Abstract

With the majority of Australia’s mineral, oil and gas reserves situated in remote locations, resource companies can struggle to get timely access to the data they need to make critical operational decisions.

A carefully considered network of remote monitoring and control systems, with optimised satellite communications, can deliver operational efficiencies and reduce costs for mining, oil & gas operators.

In this white paper learn where satellite enabled remote monitoring systems can be utilised in the mining, oil & gas industries, the considerations for cost efficient optimisation and the operational benefits of having real-time, reliable access to critical data.
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Introduction

Australia’s natural resources industry is characterised by remote locations, vast geographical areas with difficult terrain and poor 3G network coverage.

Regular, physical access to field locations can be cost or time prohibitive, leaving resources managers without access to the up-to-date information they need to make decisions that can impact on compliance with environmental regulations, efficient operations and maintenance of systems and equipment.

A carefully planned network of remote monitoring and control systems, combined with reliable, optimised satellite communications systems, can provide managers with the full visibility of field conditions they require to achieve cost-effective operational excellence.

Remote Monitoring & Control Systems In Mining, Oil & Gas

Applications

Environment
- Weather
- Water & Other Liquids
- Gases
- Air Quality - Dust

Fixed Assets
- Condition Monitoring
- Vibration Monitoring
- Temperature Monitoring
- Pressure Monitoring

Vehicles
- Driver Behaviour - Brake, Acceleration, Gear Changes
- Load

The purpose of each remote monitoring and control system can vary but the core elements remain the same.

A sensor or transmitter to capture an “event” (such as rainfall, bearing temperature, water level)

Instrumentation to read the signal from the sensor and transmit the data (such as a data logger and modem)

A wireless network connection (3G / radio / satellite) to carry the data

A device (such as a computer) capable of accessing the data transmission and translating it into meaningful information
Monitoring & Control Systems: Design Factors

What do you want to know?

Identify the list of parameters before committing to sensors or transmitters. By planning early, you may be able to find an all-in-one solution that delivers all the readings you require, or you may realise that a more affordable “single parameter” device is all that is required.

How regularly can you physically access the system?

Many sensors and transmitters require regular, ongoing maintenance. If you are unable to meet these requirements, reliability or accuracy of data may be compromised.

Is there access to mains power?

If mains power is unavailable, solar power will probably be required. Consider how many consecutive “no sun” days the system may encounter. This will guide you in regards to the size of the solar panel needed as well as the battery backup that will be used.

Can you get a clear, consistent mobile phone signal on-site?

If there is no 3G network coverage, or the network is regularly “swamped” you will need to consider alternatives such as satellite communications.

Technical capabilities: the manufacturer AND the end user

Before assigning the responsibility for component sourcing, manufacture, programming and installation to an internal resource, give careful consideration to their level of experience with

- Assessing and planning for the power draw of all system components
- Communications protocols such as Modbus and SDI-12
- Software programming - many data loggers and control devices require at least a basic level of coding for the initial setup
- Electrical wiring

Outsourcing the manufacture of a system can often be a more reliable and timely option in many situations.

The technical capabilities of the end user need to be considered during the planning and development. It is important to ensure that the system offers a clear, easy-to-understand interface that allows the end-user to access and understand the information being produced.

Manufacturing Quality Checklist

- Are all components securely mounted?
- Are there clear labels on switches to indicate what they do?
- Is the cabling tidy and electrically safe?
Is it really more expensive to use satellite communications as opposed to sending staff on lengthy trips to remote locations?

Take the example of a Queensland mine that is required to conduct regular measurements of the water levels of a bore and provide reports to their State’s environmental protection authority.

The mine has an automated monitoring system but it is not equipped with satellite communications. Without satellite communications, the mine’s Environmental Engineers must regularly visit the bore to download the data manually.

The bore is difficult to access and part of the journey from the site office needs to be done on foot, resulting in a round trip of over two hours. Safety requirements specify that at least two people must travel to the bore together. Due to these difficulties, the mine is only collecting data once per month, leaving them exposed to a significant environmental risk.

Furthermore, the automated monitoring system occasionally fails and this can go undetected until the next scheduled visit from the Environmental Engineers. When this happens, there is no data available for download, rendering the entire process pointless and expensive.

By integrating satellite communications, significant cost savings and operational efficiencies could be achieved.

<table>
<thead>
<tr>
<th>Manual Data Collection Once Per Month¹</th>
<th>Daily Satellite Data Push to Email²</th>
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<tbody>
<tr>
<td>$500</td>
<td>$1000</td>
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<td>$1500</td>
<td>$2000</td>
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How To Optimise Your Remote Monitoring or Process Control System For Satellite Cost-Savings - 5 Easy Steps

1. Before doing anything, talk to a specialist satellite communications provider about what you are trying to achieve. They can offer advice on which device and data plan is suitable for your monitoring system.

2. Opt to push reports to email as a small .CSV file wherever possible.

3. Reduce the frequency of automatic reports to email / SMS according to what is actually needed and useful.

4. Fine tune the preset parameters for any alerts that are being produced by the remote monitoring system.

5. Train staff to “dial in” to remote monitoring systems only when essential to reduce the amount of data being used on a monthly basis.

Choose the right satellite device, get it on the right plan, and get it doing the right thing. Then you will see the cost benefits of using satellite!
Application One

Environmental Monitoring Featuring Satellite Data Communications

Benefits

- Environmental Impact Statement
- Risk management strategies (e.g. mine flooding)
- Government regulations / reporting

Compliance

- Slope stability
- Exposure to dust / gases
- Risk of collapsed structures / flying objects (high winds)

Safety

- Reduce costs associated with staff travelling to manually collect data
- Reduce downtime associated with sending equipment & staff to remote locations that are impacted by adverse weather conditions

Productivity

Environmental and weather monitoring systems for mining, oil and gas will usually include sensors to monitor:

- Air temperature
- Rain
- Wind speed & direction
- Humidity
- Barometric pressure
- Water level or flow
- Water quality (e.g. pH, turbidity)
- Soil moisture
- Solar radiation / UV
- Dust levels
- Gases

The information collected is needed in real-time so that mining, oil & gas operators can make the right decisions, quickly.

Slow, manual collection of data from mission critical remote monitoring stations is not an option.

Systems need to be equipped with cost-effective satellite messaging that deliver data automatically (hourly or daily) as well as on-demand through an internet accessible portal. Many environmental monitoring applications also call for “alarm to SMS or email” capabilities - satellite communications provide certainty that such critical data is delivered on-time, every time.
Application Two
Monitoring The Condition And Location Of Plant And Machinery

Benefits

Aside from the unexpected repair or replacement costs involved, breakdowns and missing equipment can lead to major slowdowns in production that can impact on the entire mining, oil and gas supply chain.

Asset monitoring systems featuring satellite communications can be used to prevent or quickly rectify downtime linked to broken or missing assets.

A typical asset monitoring system will be manufactured to include:

- Sensors/transmitters to be fitted to equipment components (e.g. Thermocouples for monitoring bearing temperature)
- A data logger or PLC
- A satellite modem
- An audio or visual alarm for alerting on-site staff of equipment condition problems

It is critical that the physical system is complemented with a robust reporting and alarming back-end that can be accessed remotely so that technicians can regularly monitor the health of equipment and liaise with shutdown planners for preventative maintenance operations.
Since 1984 we have been solving problems for customers like you. We have experience in mining, agriculture, surveying, environmental protection and other industries and have worked with differing technologies including RFID, 24/7 remote connectivity and satellite telemetry.

From defining your needs, through to production, your dedicated Project Manager will guide you through the process of developing a remote monitoring system.

**Why You Should Choose Pacific Data Systems**

1. Our company is small enough to remain agile, yet offers the breadth of experience required to take your solution from concept through to manufacturing
2. We understand COTS (Commercial Off The Shelf) hardware and how to integrate it with bespoke systems
3. We have established strong relationships with the world’s leading suppliers of instrumentation
4. We have the in-house capability to design and manufacture printed circuit boards and micro-controls, which can be programmed to integrate with your COTS hardware and software, to satisfy specific needs.

For a confidential discussion of your project please contact us today

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