ecotech
environmental monitoring solutions

BLAST MONITORING
Solutions

ECOTECH
WORLD CLASS
environmental
MONITORING

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INTEGRATED BLAST MONITORING SOLUTIONS

Our Blast Monitoring System has been used to measure blasting activity from mine sites for more than ten years, with more than 100 sites installed around Australia.

The system is a proven solution that offers significant benefits to our customer. We have ISO9001/14001/4801 accreditation, combined with NATA Accreditation for the collection and reporting of data from air quality monitoring stations.

With a proven track record of implementing environmental monitoring solutions for many of Australia's largest mining companies, we are committed to mine site monitoring.

Our blast monitoring system is available as a fully integrated package for long-term rental with our trained staff managing the provision of blast data remotely.

The system consists of remote blast monitoring stations, called Dynamates. The Dynamates are continuously supervised by a remote software package known as Dynamaster operating on our server at the Melbourne office.

Blast results are automatically collected from the stations, collated and then made available to users within minutes of the blast. Customers can view blast results, produce reports and interact with the server software via the Dynamaster web browser.

Results can also be retrieved from anywhere using mobile devices with GPRS or NextG capability, such as a notebook PC, pocket PC, PDA or mobile phone.

The Dynamaster server software can send results via SMS messages and/or emails to authorised recipients when triggered.

BENEFITS

A fully integrated package includes:

- Easy post mount installation, solar powered with battery.
- Remote communication over GPRS or NextG.
- Results and data are available anytime at work, home, or on the road. All you need is access to the internet.
- Customer interaction by web browser.
- Users can be automatically notified of blast results by SMS, email or both within minutes of the blast.
- Event file generation and retrieval.
- No minimum time between event captures.
- Advanced triggering methods ensure that 100% blast capture can be achieved.
- Capture blast results up to six months after a blast, even if an automatic trigger did not occur.
- Three varieties of geophone are available, depending on your monitoring requirements.

SYSTEM OVERVIEW
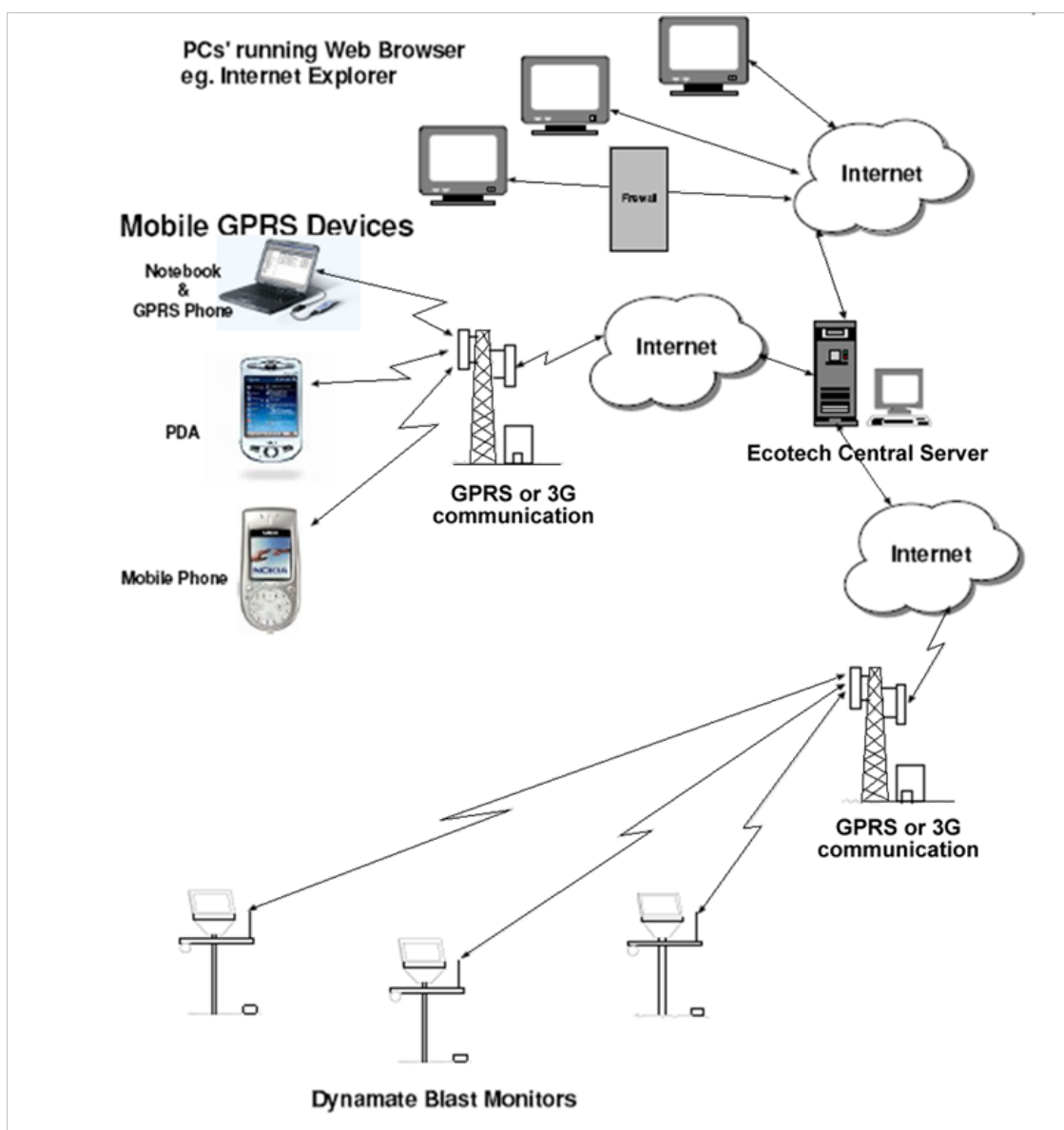
MAJOR COMPONENTS

GPRS or NextG communication module
All Dynamate communications are handled by either GPRS or NextG communications.

Global positioning system
A GPS module is included to provide highly accurate position and time information. The position information is used to optimise the Dynamate trigger settings to ensure that blast events are reliably captured.

The time information provided by the GPS module is extremely accurate and is utilised to maintain time synchronisation between Dynamate stations to within a millisecond. This synchronisation between Dynamates facilitates accurate calculation of ground and air blast velocities and the development of site laws.

Real-time clock
A real time clock, synchronised to the communication module, provides flexible sleep mode functionality.

Battery management module
The battery management module optimises the management of the battery. It continuously monitors battery temperature, state of charge, available solar power and current power consumption. Using this information, it efficiently manages battery charging operations.

Battery checks
The battery and solar voltage level of every monitor is checked twice a day. If the battery is low then the charge mode is changed remotely to ensure the battery is fully recharged. A replacement is arranged if the battery is faulty.

Air blast microphone and windscreen
The air blast microphone (3dB Points: 2Hz to 250 Hz Linear) is fitted with a proprietary windscreen. The windscreen is designed to dramatically minimise the effect of wind on air blast readings with insignificant effect on the accuracy of the air blast readings.

Triaxial geophone
High and low range geophones are available; the 2Hz and 4.5Hz capable of 0.005-24mm/s and the piezo capable of 1- >100mm/s.

Sealed lead acid battery
A Sealed Lead Acid (SLA) battery is used to eliminate the effects of spillage and out gassing which are common problems with "wet" batteries. These batteries have special charging requirements which are satisfied by the battery management module described above.

COMMUNICATION

Devices using GPRS and NextG are "internet aware", meaning that they connect, via a carrier, to the internet. For all practical purposes, they can be considered to be "always connected".

GPRS and NextG have good coverage in Australia and most sites will have access to at least one network. Other communication methods such as satellite can also be employed. Customers can therefore retrieve blast results and control the blast monitoring system from virtually anywhere.

GPRS & NEXTG COMMUNICATION

GPRS and Next G puts Dynamate stations on the internet. By utilising either GPRS or NextG, the Dynamate monitoring stations are on the internet and can be accessed (by authorised personnel via the Ecotech Dynamaster web server) by any device with a web browser and Internet connection (GPRS, NextG, Broadband or Landline). Australian users also have the benefit of being able to connect using our private Telstra network.

Line of Sight considerations are no longer relevant
Dynamates can be located anywhere where communication networks are available. The distance from the Ecotech Server or other Dynamates is insignificant.

Consistently reliable
The GPRS and NextG network is regulated and maintained by the major carriers. It was specifically designed for high speed, reliable data transfer.

FEATURES

Data capture and storage

At all times, Dynamates continuously record, at either 500 or 1000 Hz, the air blast and vibration signals in an endless sample buffer loop. This recording continues independently of any other software process.

At the maximum sample rate, the sample buffer contains up to 10 days of air blast and vibration data. When triggered, the central Dynamaster software uses its current event capture settings to calculate the appropriate data set in the sample buffer.

As the sample buffer contains data collected prior to any trigger, any practical amount of pre-trigger data can be included in the event file by means of appropriate user settings.

Data retrieval

When an event file has been generated, the Dynamate notifies the central Dynamaster server. If the automatic upload option has been selected, the central server will automatically upload the event file.

Users can issue a manaul trigger to cause an event file to be generated and uploaded to the central server.

This function is useful for determining background signal levels, or to capture blast event data in cases where a trigger has not been successfully generated automatically. For example, when a shot is fired and vibration levels are insufficient to cause a threshold trigger.

Data checks

A data analyst checks and records every event and also monitors the website to ensure results are displaying correctly. A second internal application is used to view and audit data. Unusual results are reported to the systems technician to investigate and resolve.

No minimum time between event captures

Sample buffer and event capture processes operate independently of any other Dynamate process (for example uploading of event files). This means that there is no "down time" between captures.

Various trigger modes

Several trigger modes are available to the user. These are:

Manual

The Dynamate can be triggered by the user via the web server.

Threshold

In this mode, a trigger is generated when either the air blast or vibration levels exceed their respective trigger threshold settings.

Integral

This mode allows the user to set a threshold limit, but instead of the event capture being triggered as soon as the threshold is exceeded, the vibration peaks over a user-defined time period are integral.

The software then determines whether it is an actual blast, or a single peak caused by some other phenomenon, such as rock fracturing.

Auto

In this mode, the Dynamate continuously generates event files covering a time period as specified in the appropriate user settings.

Event upload test

Each night a manual trigger of every station is conducted. The following morning an analyst ensuresall stations have uploaded the event correctly.

Faults or issues are reported to the system technician and a test identifies any system errors prior to shots being fired. If a fault is identified early in the morning, the customer will be notified so that they can reschedule shots. Remote maintenance is then undertaken on the monitor.

CENTRAL SERVER

Dynamic triggering

Dynamic triggering is used to minimise the amount of data downloaded for each event while optimising the capture window of the monitor.

The early warning unit, which is the first unit to register the vibration generated by the blast, notifies the central server that an event has not occurred. The server then utilises the GPS location of the other monitors within the network and calculates the correct time-frame for data to be captured from each monitor.

Histogram mode

Besides continuously recording the blast sensor signals, the Dynamate also continuously records the peak values of air blast and vibration. The peaks are recorded at a user-defined histogram interval.

At the end of each interval, the peak air blast and vibration values that occurred during that time, together with a date-time stamp, are recorded in the histogram memory. This is done in an endless loop manner with the oldest values being overwritten with the most recent.

The histogram memory stores data at a maximum sample rate of 500Hz and can store more than 50 million air blast and vibration peak values. The peaks are all as accurate as the real time data peaks originally recorded.

A histogram search facility provided by the central web server allows the user to search and find peak values for any time period.

DYNAMATE STATION HARDWARE

The Dynamate Blast Monitor has the following key features:

- Low power design
- Fully integrated solar panel
- Battery and controller
- Aesthetically pleasing design
- 1.7m pole
- No guy wires
- IP65 enclosure
- Relocatable.

CENTRAL SERVER/WEB SOFTWARE

The central Dynamaster server is a fully integrated internet web server and blast monitor management application. It has SMS and email capability and can manage multiple stations and users.

Blast result retrieval and display

The peak values for the most recent blast event are displayed on the users screen.

Two methods of blast results retrieval from the Dynamate stations are available:

Auto

This is the default mode. In this mode, the central server automatically uploads blast results from the Dynamates as they become available.

Blast results are typically uploaded and available for review within two minutes of the completion of the event. By default, events files are automatically deleted from the Dynamate as they are successfully retrieved. This action can be overridden by an appropriate user selection, leaving the event files in the Dynamate.
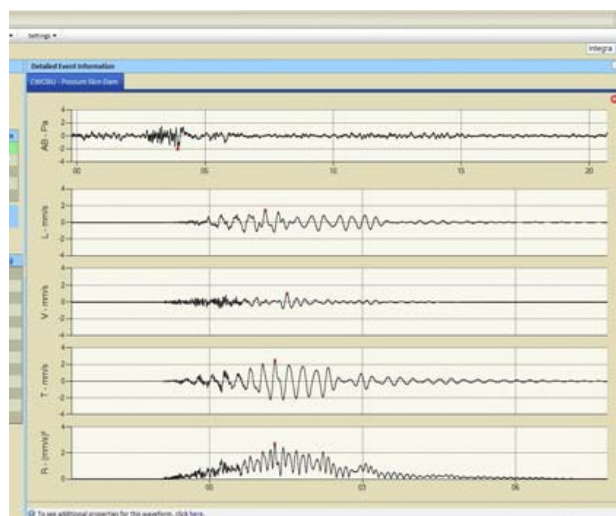
WEB SOFTWARE

Manual
In this mode, retrieval of blast events is initiated by the user.

Dynamate event listing
Users can view a listing of event files held by a Dynamate. Users can apply various parameters such as date range, peak values etc., to customise the listing.

Within this functionality, the user can specify operations such as delete file(s), upload file(s) etc,.


Dynamate histogram management
The storage of histogram data provides a powerful means of exploring data collected by Dynamates that has not necessarily been included in event files.
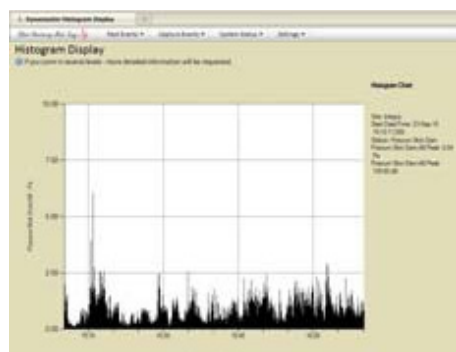
To locate data of interest, the user sets a date-time range, and the histogram data set relating to this date-time range, is retrieved from the Dynamate(s).

The histogram data set is displayed as a bar chart representing peak values. Clicking on a bar of interest causes the histogram data set to zoom in on the specified peak.

Using this process the user can successively drill-down retrieving histogram data sets of increasing granularity. The user can drill-down to the level of one histogram interval.
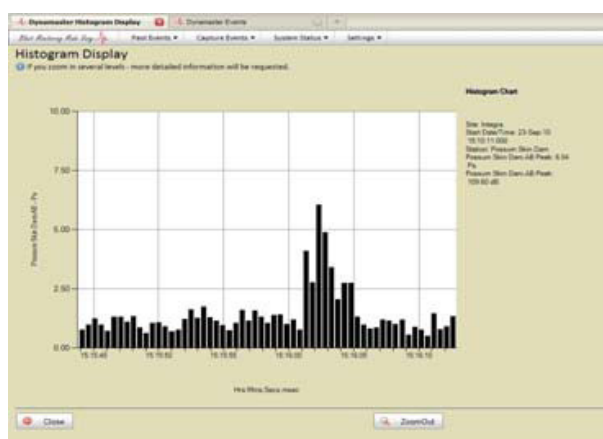
The above process can be applied to multiple Dynamates at once. In this case the histogram data sets from each Dynamate of the group are retrieved and presented.

Once the user has located the time period of interest, the user can force an event file, containing the data from that period, to be generated by the Dynamate.

The resulting event file can then be manually or automatically uploaded to the Dynamaster web server.

ENVIRONMENTAL REPORTING

User messaging

The user messaging functionality is a significant feature. Authorised users can be sent messages by either SMS or email.

The user nominates the triggers for which they wish to be messaged, and the desired message contents.

Messaging triggers and message content

Message triggers	Message content
New blast events Occurs when a new blast event has been uploaded	Date-time Station(s) Peak overpressure and vibration values
Low battery voltage	Date-time Alert message Dynamate station Battery voltage

ENVIRONMENTAL REPORTING SERVICES (ERS)

Our ERS division provides data collection and reporting services.

ERS perform all data management from data download, validation and reporting, to live data on the web and coordinated onsite repair and maintenance.

Every waveform generated and uploaded by the Dynamates is reviewed and audited by ERS staff.

We operate one of the largest networks of monitoring systems in the world, consisting of over 250 sites. The ERS division produces over 200 reports per month which are totally configurable including tables, graphs and transformed data.

Reports can be delivered in a number of formats including:

- Email
- Output directly onto a computer/network
- Hardcopy delivered by courier
- FTP transfer
- Website (live data).

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MANAGEMENT SYSTEM
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MANAGEMENT SYSTEM
AS/NZS 4801

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ISO14001