ONLINE COAL ASH & MOISTURE ANALYSIS

- AshScan Duo™

A Division of
Realtime Group Ltd
ACN: 107 618 502

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REALTIME INSTRUMENTS

- Specialists in
  - Online Detection, Measurement and Analysis Instrumentation
  - Industrial Radiation Services, Training and Equipment.
- Customers
  - Mining and Resources
  - Industrial Manufacture (Building materials, Food, Biofuels etc.)
  - Domestic and International
- Located in Australia – Mackay (Qld) & Perth (WA)
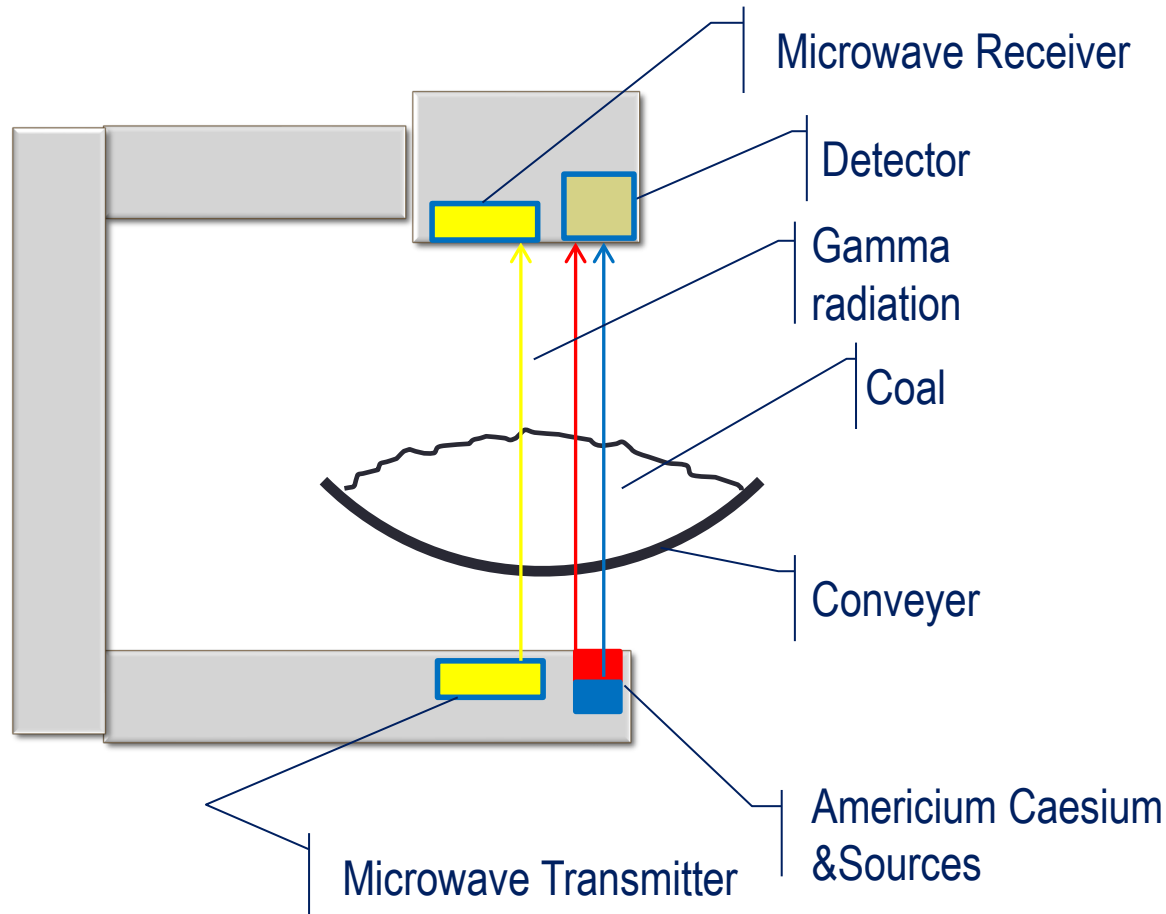- Technical and Sales Agents throughout the world

AshScan Duo™

DUAL Energy Transmission ("LET" = Low Energy Transmission)

AshScan Duo™ - WORKING PRINCIPLE

Measures the absorption of gamma rays by the coal

- Microwave Receiver
- Detector
- Gamma radiation
- Coal
- Conveyer
- Americium Caesium &Sources
- Microwave Transmitter

AshScan Duo™ - WORKING PRINCIPLE

Two radioactive sources used:

- Am^{241} : low energy gamma radiation.
  - Absorption of these gamma rays occurs due to the presence of the major ash-forming elements (Si, Fe, Al, Ca, Na, Al, Si, Ti) **AND** the amount of coal (loading + density) on the belt

- Cs^{137} : high energy gamma radiation.
  - Absorption of the high energy gamma rays occurs due to the amount of coal (loading + density) on the belt **ONLY**.

The Cs^{137} allows us to mass compensate the Am^{241} measurement

This is then correlated to total Ash content by calibrating with a laboratory Ash analysis.

REAL*time*INSTRUMENTS

AshScan Duo™ - WORKING PRINCIPLE

- A microwave signal is passed from the bottom antenna through the material and received in the top antenna.

- Water in the material reduces the amount of signal (attenuation)

- Water in the material also shifts the phase of signal (phase shift)

REAL*time*INSTRUMENTS

AshScan Duo™ - WORKING PRINCIPLE

- Cs^{137} high energy gamma radiation measures amount of coal (loading + density) on the belt.

- By combining the change in microwave signal with the amount of absorption of the Cs-137 gamma rays the percentage moisture is calculated.
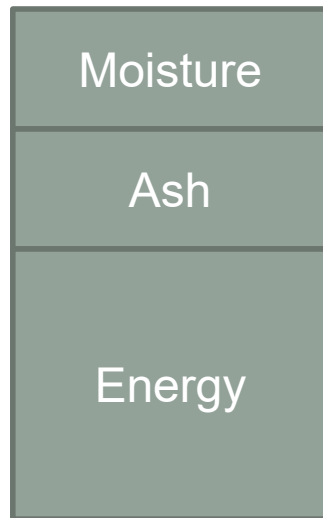
AshScan Duo™ - Measuring Ash%

Ash% = Offset + slope * Americium /Caesium

AshScanDuo™ - MEASURING MOISURE%

- Moisture% = Slope * Microwave/Caesium + Offset

Measuring Calorific Value

Moisture
Ash
Energy

The MAFCV for the coal type is input into CV calculation equation

Ash & moisture is measured by the AshScan™ Duo

Energy is calculated and reported in real time according to the equation below

Calorific Value = ((100-Ash-Moisture)/100) * MAFCV

MAFCV = Moisture Ash Free Calorific Value

AshScan™ - Outputting of Results

- 2 x 4-20mA to send 2 of either ash, moisture, or CV

- If serial or Ethernet connection to Control Unit no limit on what can be sent to the plant DCS

- CV can be either calculated in the AshScan Duo™ or can be calculated in the plant DCS

AshScan Duo™ - GENERAL FEATURES

Touch Pad and Screen Display

- No laptop required

- Cabinet does not need to be opened to operate

- Password protected to prevent unauthorised access

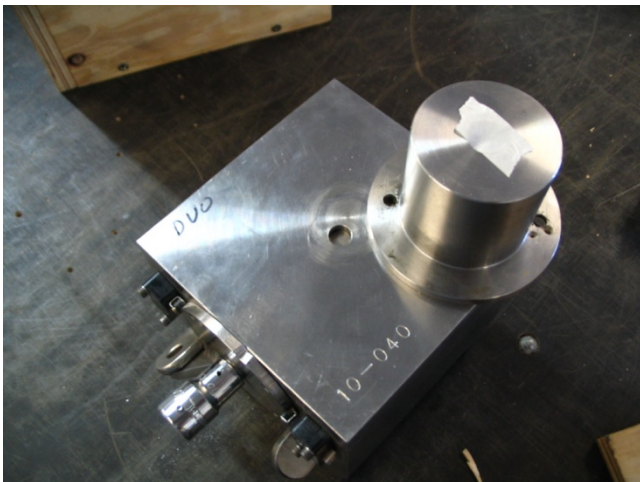# AshScan Duo™ - HMI

Touch Pad and Screen Display

- No laptop required

- Cabinet does not need to be opened to operate

- Password protected to prevent unauthorised access
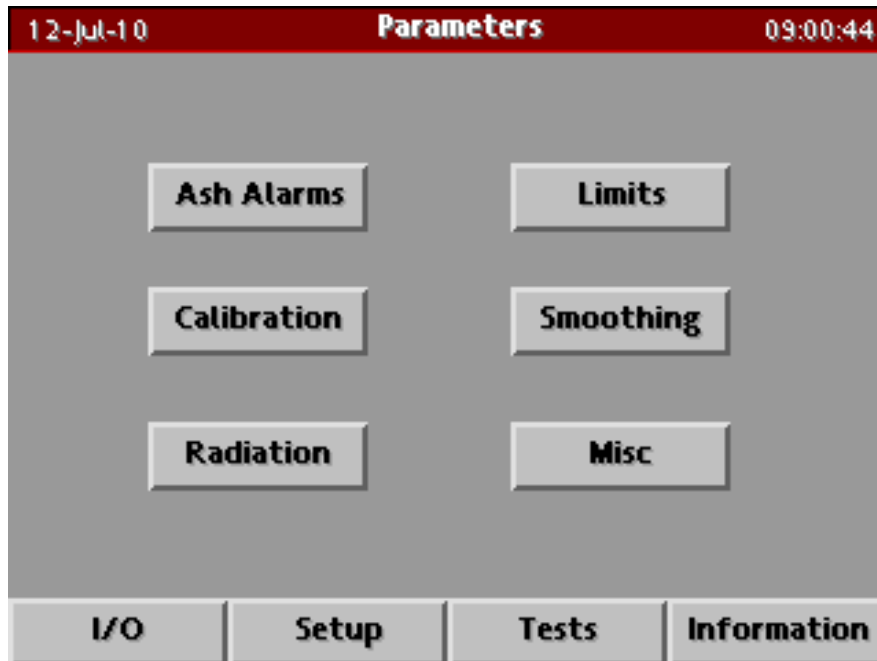
AshScan Duo™ - SAFETY

Safety

• Source can be removed while conveyor is running for easy service & in case of emergency

• Source Block and Source Holder fabricated to highest international standards

AshScan Duo™ - HMI

Practical

- Designed by commissioning engineers for on-site engineers
- Step-by-Step Instructions on HMI
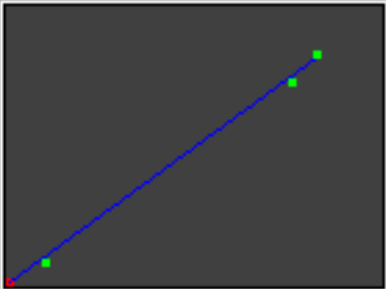
AshScan Duo™ - HMI

On Board Calibration

- Regression equation calculated by the HMI

AshScan™ - HMI
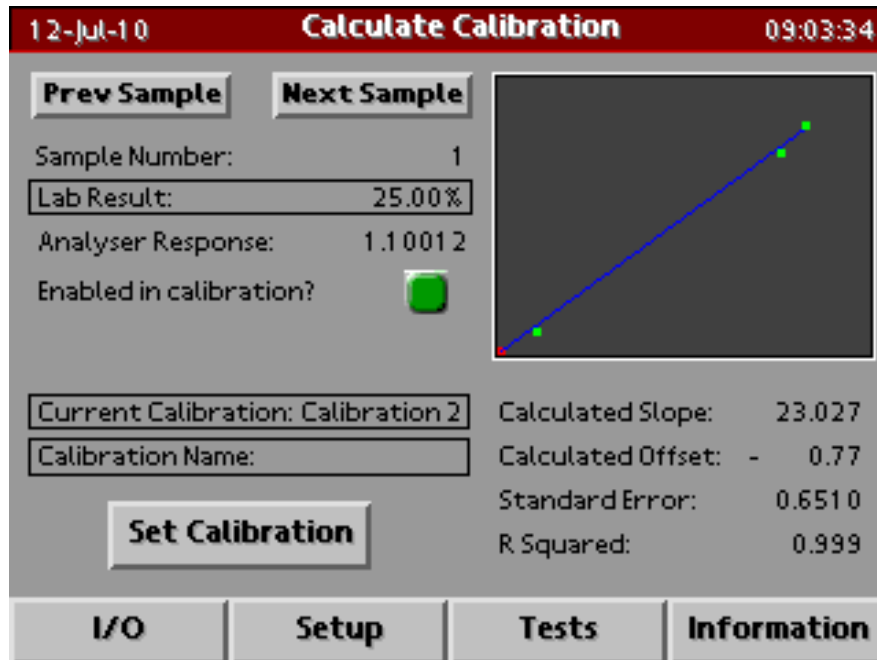
Accurate & Reliable

- Accuracy depends on the quality of set up & calibration

- The easier the analyser is to set up and calibrate, the better the quality of calibration

- The Ashscan has a small number of set up parameters and intuitive calibration through the HMI

AshScan Duo™ - CONNECTIVITY

- **Out (Standard)**
  - 2 x 4-20mA to send 2 of either ash, moisture, or CV
  - If serial or Ethernet connection no limit on what can be sent to the plant DCS

- **Out (optional)**
  - Serial (eg. ModBus)
  - Ethernet
  - 3G modem

    Data is sent via 3G to a secure website managed by RTI.

    Clients have their own login and password

    Independent of Client's network; no security issues, unaffected by changes in network

AshScan Duo™ – FEATURES AND BENEFITS

Feature		Benefit
Dual Energy Gamma Ray Technology (DUET)	►	Worlds most proven technology for measuring coal ash
MoistScan Microwave Transmission Technology	►	Full Transmission 100% material analysed
Easy to Install	►	Supplied fully assembled 90kg; 2 person install
• 4-20mA and CF card logging standard. • Serial & Ethernet connection options to Plant, compatible with most popular communication protocols • 3G modem option.	►	Seamless, hassle-free plant integration

REAL*time*INSTRUMENTS

AshScan™ – FEATURES AND BENEFITS

Feature		Benefit
Continuous Data Logging to CF Card	►	Excellent tool for commissioning and calibration assistance & diagnostics
Source can be installed & removed whilst conveyor is running	►	Belt shut down not required Safety – eg in instance of fire
HMI on Cabinet with simple Menu Structure and Graphical Interface	►	Source operation, forcing analysis, standardization, calibration selection all done from HMI Easy commissioning & set up Easy calibration No special software, cabling or hardware required

REALtimeINSTRUMENTS

AshScan™ – FEATURES AND BENEFITS

Feature		Benefit
Small number of set up parameters	▶	Very easy to set up. Virtually eliminates "set up error" – a major reason for poor performance in competitor gauges No external "expert" required
Step by step instruction on HMI to commission & calibrate	▶	Very easy set up No external "expert" required
Calibration regression equation is calculated within HMI	▶	No need for a PC and spreadsheet analysis to develop regression equation

RH
REALtimeINSTRUMENTS

AshScan™ - SUMMARY

- Suited for all coal applications; Provides accurate ash measurement of bulk coal streams in real time.

- Detector sits above belt; may need protection from overburden (eg on ROM)

- Components are built and pre-aligned into a rigid steel 'C' frame

- Communications to plant control systems via standard industrial protocols.

- Touch Pad and Screen Display (no PC required)

- Designed and built to withstand true industrial environments.

REAL*time*INSTRUMENTS

AshScan Duo- SUMMARY

- Sensitive and fast
  - Rolling 10-30 second acquisition typical
  - good for fast coal sorting applications
  - Can work with lower burdens; 50-350mm bed depth
- May require recalibration for coal from a different seam (if the % of Fe or Ca in Ash varies significantly)
- Requires Radiation License
- AshScan Duo model also incorporates Moisture Analysis using our "MoistScan" microwave technology

AshScan Duo™ – Installation Examples

AshScan™ - China

Power Plant – Huanian Province China	
Coal Type	Medium Rank Coking
Ash %	25
Moisture %	20
Precision	0.75% (1SD)

AshScan™ - Australia

Hail Creek – Australia	
Coal Type	High Quality Coking
Ash %	9
Moisture %	12
Precision	0.75 (1SD)

AshScan Duo™ - USA

Eagle Butte Mine - USA	
Coal Type	Anthracite
Ash %	6
Moisture %	30
MAFBTU	8400btu/lb
Precision	0.65 (1SD)

AshScan Duo™ - USA

Mine – Baton Rogue USA	
Coal Type	Sub-bituminous
Ash %	8-16
Moisture %	15-30
MAFCV	8300 – 11500 btu/lb
Precision	0.85 (1SD)

AshScan Duo™ - Australia

Mine – Berrima Coal	
Coal Type	Coking Coal
Ash %	5 – 12%
Moisture %	12-18%
Precision	0.8% (1SD)

AshScan Duo™ - Australia

Mine – Muswellbrook Coal	
Coal Type	Brown Coal
Ash %	25-40%
Moisture %	8-15%
Precision	1.3% (1SD)

AshScan Duo™ - Australia

Mine – Tahmoor Coal	
Coal Type	Coking
Ash %	6-12%
Moisture %	5 - 8%
Precision	0.75% (1SD)

AshScan™ - Examples

- Newlands Coal Mine – Qld, Australia
- Callide Power Station – Qld, Australia
- Westcliff Coal – NSW, Australia
- Dendrobium – NSW, Australia
- Westside – NSW, Australia
- Invincible Colliery – NSW Australia
- Berrima Colliery – NSW Australia
- Powder River Coal – USA
- Dugout Canyon Mine – USA
- Shangjiibei Mine – China
- Macmet – India

Service and Support in India

- VISHWA
  - Site technical support

- RTI
  - Remote Support via external connection to analyser