

# ARGUS CONDITION MONITORING SYSTEM

## INSPIRED SYSTEMS

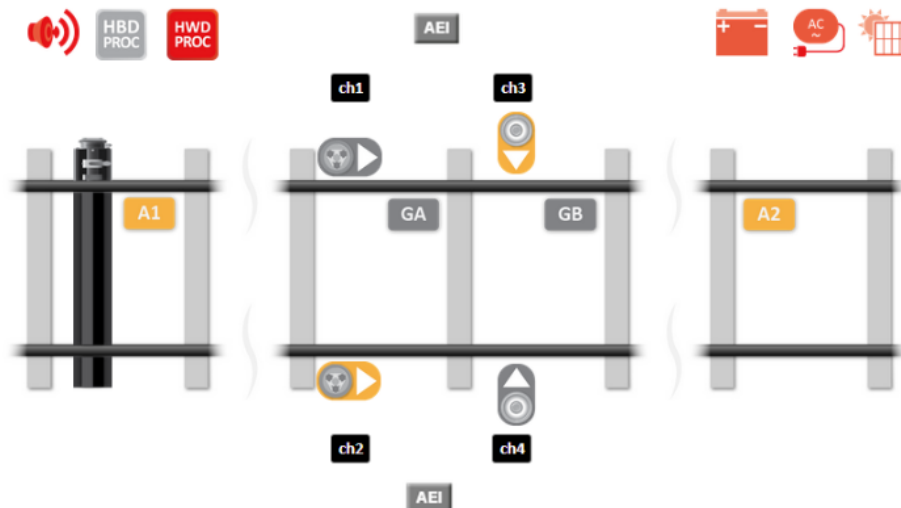
Argus is an essential, integral part of the Asset Protection central communications and telemetry platform. Argus establishes the framework for smart communications between field devices, office processing and the Central Train Control System.

### ARGUS SERVER SYSTEM

#### OVERVIEW OF ARGUS

Argus collects and compiles data from various types of wayside vehicle performance monitoring devices, to create a composite view of railway vehicle performance. This view can be selectively modified by the user to create custom event notifications and reports for individual vehicle performance or overall fleet performance.

The ability of Argus to collate the information is central to lower maintenance cost through easy identification of where problems occur. With Argus, the driver or Train Control can quickly identify which rail cart has a problem and even which axle is experiencing problems. Argus also pushes that information downstream to maintenance programs to allow the defective rail cart to be cut out or for the information to be used for predictive maintenance purposes.



Argus provides the timeline of when problems occur, enabling faster determination of the sequence of events preceding and following an alert or incident.

Argus will identify communications or telemetry failures in real time.

Argus is an industry standard platform used extensively by the major mining companies. The system is deployed at BHP Billiton, FMG, Rio Tinto and Queensland Rail to provide them with the most effective method of identifying potential problems and protecting their assets.

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### MAINTAINING UP-TIME

Argus has been developed to allow the maximum possible up-time through the concept of modularisation. This is achieved by dynamic loading and unloading of each module, and dynamic reconfiguration.

This provides maximum up-time by:

- Allowing modules to be added, upgraded or removed individually, without taking the whole system down.
- Allowing live addition, removal, and reconfiguration of telemetry stations.

### FEATURES

- Communicates with any interface
- Uses a high-throughput, low latency internal communications system
- Provides inter-module communications at extremely high message counts per second
- Can host an unlimited number of telemetry devices
- Is restrained only by the host platform.

### REPORTING

Argus contains extensive reporting mechanisms, and can interface to any type of notification system. This provides live exception reports, as well as periodic and ad-hoc performance statistics.

All reports open a new item in the Windows Task bar allowing easy switching between reports.

All reports list the train name, which includes HBD site, time and direction, as the title of the window.

All items are colour coded to help alarm or fault detection.

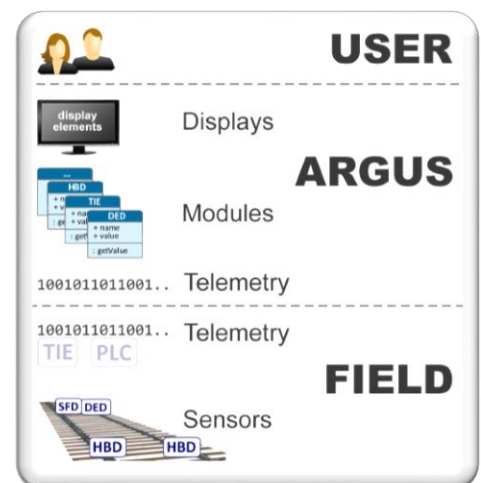
All report windows can be adjusted in size and data viewed to allow larger or split monitors to be used to full effect.

### USER INTERFACE

The Argus user interface combines powerful cutting edge features, with easy to use web based technology. This provides sophisticated, yet user-friendly access to the features exposed.

Secure login provides access to the system's features in three levels:

- Administrative
- Technical
- Observational



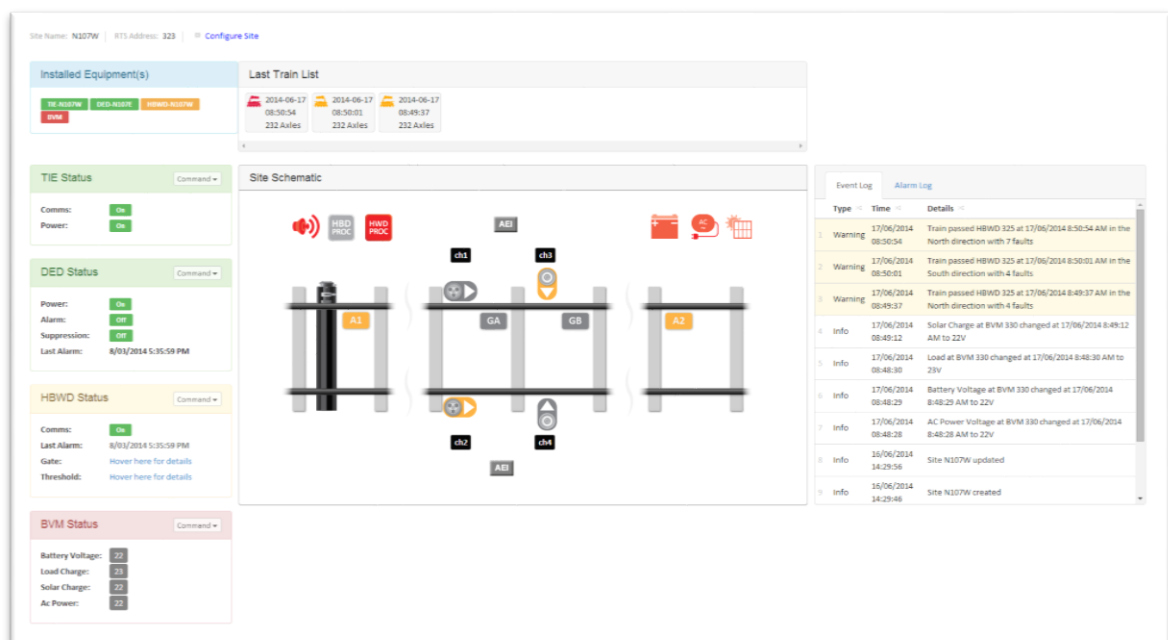
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### SITE VIEW.

The site view allows a quick overview of an entire site. This allows the user to quickly determine areas of interest. Argus is run as a dynamic site – this means that as the status of equipment changes, users will see this live on their site view via colour changes and event and alarm logs.

- **Red:** Category 1 warning
- **Yellow:** Category 2 alert
- **Green:** Functioning to requirements
- **Grey:** Inert device



### ALARM LOG

There are two types of alarms generated by the Argus system to Train Control. These are State based alarms, and Train based alarms.

State based alarms will be generated and cleared by the field equipment in response to a change of state. This includes:

- High voltage
- Low Voltage
- Charge Fail
- Dragging Equipment Detector (DED)
- Microlock (MLK)
- Stream Flow Detector (SFD)
- HBD Site Communication Fail (HDB Equip)

Train based alarms are generated when an alarm is detected on a train. This includes:

- Hot Bearing alarms
- Hot Wheel alarms

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As there is no subsequent way for these alarms to restore themselves, the user must acknowledge each alarm in turn, to clear the state. To do this, the user selects the 'Clear Train Alarms' option from the 'Alarms' menu. This will restore the site bit in the Train Control system, clearing the alarm for that site. The user should be authorised by Train Control before performing this operation, to ensure that the train with the alarm has been checked.

### EVENT LOG

The Event Log is a list containing any events Argus considers important.

Important events include:

- Train processing successes and errors
- Communications issues and events
- Debug information if sub systems set to 'verbose' reporting
- Alarms set or clear events.

The list is echoed in a log file, generated on a daily basis and stored in the log file folder. The list is intended to allow a user to review significant events. Each item is colour coded:

- **Red:** Critical fault
- **Yellow:** Warning
- **Green:** Functioning to requirements
- **White:** Information

Each item is listed with the type, time and details of the event as it occurred (in real time).

Event Log			Alarm Log		
Type	Time	Details	Type	Time	Details
1 Alarm	16/06/2014 15:10:48	Solar Charge at BVM 323 changed at 16/06/2014 3:10:48 PM to 22V	1 Warning	N107W 17/06/2014 08:50:54	Train passed HBWD 325 at 17/06/2014 8:50:54 AM in the North direction with 7 faults
2 Alarm	16/06/2014 15:10:48	Battery Voltage at BVM 323 changed at 16/06/2014 3:10:48 PM to 22V	2 Warning	N107W 17/06/2014 08:50:01	Train passed HBWD 325 at 17/06/2014 8:50:01 AM in the South direction with 4 faults
3 Alarm	16/06/2014 15:10:47	AC Power Voltage at BVM 323 changed at 16/06/2014 3:10:47 PM to 21V	3 Warning	N107W 17/06/2014 08:49:37	Train passed HBWD 325 at 17/06/2014 8:49:37 AM in the North direction with 4 faults
			4 Info	N107W 17/06/2014 08:49:12	Solar Charge at BVM 330 changed at 17/06/2014 8:49:12 AM to 22V
			5 Info	N107W 17/06/2014 08:48:30	Load at BVM 330 changed at 17/06/2014 8:48:30 AM to 23V
			6 Info	N107W 17/06/2014 08:48:29	Battery Voltage at BVM 330 changed at 17/06/2014 8:48:29 AM to 22V
			7 Info	N107W 17/06/2014 08:48:28	AC Power Voltage at BVM 330 changed at 17/06/2014 8:48:28 AM to 22V
			8 Info	N107W 16/06/2014 14:29:56	Site N107W updated
			9 Info	N107W 16/06/2014 14:29:46	Site N107W created