Final report

Implementing McGregor Diesel Fuel Management at Romani Pastoral Co

Abstract

The McGregor Diesel Fuel Management System is a monitoring system and/or management system for monitoring diesel from a remote location. The system allows you to measure tank levels and fuel usage for business and personal assets collecting real time data giving productivity, vehicle efficiency and production by driver and asset.

The McGregor Diesel Fuel Management System was installed and made operational using the following digital components:
1. Fuel Management Subscription – Fuel Management Subscription Service Bulk Tank (annual subscription)
2. Fuel Management Subscription – Fuel Management Subscription Service Fuel Truck (annual subscription)
3. Bowser – System 2 Fuel Level Sensor Mobile Fuel Management Flow Meter 1" (includes controller) immobiliser 1"
4. Fuel Truck – System 4 Mobile Fuel Management Flow Meter 1 ½" (includes controller) immobiliser 1 ½"
5. Electricity – 240VC-12VDC Power Supply (convertor)
6. Battery/Solar Connector for mobile fuel storage

The McGregor Diesel Fuel Management gives the following benefits:

Storage
o   Real time tank level measurement and recording
o   Vehicle/Driver Identification
o   Volumes Delivered
o   Immobilisation/Theft Control
o   Customised Reporting

Delivery
o   Identifies drivers' transactions through ID Tag/Fob
o   Actuates ball valves to allow authorised deliveries
o   Stores accurate transaction data
o   Captures volume delivered
o   Cloud Based – real time data

Dispensing
o   Improves accuracy of fuel records
o   Driver Identification – assets & drivers
o   Actuates ball valves automatically
o   Real Time Data – Cloud Based

The McGregor Diesel Fuel Management Technology works on the Telstra network giving better coverage in rural and remote areas. This can be enhanced by using a high gain antenna allowing you full coverage and live data in remote locations.

Executive summary

Using our qualified mechanics and technicians, McGregor Diesel manufactured the Fuel Management Solution in their workshop in Goondiwindi, providing support and service for our solution.

The McGregor Diesel Fuel Management Solution was installed at the Romani Pastoral Company property, "Windy Station" at Quirindi into a Bulk Fuel Tank and Mobile Fuel Truck.
Both systems are in a high-quality locked enclosure with the following specifications:

- Material: GRP (Sheet Moulding Compound), Coated with Relius Coatings RELEST® Wind I306 Colour
- Operating Temperature: -50° C to + 200° C
- Glow Wire Capability / Flammability: 960° / UL94 V0
- Expected UV Life (Direct Exposure): 25 Years
- IP Protection: IP66

The McGregor Diesel Fuel Management System can be either connected to main power supply or installed to a mobile storage connected to battery and solar panel as the power source.
The system is effortlessly serviced by an auto electrician or GPS technician.
McGregor Diesel provide spare parts, over the phone support and guidance where needed. Parts are easily replaced.

Figure 1 – McGregor Diesel MDT Diesel Tracker enclosure installed at Romani Pastoral Company

Table of contents

1. Background

Farming, mine, construction and earthmoving sites generally require significant amounts of diesel to operate their equipment, which is used for performing a variety of tasks from harvesting to transportation to development. The equipment is generally spread out over large areas, and as such, many sites include multiple diesel storage tanks, thereby providing diesel close to the equipment. In short, diesel is generally transported to the sites in bulk from nearby cities or towns, to fill the tanks when needed.

Many centrally managed farming and mining sites are spread out over a region, and are often located in remote locations. Furthermore, several operators may operate the equipment, and thus use the diesel. As such, management of the diesel across these sites is often very difficult. As a result, it is generally difficult to predict when the diesel tanks will need refilling. Accordingly, the diesel tanks are often refilled based on know-how and best guesses, which is inefficient.

Several attempts have been made to improve diesel management in such cases, based upon regular, manual tank level monitoring. While such monitoring enables a manager or other person to get a better understanding of the diesel levels, the monitoring, management and travel to and from the site are all time-consuming tasks, which take staff away from other more productive tasks.

In more recent years, remote tank monitoring systems have been developed, where level sensors are used to remotely sense a level of diesel in a tank, and transport details of the tank levels by the Internet. A problem, however, with such remote monitoring of tanks is that the systems are generally complex and expensive. Furthermore, in many cases the systems must be custom made to suit each configuration, which is complex and time consuming.

Another problem with such remote monitoring systems is that the data therefrom can be difficult to interpret, and as a result, it can be difficult for a manager to get a good overview of the diesel levels and usage information.

A further problem with such Internet-based remote monitoring systems is that they are not well-suited to remote areas. In Australia, a large portion of the country is without mobile broadband Internet coverage, and as a result, such systems are generally not suitable.

Satellite based Internet is available in many remote areas, but these systems are generally complex, difficult to install and expensive. Furthermore, many remote tanks may not have access to mains power, and as such, require further associated infrastructure to be installed.

2. Objectives

The project was designed to monitor and manage fuel usage and levels across the fleet of Romani Pastoral Company including their business and personal assets. Theft control using immobilisation and customised reporting are assisting in day-to-day administration. This allows for:

Improved accuracy of fuel records
Driver Identification of assets and drivers
Theft Control using immobilisation techniques
Real Time Data in a cloud-based software solution

The project was to demonstrate that technology was available to provide Romani Pastoral Company with the ability to measure fuel across their fleet including business and personal assets. To prevent safety issues climbing on top of the fuel tanks to dip fuel levels, the McGregor Diesel Fuel Management Solution provides live levels of the tanks. Data collected through the McGregor Diesel Fuel Management Software produces various reporting giving productivity/vehicle efficiency and production by driver and asset. This information gives the user the power to manage their business while reducing cost and increasing productivity.

Supplied and reporting in remote locations, the following digital components were installed and made operational:

1 x Fuel Management Subscription – Bulk Tank – allowing full access to software and reporting for fuel management system.
COMPLETED & WORKING – Subscription service gives to access to the McGregor Diesel Fuel Management Software & Reporting

1 x Fuel Management Subscription – Fuel Truck – allowing full access to software and reporting for fuel management system.
COMPLETED & WORKING – Subscription service gives to access to the McGregor Diesel Fuel Management Software & Reporting

1 x Bowser – System 2 Fuel Level Sensor Mobile Fuel Management Flow Meter 1" (includes controller) Immobiliser 1" – Bulk Fuel Tank
COMPLETED & WORKING - Full system allowing fuel levels.

1 x Bowser– System 4 Fuel Management Flow Meter 1 ½" (includes controller) Immobiliser 1 ½" –
COMPLETED & WORKING **-** Bulk Tank - Flow Meter identifying drivers' transactions through ID Tag/Fob.

1 x Electricity – 240VC-12VC Power Supply (convertor) including travel. COMPLETED & WORKING
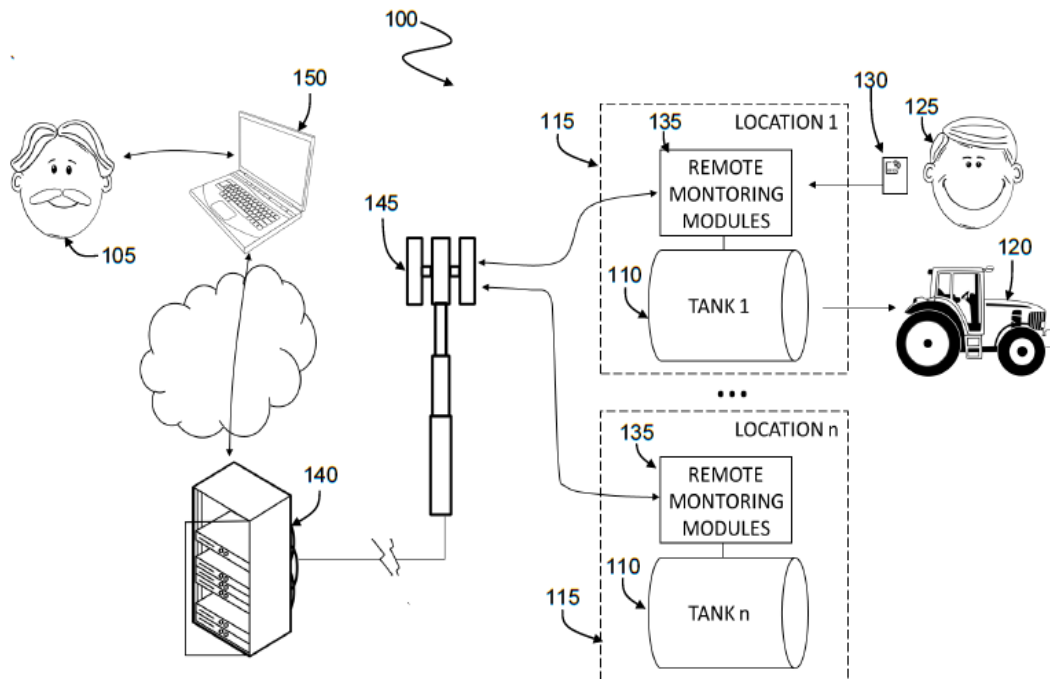
3. Methodology

Figure 2 – Methodology Table

3.1 Information on Methodology

DETAILED DESCRIPTION

[0001]   Figure 2 illustrates a system 100 for managing and monitoring diesel across a plurality of remote sites, according to an embodiment of the present invention. In particular, the system 100 enables a manager 105, or other authorised individual, to obtain an accurate overview of each of a plurality of tanks 110 storing the diesel, distributed across a plurality of remote sites 115, in a manner that is easy to use and understand. This enables better decisions to be made about the diesel, and reduces the likelihood that the diesel unexpectedly runs out in one of the tanks 110. The system 100 also enables sites 115 to be monitored in areas without mobile broadband Internet coverage, as outlined in further detail below.

[0002]   The sites 115 may be agricultural or mine sites, where equipment 120, such as mining or agricultural machinery, is operated. The equipment 120 is powered by diesel from the tanks 110. Operators 125 of the equipment 120 use RFID tags 130 to gain access to the tanks 110, which thereby enable the operators 125 to fill the equipment 120 with diesel.

[0003]   Each tank 110 is associated with remote monitoring modules 135, which provide access control (i.e., ensure that the operator 125 is authorised to access the diesel), and monitoring of the diesel usage, such as monitoring of the amounts of diesel distributed, to whom, and when. The remote monitoring modules 135 may also obtain data of the equipment 120, such as an equipment identifier and associated running data (e.g., hour meter or odometer readings).

[0004]   The monitored data is uploaded to a remote server 140 by way of one or more cellular

base stations 145. The cellular base stations 145 may receive the monitored data using a mobile broadband Internet configuration, when available, and messaging (or voice) configurations otherwise. As an illustrative example, the remote monitoring modules 135 may communicate with the cellular base station 145 using 3G or 4G mobile broadband Internet when available, and revert to text messaging when 3G or 4G mobile broadband Internet is not available.

[0005]   In case text messaging is used, the data may be encoded and compressed in the text message prior to being uploaded, to save transmission costs, and to increase reliability. As an illustrative example, the data may be encoded as a string of hexadecimal characters.

[0006]   The use of messaging, when required, enables the system to function in areas where mobile broadband Internet is not available, but when cellular coverage is available. As such, this configuration provides a cost-effective step between mobile broadband based solutions and expensive satellite-based solutions.

[0007]   The server 140 receives data from each of the remote locations 115, and both saves and analyses this information. This in turn enables the manager 105 to receive intelligent warnings and messages, as well as be able to access the received data in its original (untransformed) state, e.g. for investigative purposes.

[0008]   As outlined below, the server 140 generates a dashboard, which is displayed to the manager 105 on a manager computing device 150, such as a personal computer. The dashboard includes warnings and alerts (if relevant), and information regarding levels of diesel in the tanks, as well as usage statistics and other important information. The dashboards are configurable, which enables managers 105 to see data that is most relevant to them.

[0009]   In addition to monitoring, the manager 105 may select one or more restrictions to place on an operator 125 and or equipment 120. As an illustrative example, the manager 105 may, using the system 100, direct an operator 125 to use a particular tank 110, either generally or for particular equipment 120. This is preferably achieved by sending a message, using the system 100, to the operator 125. As a result, the manager 125 is able to have better control over how the diesel in the tanks 110 is used.

The manager 105 may also arrange for diesel to be transported from one tank 110 to another tank 110, instead of simply arranging for the other tank 110 to be filled. This may be arranged using the system 100, for example using messaging, or directly with a transport vehicle. This in turn enables the manager 105 to have better control over the diesel in the tanks 110 as a whole, rather than considering each tank 110 in isolation. This may in turn enable the manager 105 to reduce a total amount of diesel stored on site, while maintaining availability of the diesel where required.

4. Results

Romani Pastoral Company have found the McGregor Diesel Fuel Management Solution to be a successful application on farm and have shown further interest in using this solution on other fuel storages.

The Romani Pastoral Company, Windy Station manager has advised this system has increased their efficiency around the following:
Fuel ordering and cash flow.
Accuracy and availability of data for fuel records to lodge their BAS.
Fuel Usage – monitoring of assets and staff usage.
Productivity – allowing the management team time to concentrate on operational matters.

5. Conclusion

With live data, managing and monitoring diesel across a plurality of remote sites, in enables Romani Pastoral Company or other authorised individual, to obtain an accurate overview of each of a plurality of tanks storing the diesel, distributed across a plurality of remote sites, in a manner that is easy to use and understand. This enables better decisions to be made about the diesel, and reduces the likelihood that the diesel unexpectedly runs out in one of the tanks. The solution also enables sites to be monitored in areas without mobile broadband Internet coverage.

Saving time collating data to update fuel records for BAS, Romani Pastoral Company will now have more time.

Secondly having access to the data daily Romani Pastoral Company can manage fuel orders and cash flow to better their management practices.

5.1 Key findings

McGregor Diesel Fuel Management Solution has changed the way Romani Pastoral Company manage their bulk fuel supply. The system allows real-time information around fuel usage, ensuring their operation is running efficiently and safely.

Storage

- Real time tank level measurement and recording
- Customised Reporting
- Volumes Delivered

Delivery

- Volumes Delivered
- Stores accurate transaction data
- Cloud Based – real time data

Dispensing

- Improves accuracy of fuel records
- Driver Identification – assets and drivers
- Theft control – actuates ball valve automatically
- Real time data – cloud based - live

5.2 Benefits to industry

Increase the profitability of their farming enterprise. The use of technologies in the beef industry is a major contributor to the safe work practices. The accumulated use of technology in the beef industry has improved operations, saving time, fuel and management costs.

- Supplied locally (Australia)
- Works in remote locations
- Has the ability to add satellite
- Customisable
- Easy to use
- Proven out in the field

6. Future research and recommendations

McGregor Diesel are currently researching options for satellite communication and Wi-Fi coverage in the Northern Territory.
We are also investigating options to upgrade our control panel to enable multiple inputs of data to include the following:

- Driver
- Asset Number
- Hours or Kilometres
- Crop Description

To enable the above capabilities would benefit farming enterprises throughout Australia, increasing the overall efficiency and management of their fuel and records.

7. References

For any photos, case studies or testimonials please visit the McGregor Diesel website.
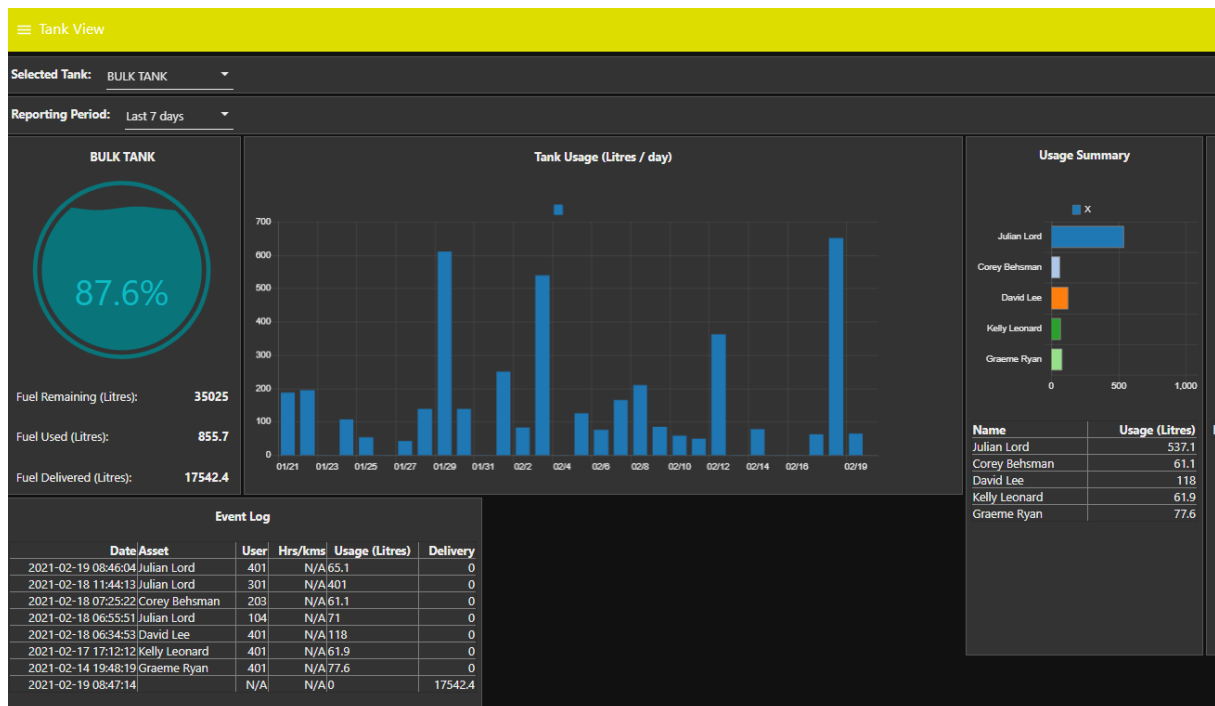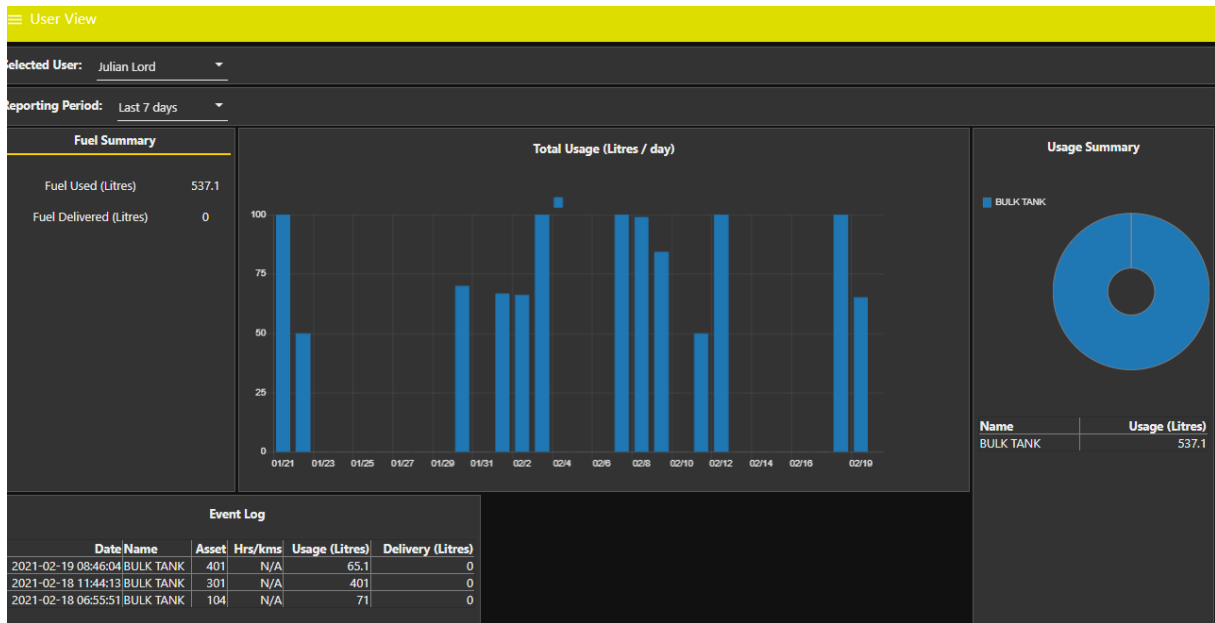www.mcgregordiesel.com

8. Appendix

Figure 3 – Fuel Management Software Tank View

Figure 4 – Fuel Management Software User View