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ROYCE Mining Telemetry

"All the Data, All the time"

Pempek Telemetry Systems installed for more than 10 years on multiple sites globally!

The ROYCE system is installed and functioning on notable sites such as Kriel Colliery, Kestrel Coal Mine, Matla Coal and many others.

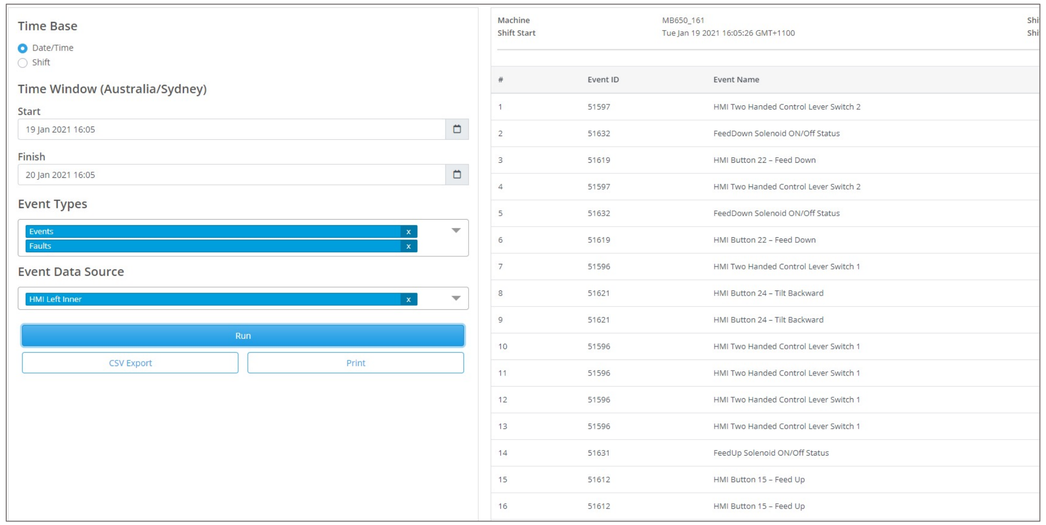
ROYCE is the current development of the proven Elliot reporting system, which has been a functioning and stable system for over ten years. The ROYCE system integrates the consistency and functions of the legacy Elliot system, while bringing forward the addition of new exciting technologies and developments to the fingertips of the user.

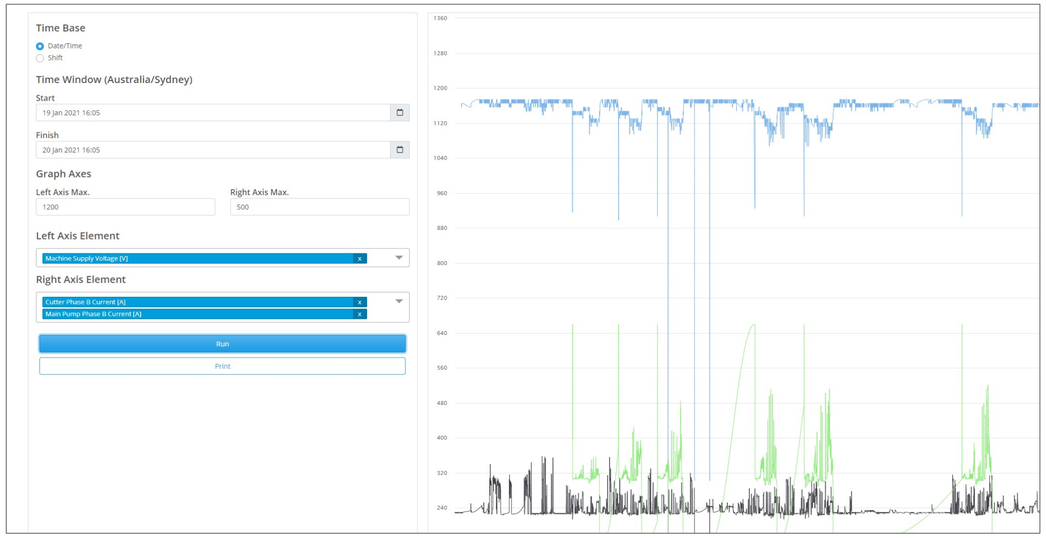
KESTREL COAL RESOURCES

exxaro POWERING POSSIBILITY

ROYCE Feature Summary

- Live Dashboard
- Historical Database
- Multitude of reports
- User Configured report generator & data trending
- Mine specific KPI's and feedback
- Fault reporting and troubleshooting functionality
- Data Export functionality
- Automated email service
- User permission control
- Device and Machine connectivity diagnostics
- Site Status feedback
- Data Buffering and Recovery from machine
- Section Overview display.





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Live, reliable, future proofed, user driven reporting, available anywhere.

Mining Telemetry

- **Collects live data** from a range of machines (CM, BM, SC, Bolters, Conveyrs)
- **Presents the data live across a range of devices in a range of formats**
- Protects from network dropouts, no loss of data!
- A VAST RANGE of standard and user driven report generators
- Visually clear and intuitive, with simple navigation and control mechanics
- Web browser interface to support PC, Laptop, Tablet, Smartphone
- Permission levels to present appropriate range of data with query tools
- Future proofed to support future changes in hardware & operating systems.
- **IS optimised for existing Pempek Ecosystem & Nautitech modems.**

Live Telemetry

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Live Telemetry

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Live Telemetry

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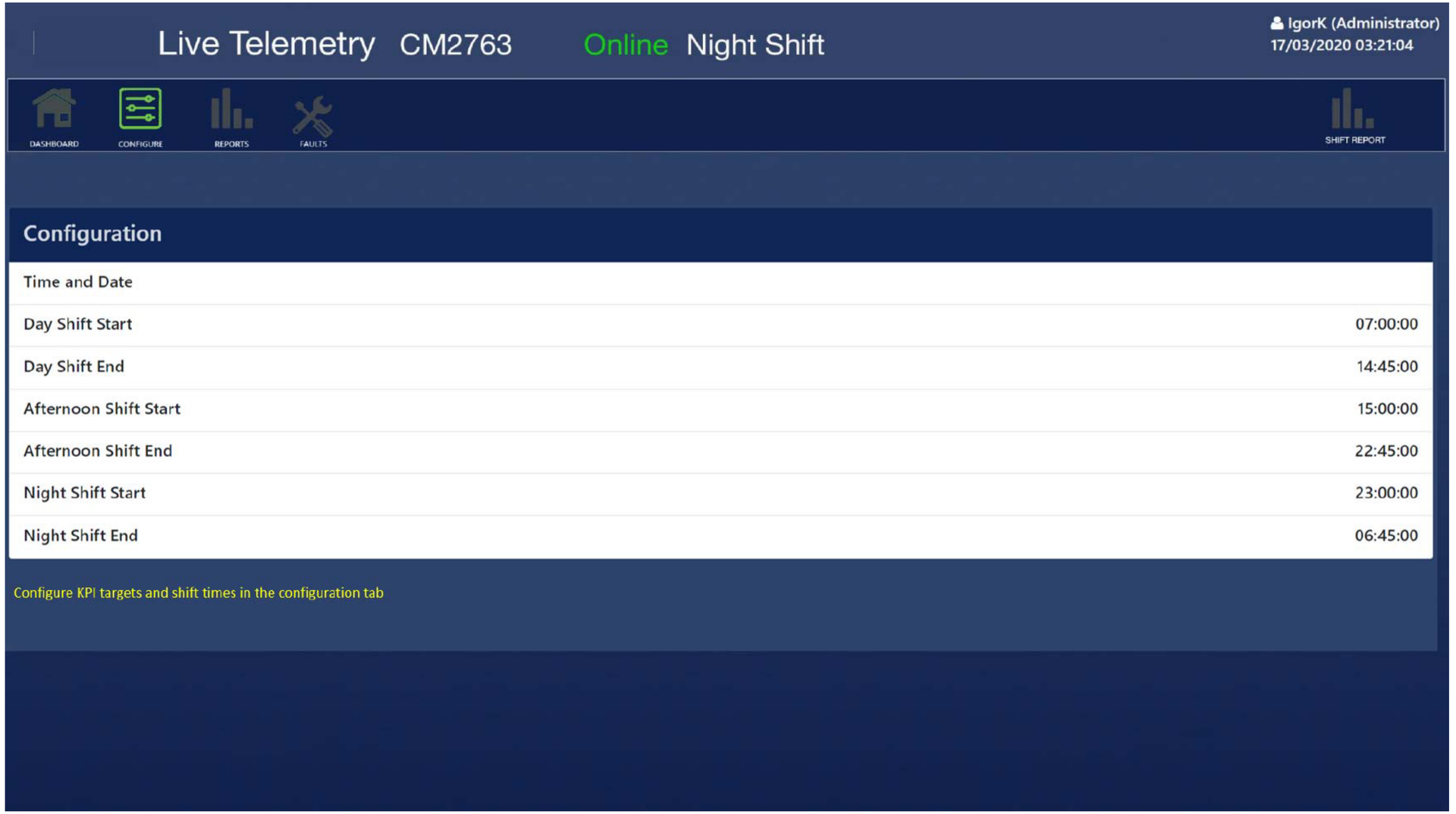
Live Telemetry



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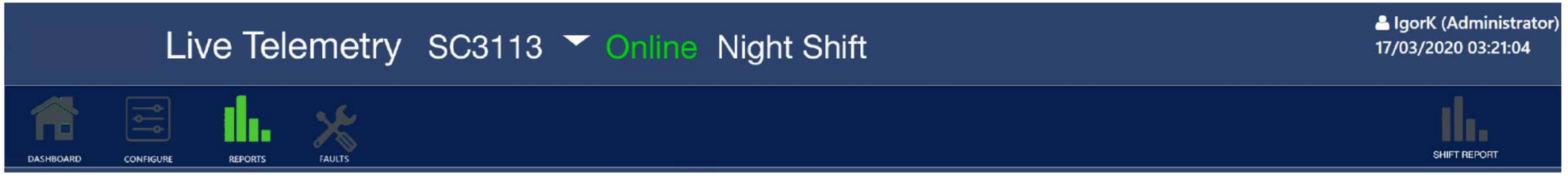
Live Telemetry



Provides a vast range of in-depth configurable reports

ROYCE Provide a vast range of configurable reports.

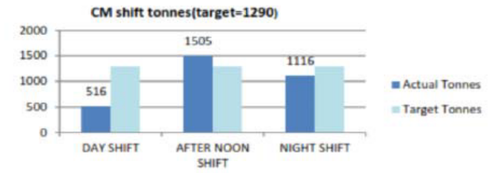
The generation of high-quality production reports make it easy to estimate a shift outputs, makeshift comparisons and improve business process. Set your commission goals and validate their completion using these reports.

- Provides intuitive platform which users can configure including:
- Troubleshoot issues with a machine fault report
- Generate custom graphs based on selected data
- Generate historic production graphs based on the period of your choosing,
- Query all events that occurred in a machine over a specific period,
- And a number of other useful applications.

Mine:
Section: 18
Machine ID: 25
Machine no: CM004

	Ave Estimate meters per shift	Ave Estimate tonnes per shift	Ave Cutting time per shift	Ave Cutting tempo per shift	Ave Production tempo per shift	Ave late 1st Coal	Ave early last Coal	Ave late machine powered	Ave early machine shutdown
ACTUAL	25.92	1116	136	8.2tpm	4.26tpm	00:04:50	0:00:36	00:06:29	0:00:00
TARGET	30	1290	144	9.00	6.00	00:00:00	0:00:00	00:00:00	0:00:00

	Ave SC Loads per shift	Ave SC away time per shift	Ave SC load time per shift	Ave system Availability per shift	Ave system Utilisation per shift	Total daily tonnes
ACTUAL	72	88sec	129sec	?	?	3137
TARGET	83	90sec	80sec	?	?	3870



	Fault	Duration	Count
1	Traction Cont supply below limit	100milliseconds	2
2	Machine powered up	15seconds	1
3	Left Drive: Mains supply under voltage	12seconds, 100milliseconds	6
4	Left Drive: Lost phase lock on mains supply	2seconds, 200milliseconds	5
5	Right Drive: Mains supply under voltage	100milliseconds	2
6	Right Drive: Lost phase lock on mains supply	250milliseconds	5
	Total	29seconds, 750milliseconds	21

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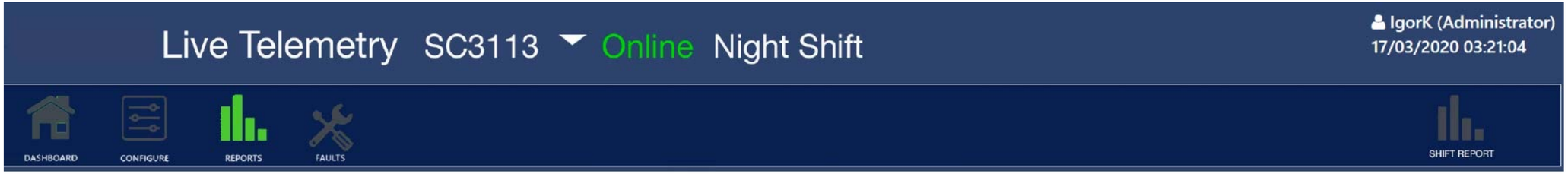
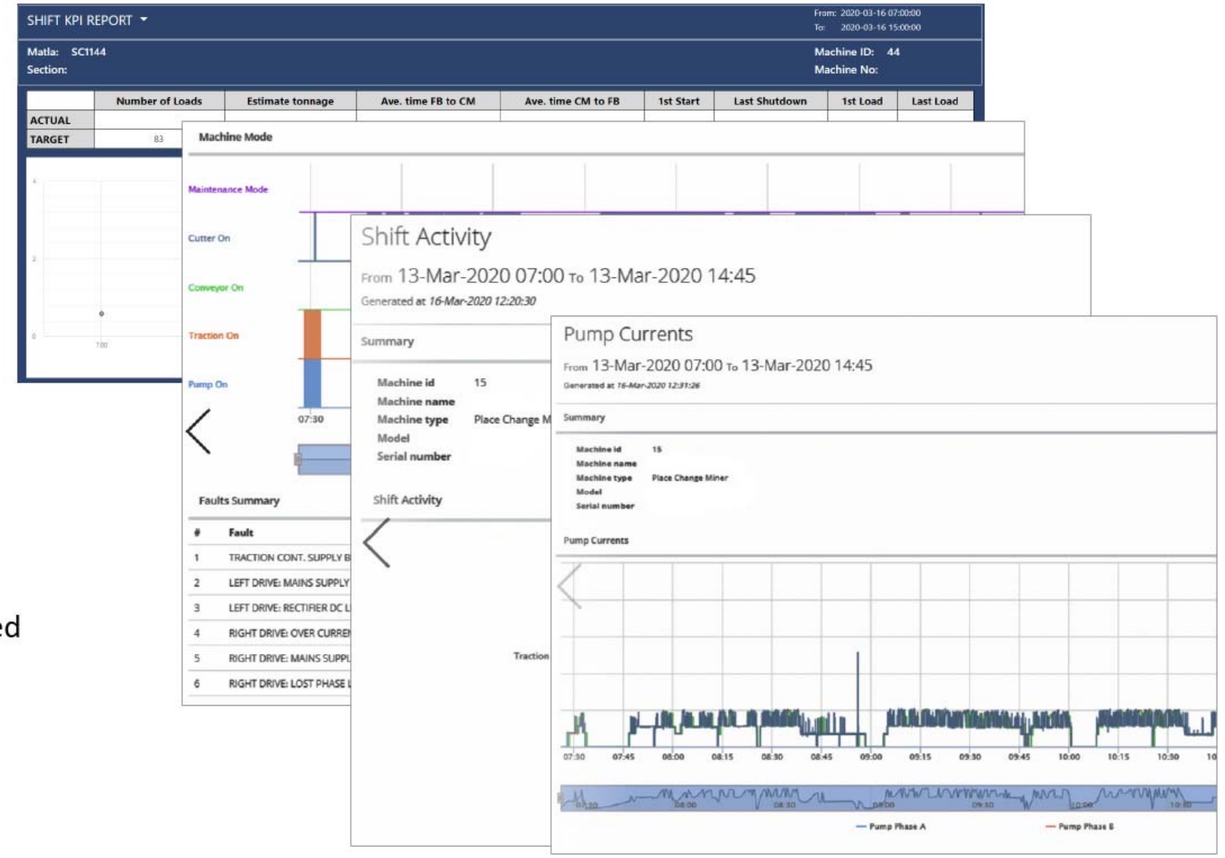
Live Telemetry



A VAST range of preconfigured reports

- Activity - Shows machine activity
- Production - Shows estimated coal output and info
- Event - Highlights notable machine events
- Fault - Details on last 20 active faults
- Cycle Time - Graphical break down of cutting cycle
- User Configured - User selects elements to be graphed
- Custom - Custom report request to be added to app



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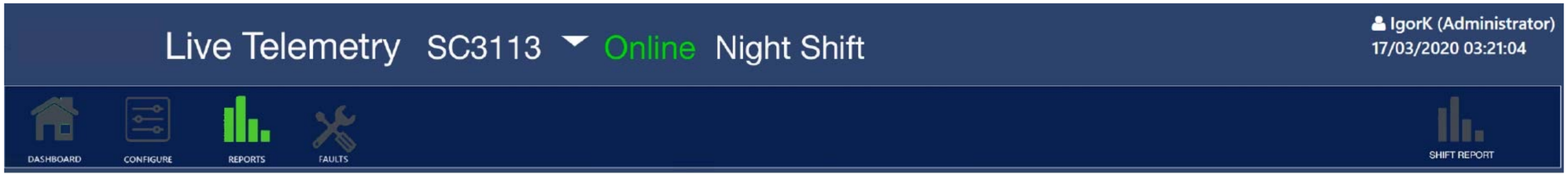
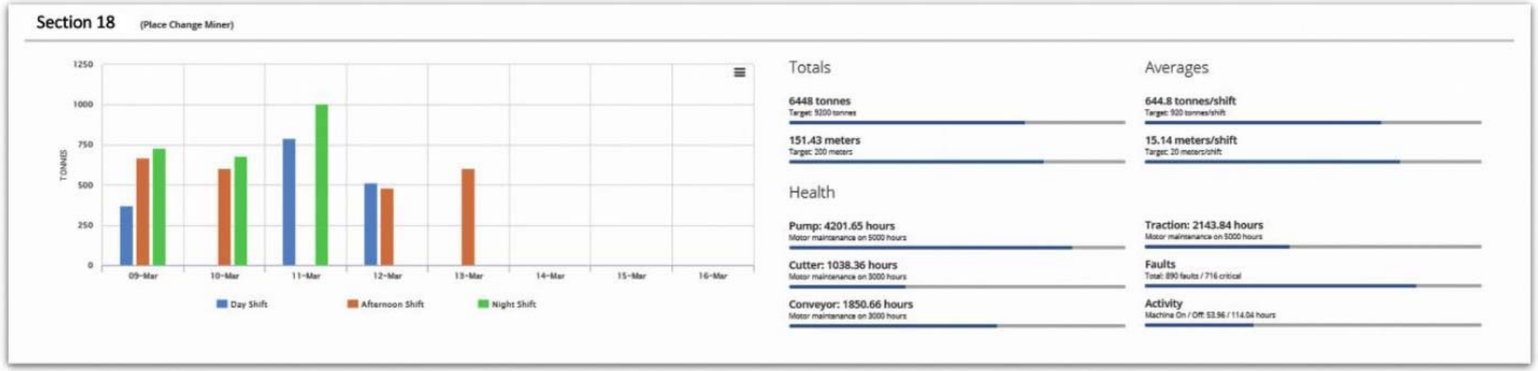
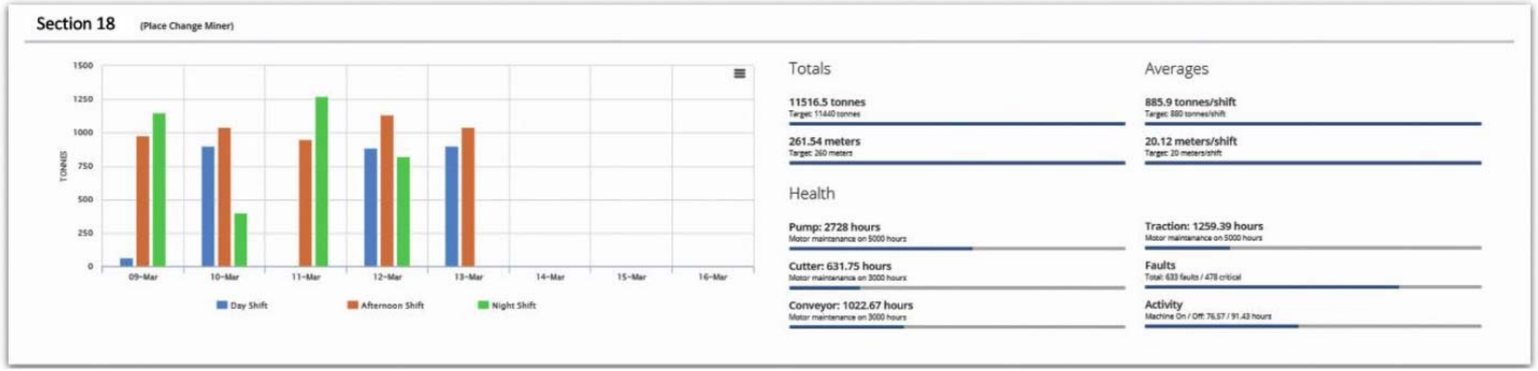
Highly detailed graphical outputs

Compare prior periods







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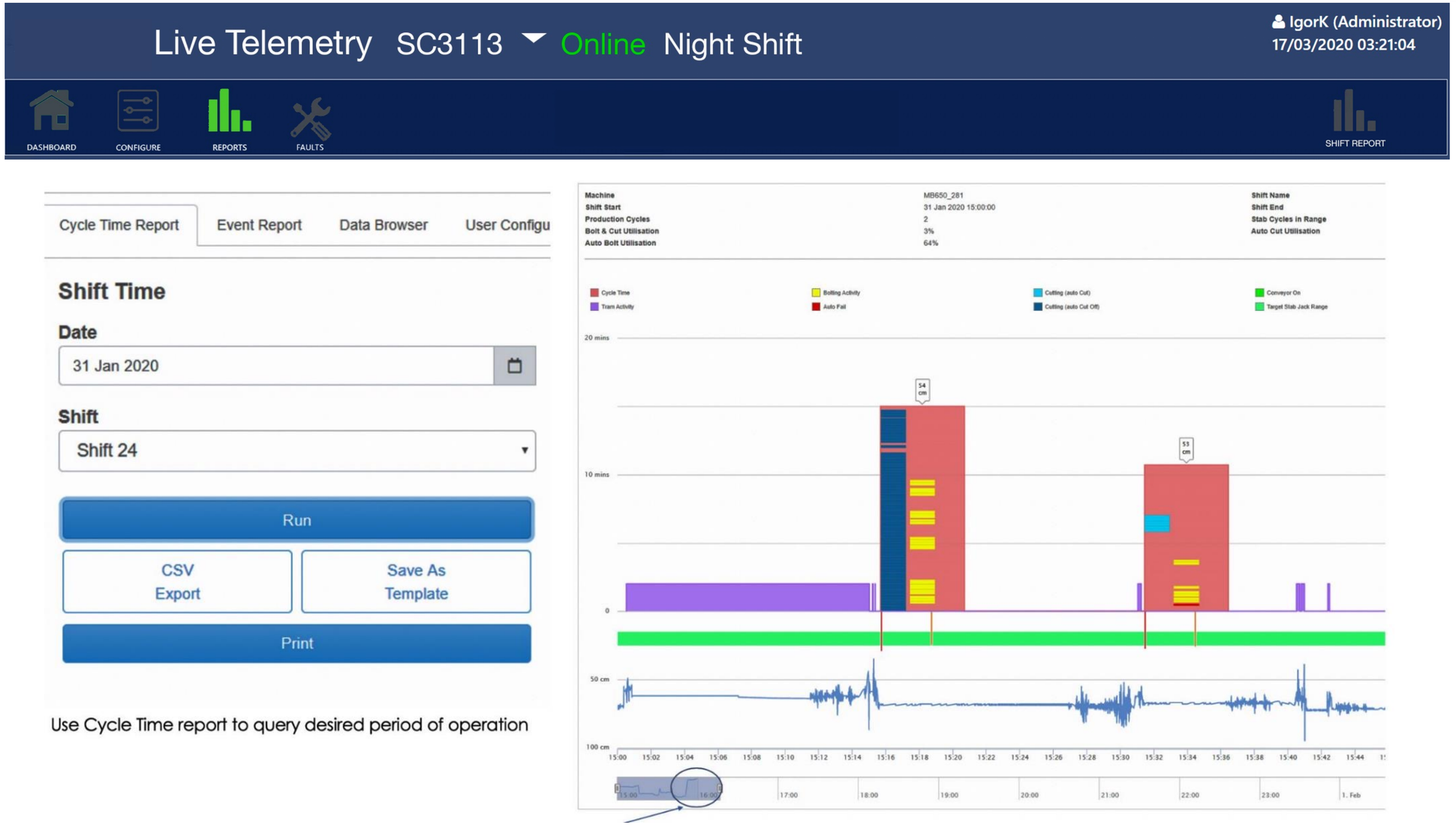
User analytics process example



Zoom functionality

Zoom into area of concern on the graph within your queried period

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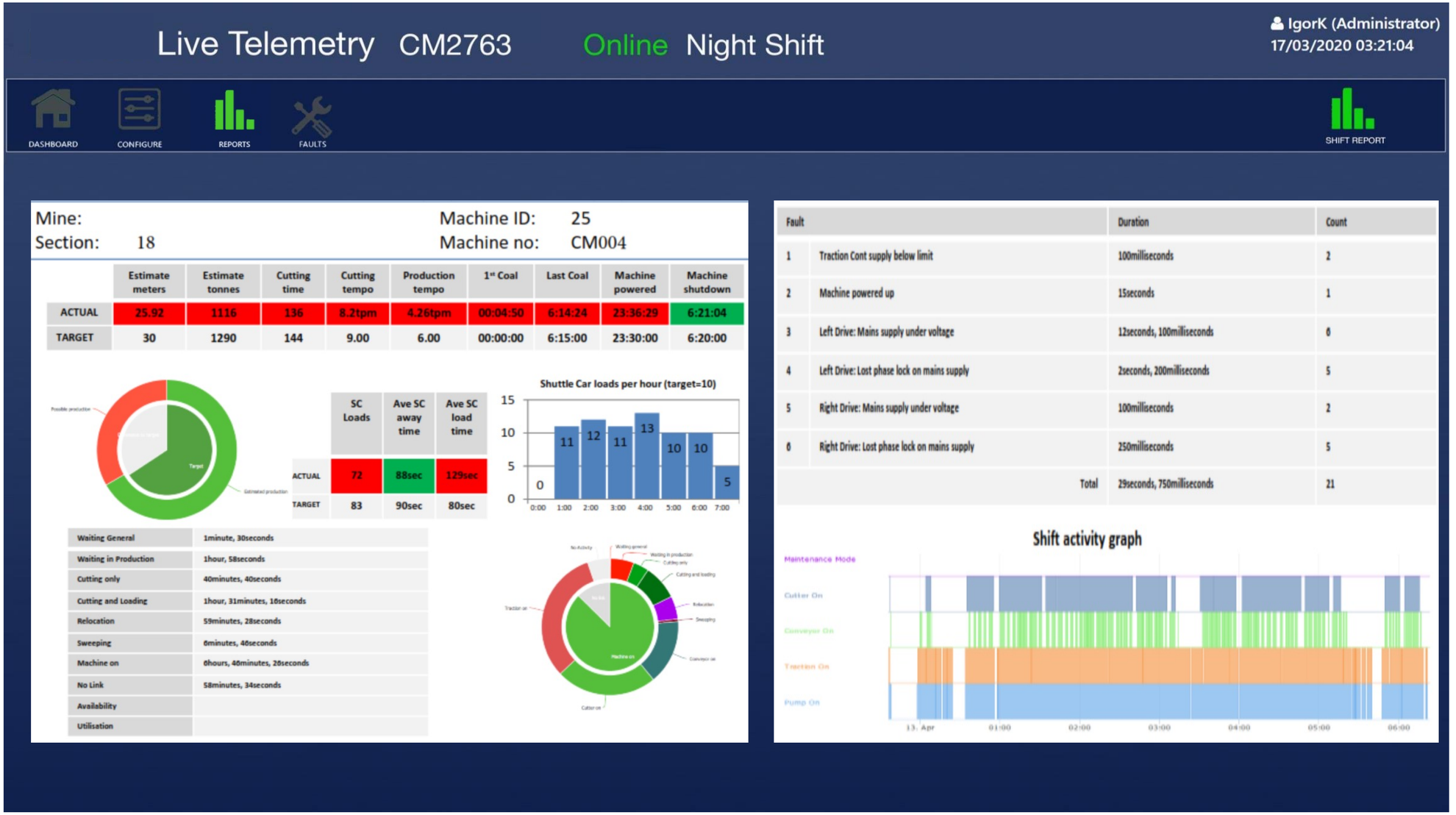
A typical shift summary that can be reconfigured by the user with different reports for different user types



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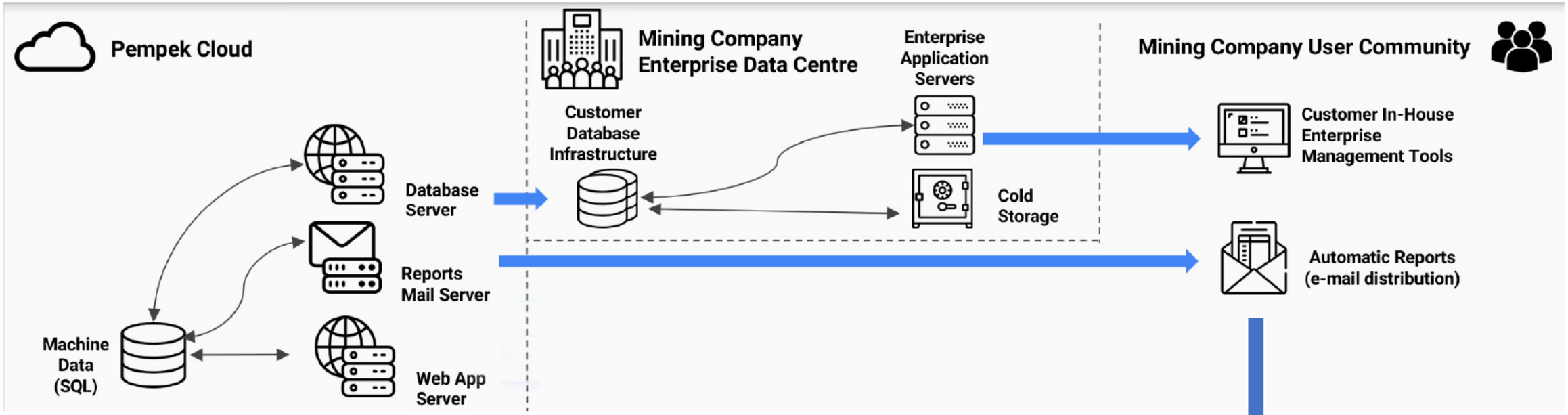
Live data displayed on any device!

Mining Telemetry



SEE YOUR LIVE DATE AND REPORTS ON ANY OF THESE DEVICES

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An abundance of additional features

Mining Telemetry

- CSV and JASON data export: for movement into excel tables or other desired use case
- User Account Control: designate who gets access to Application, and what level of control they have
- SMTP report email service: have reports automatically emailed out to a desired recipient list
- Can be accessed on phone or tablet!
- Azure development platform: providing a robust backbone for the system
- Draws data from installed Telemetry Database, which is capable of syncing with both OPC and ODBC

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Data browser

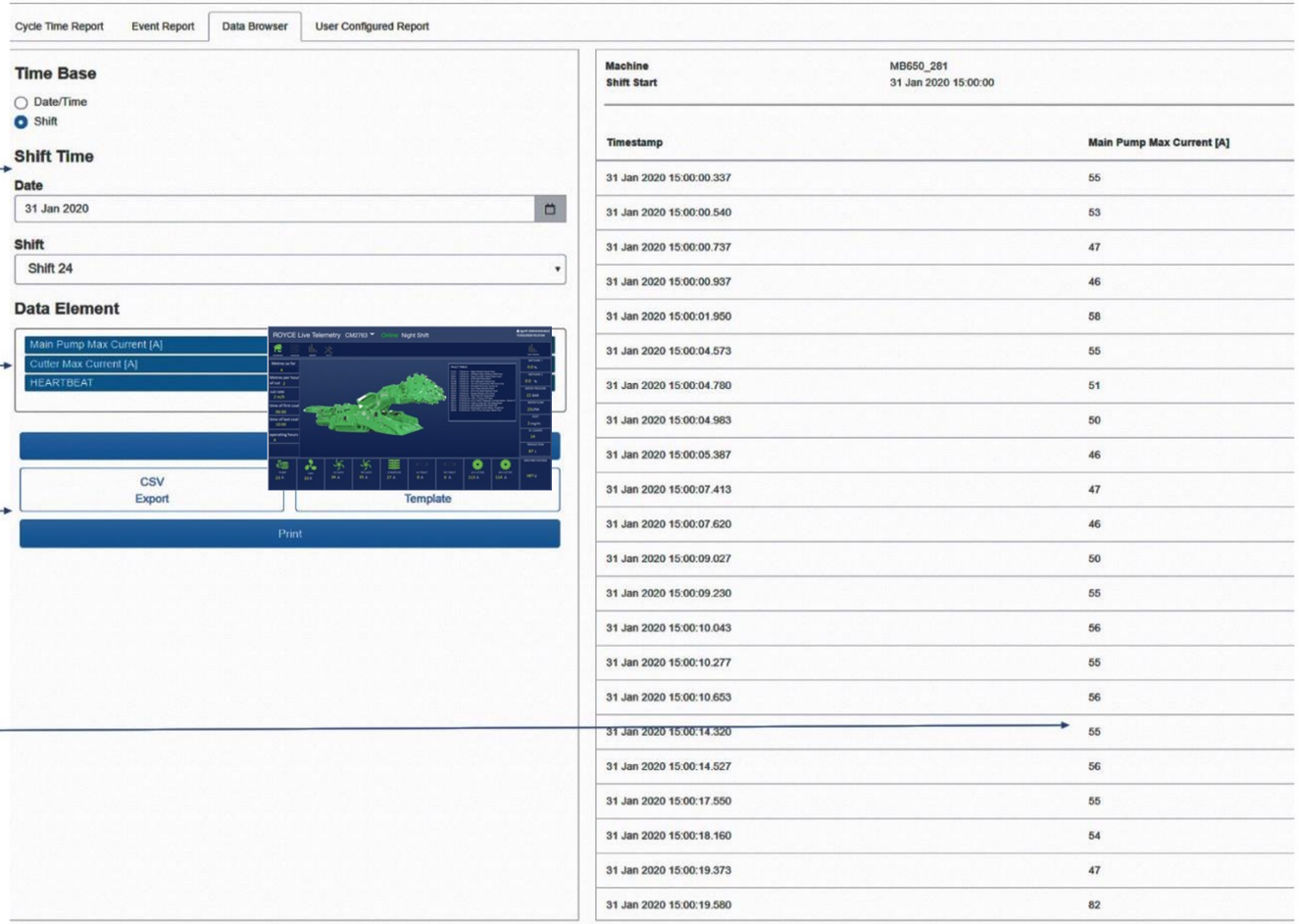
Mining Telemetry

Select desired period

Select what data you wish to query

Customize your output

View raw data values



- Data Browser application, allows the user to query any machine data, at any period of time.
- Exceptionally useful tool when fault finding, troubleshooting and analysing operation process.

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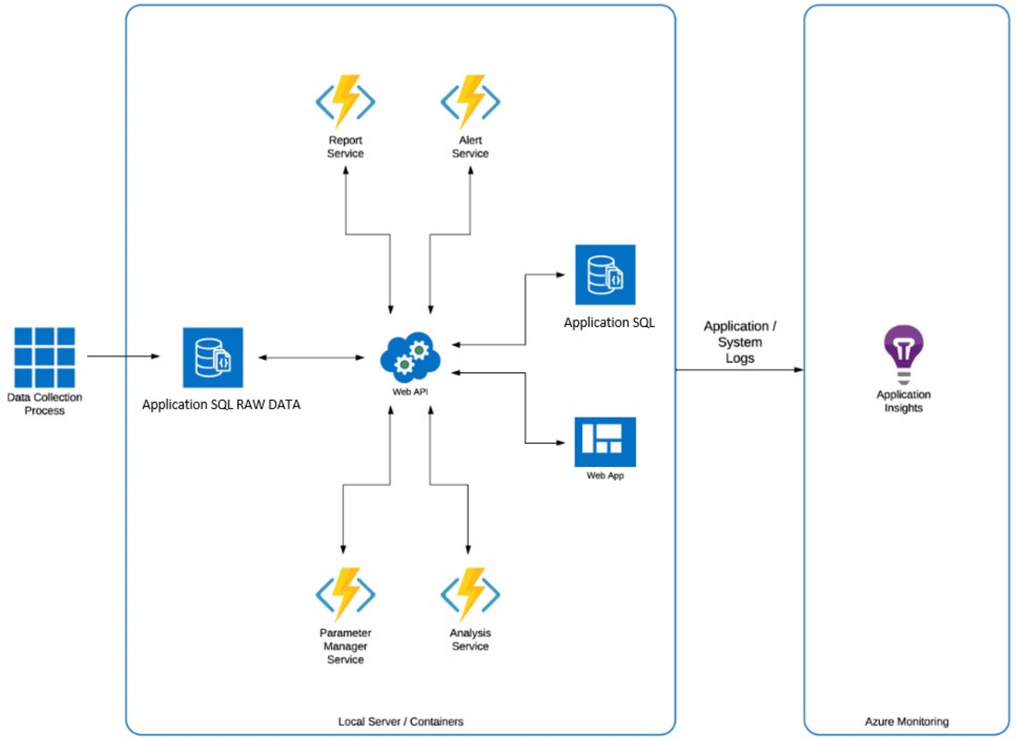
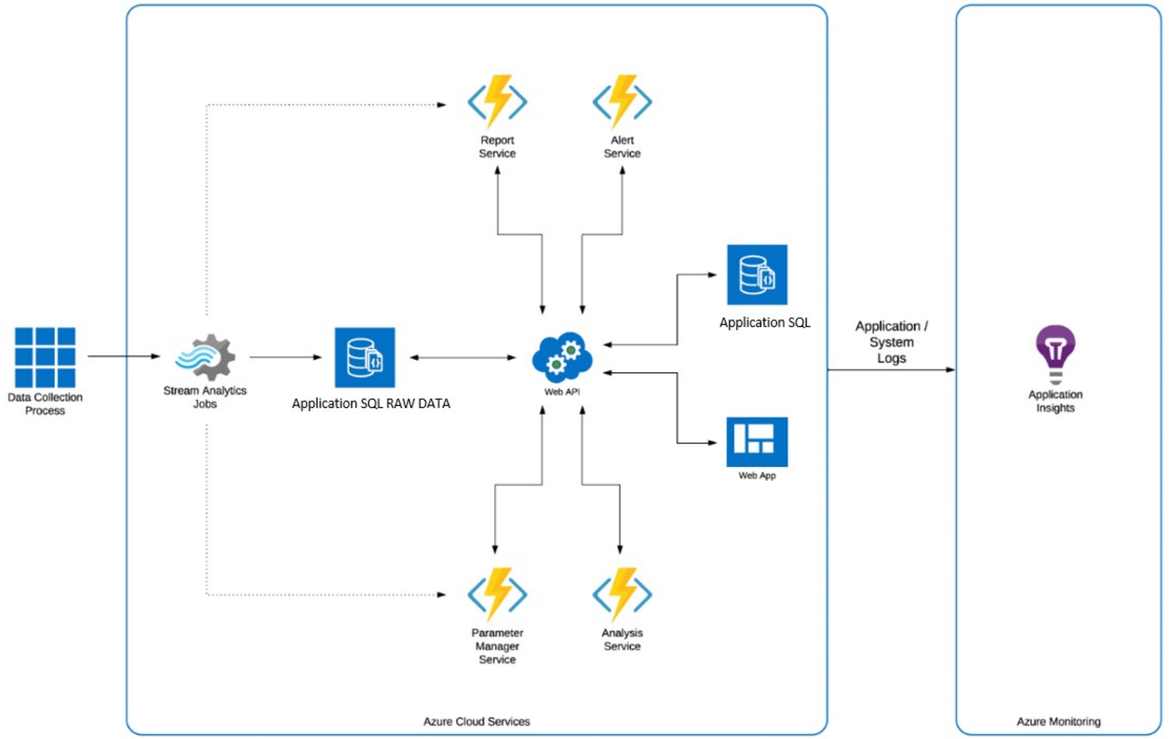
Machine to surface, functional overview

Mining Telemetry

Data Analysis / Visualization





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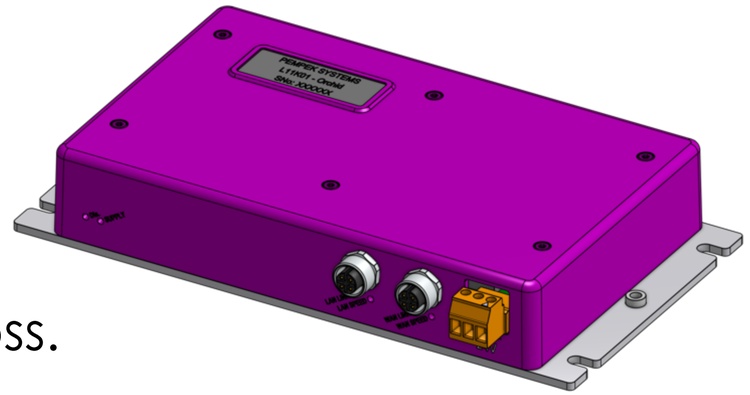
Pempek's Intelligent collector protects against data loss!

Mining Telemetry

NO CONNECTION? – NO PROBLEM WITH PEMPEK ORCHID UNIT



- Provides a point of collection from a number of sources.
- Has on board, data buffer. Data disconnection? No data lost!
- Data connection can be down for up to five days without data loss.
- Once reconnected, collector will feed stored and live data simultaneously.

- Has EIP functionality setup.
- Has Diagnostic tool, which is useful to validate system setup and health.

Nautitech, how we choose to get information from A to B

Mining Telemetry

Data Movement:

- For establishing a link between machine and server, we have opted to utilize Nautitech, with whom we are having great success with in ongoing projects

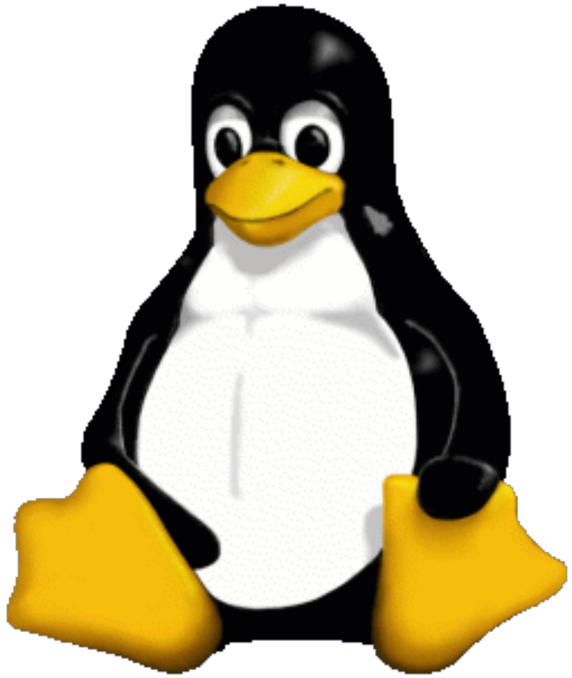
- Nautitech Power line solution, the Spitfire, is our top option. It is hardy, needed for a mining environment, and requires little additional infrastructure to implement.

- They also offer wireless solutions, which require more setup, but is certainly an exciting option, looking into the future.

- Finally they too have a Fibre solution, which provides the fastest link, but only works as a solution if it can maintain structural integrity in the target use case environment.

Future proofed with .Net

Mining Telemetry



ROYCE works on any Operating System Platform

WRAP

Mining Telemetry

ALL the data All the time

- Live collection
- Live capture
- Live storage
- Live display
- Live reporting

- Standard or user generated reporting
- User query function
- Any Operation System
- Local or Cloud data base
- Future proofed

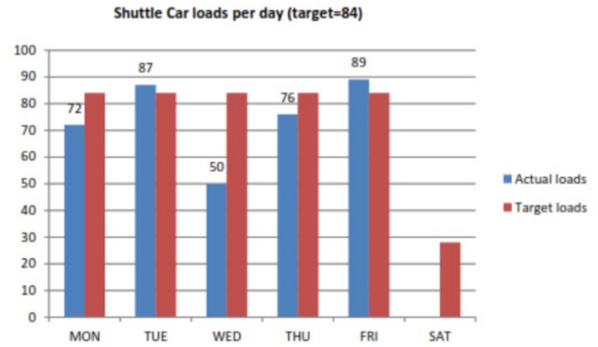
An annual subscription service to keep the platform in the forefront of telemetry practise in mining!

SC WEEK TO DATE KPI REPORT

14/04/2019 23:00 to 19/04/2019 21:45

Mine:
Section: 18
Machine ID: 40
Machine no: SC3272

	Ave. No of loads per shift	Ave. est. tonnes per shift	Ave. travel FB to CM per shift	Ave. travel CM to FB	Ave. late 1st start up	Ave. early last shutdown	Ave. late 1st load	Ave. early last load	Total weekly tonnes
ACTUAL									
TARGET									



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"All the data, all the time"

OTHER FEATURES

- FUNCTIONAL LAYOUT
- INFRASTRUCTURE
- FUTURE PROOFING

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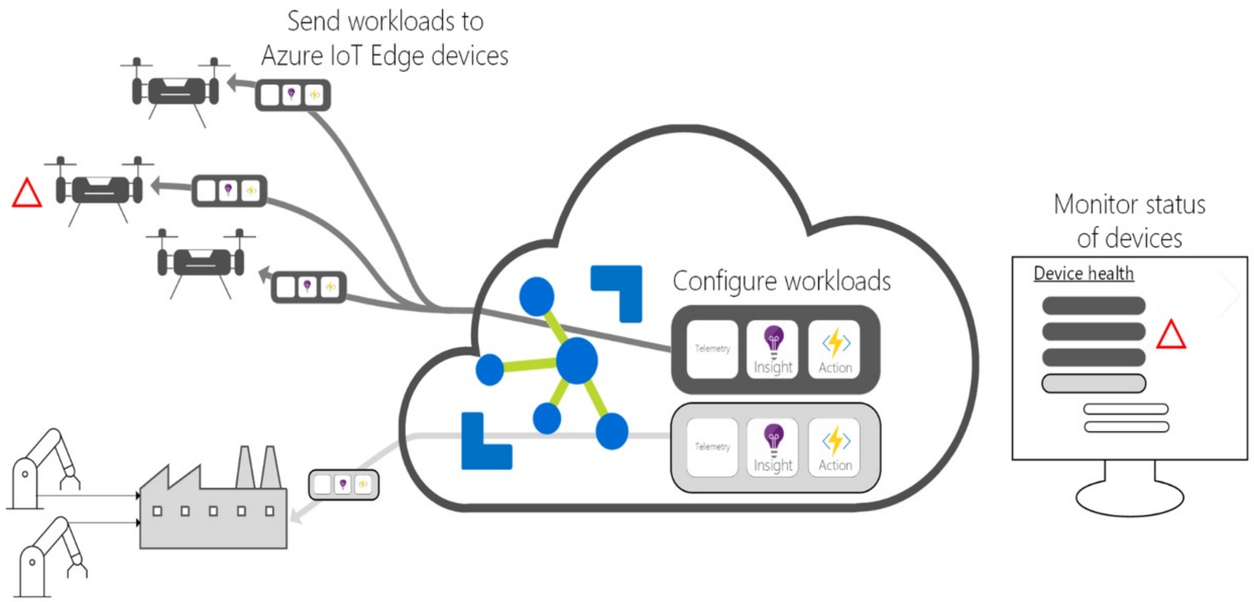
Future proofed with Cloud data

Mining Telemetry

The future of data storage, control and analytics, lies in cloud based systems.

We propose that the platform be redeveloped to support both local and cloud databases.

Taking this step now will prevent costly future redevelopment and bring a major and important upgrade path to your clients.



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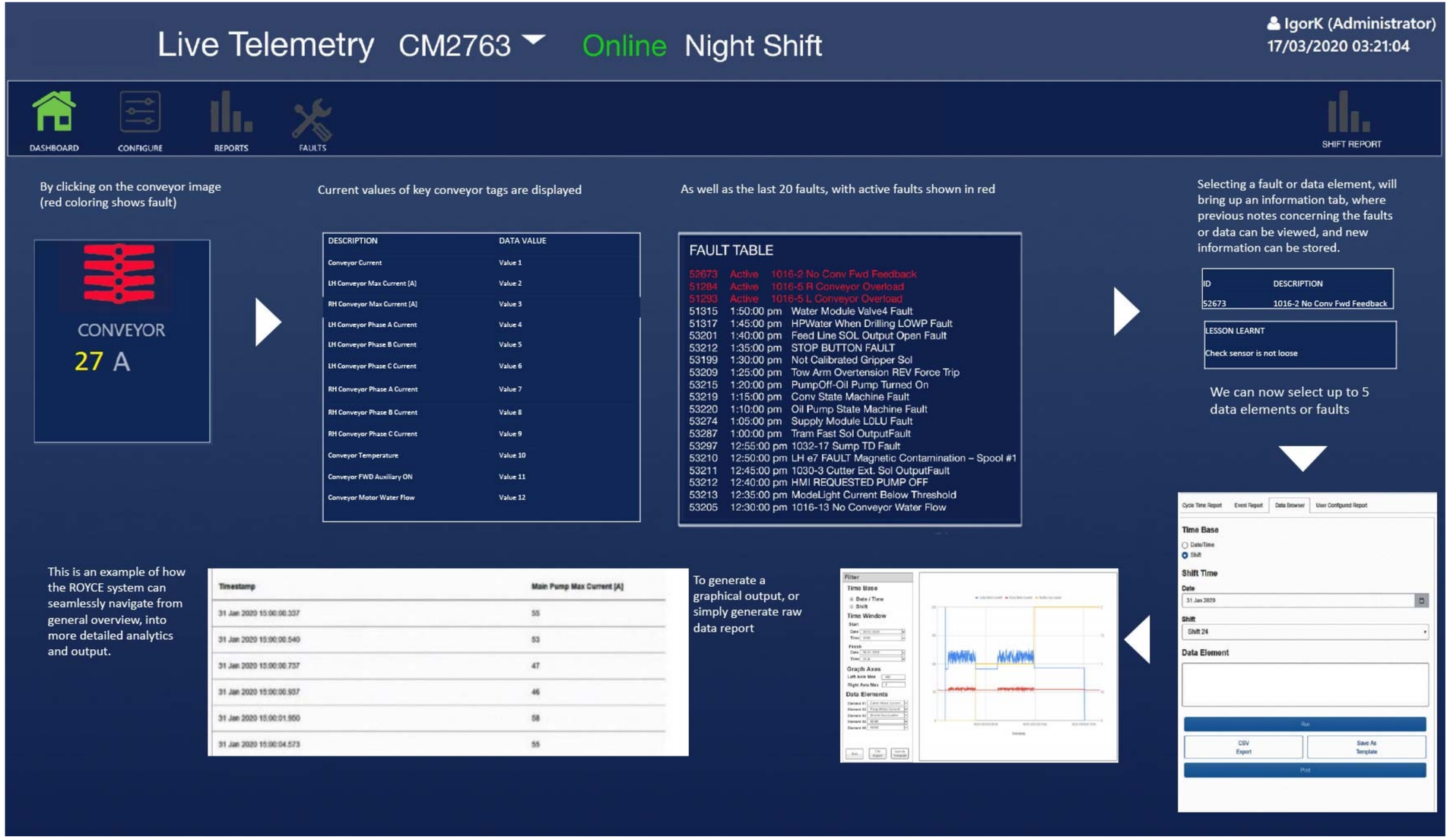

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Lessons learnt - guide future fault response!

Mining Telemetry

Royce System "Lessons Learnt" Information Feedback

When querying a specific fault, a notes tab will come up displaying information previously stored on the fault.

The user can edit the notes on the fault that can be used to guide a response to a certain fault.

This may have helpful hints from people who previously troubleshot the issue and allows you to set a bread trail for people who query the fault after you in order to speedily resolve it!

Event MSG Long Description (Customer Defined) :

"The control system did not detect a 24VDC feedback from the auxiliary contacts of the safety relay SR1. Things to check:
- Relay is correctly installed and wiring is intact
- Check 24VDC power supply to relay coil is OK
- Check 24VDC power supply to aux contact is OK
- Check 24VDC input to module
- Replace Relay"

Royce Cloud "Lessons Learnt"

As more sites come online with the ROYCE system, more information on particular faults can be collected. If permission is granted it, will allow sites to share fault information. Meaning technicians will avoid double work.

Eventually this will develop into a robust troubleshooting library, where any issue will have been seen before, and have some information on the issue stored.

This database will also serve as a means of evaluating machine function and highlight recurring issues, and areas for improvement.

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Mining Telemetry

"All the data, all the time"

Jason Koch – Telemetry Team Leader

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