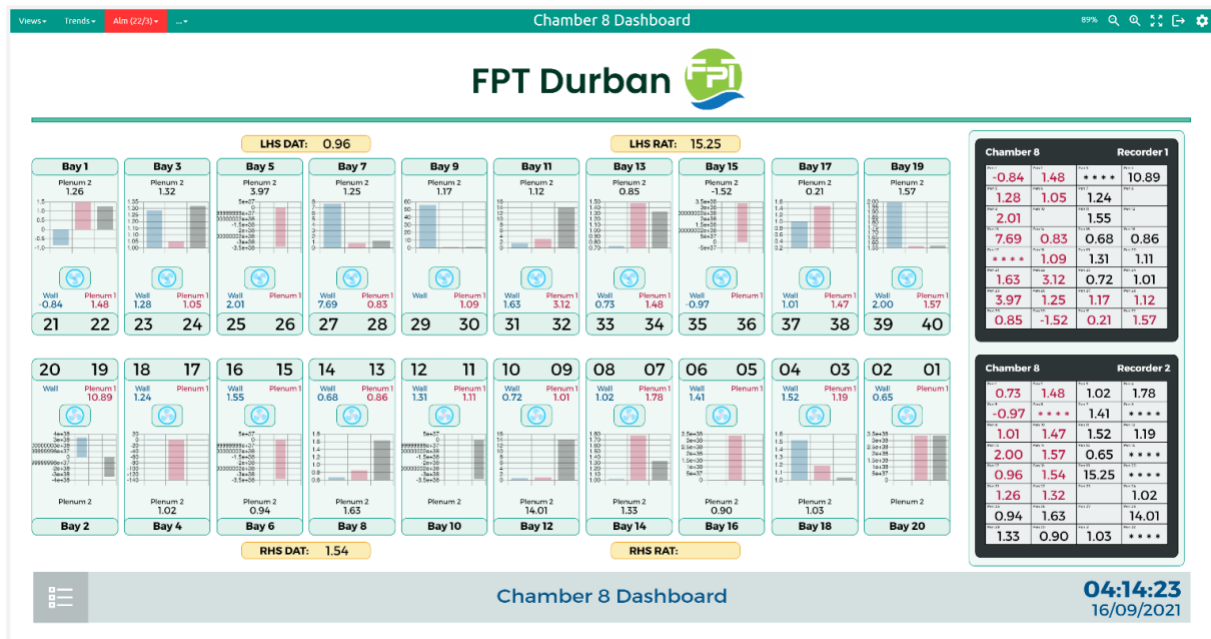
Picture 6 – Plant Overview Of All Tunnels/Chambers



Picture 7 – Detailed View Of Chamber



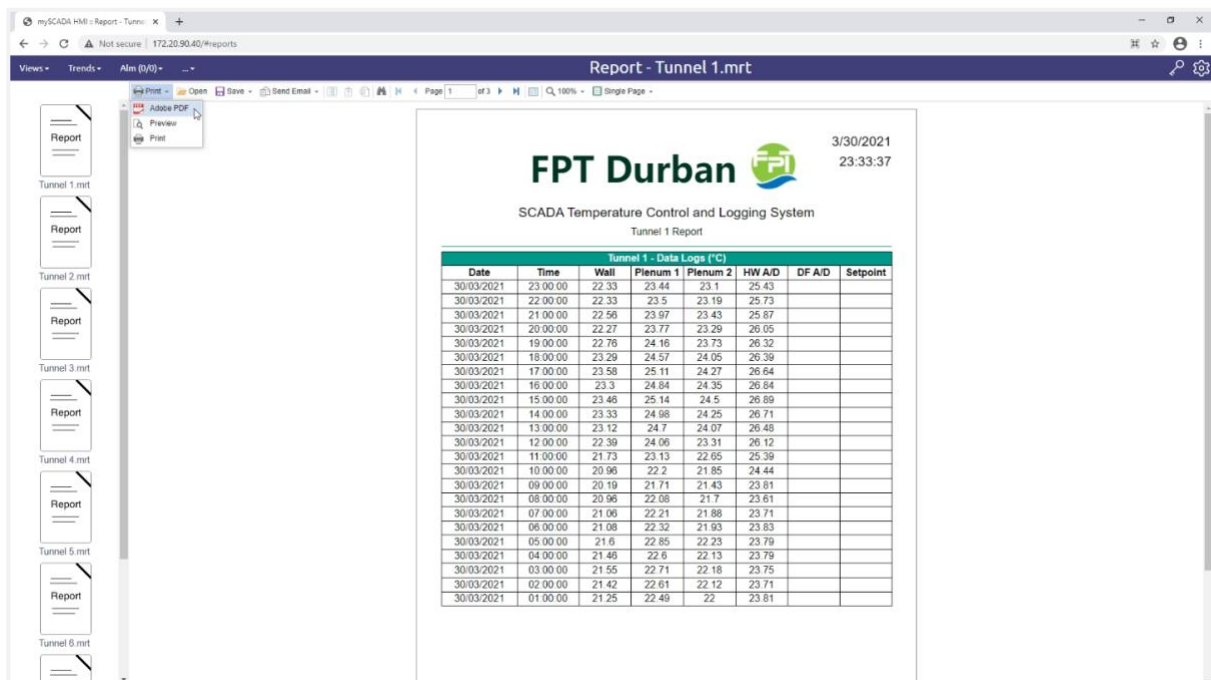
Picture 8 – Chamber Selection Screen



Picture 9 – Chamber 8 (detailed)

**Reports** - Formal reports are also available for download. These reports are accessible similarly to regular data-logs and trends. The operator can scroll and select the appropriate report as required.

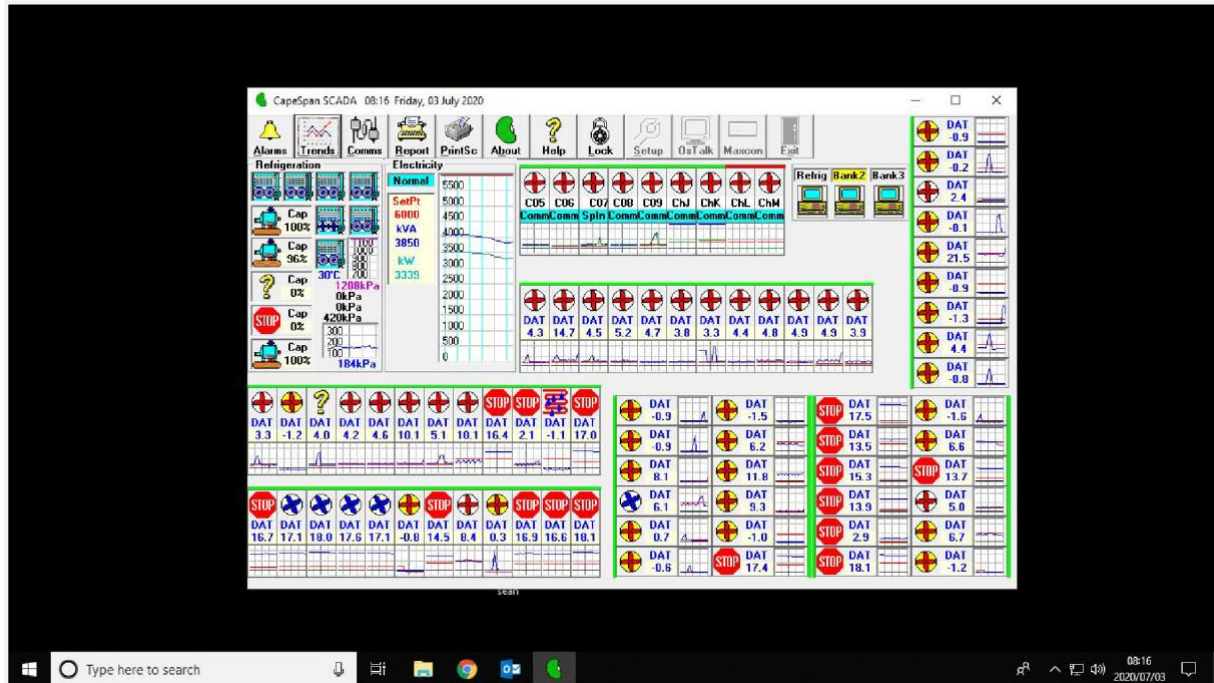
Once the report has been loaded, the operator can perform a variety of functions using the toolbar on the top of the report. Some functions include viewing other pages, zooming in/out, saving the report, and printing the report. These reports are suitable for audits and the final page includes a graph of all pens over the specified time-range.



Picture 10 – Report (ready to export)

## The implementation

To fully realise the project, it required 6 months of continuous work which includes many on-site tasks such as running cables, setting up PLC's, changing controllers/hardware etc. With myPRO and myDESIGNER ENTERPRISE, the software tasks were easily managed with many complex tasks, graphics and animations being possible to use easily thanks to the offered tools. A significant different in project quality can be seen when comparing the old system (Picture 11) with the new system running on mySCADA.



Picture 11 – Old system Used Before



## ADDED VALUE

mySCADA has offered us a brilliant solution with dozens of different communication options that can interface with any industrial communication standard. The ease of **implementing huge projects can be done more efficiently and faster** due to the drag and drop creation tools. The **advanced graphics** and SVG based standards allow for clear and easy understanding of factory systems with no training or background knowledge for operators.

*“Technical support is always helpful and provides quick responses to any problem encountered. Fixes and updates are released frequently which continuously improve functions and performance”*

said Mayur Singh -Embedded System Engineer.

FPT has made it clear that they appreciate the once-off cost of the system and allows them to own the product while also being open, easy to work with and easily accessible from any device with a web browser.

## CONCLUSION AND FUTURE COOPERATION

FPT is very satisfied with mySCADA visualization system. It brings a complex overview of the tunnels and chambers and the system allows to see and evaluate all logged data.

Further additions are in the works which include all factory power monitoring systems, water flow and usage, lighting control, underground diesel tank monitoring and suction/evaporator fan control, adding an estimated 750 IO points. They are also approaching a variety of cold storage facilities within Durban, South Africa, to hopefully bring mySCADA into their production environment. The next planned project is in Zimbali Coastal Estate Heritage Site, where 18 energy meters are being installed to allow for the sub-billing of tenants. Monthly reports will be generated and automatically sent to tenants for rental payments.



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