

Welcome to Scantech, Australia



Commercial in Confidence



Core Business

Providing technical and commercial solutions
for process optimization through real time
analysis of bulk materials.

Over 1,000 Analysers Sold Worldwide



Product Range

CEMENT

- **GEOSCAN-C** Full elemental analysis for stockpile and raw mix control
- **TBM 210/230** Through Belt Moisture monitoring

MINERALS & STEEL

- **GEOSCAN-M** Full elemental analysis for grade control
- **TBM 210/230** Through Belt Moisture monitoring
- **CM100** Coke Moisture analysis for conductive materials
- **IRONSCAN** Elemental analysis for grade control

COAL & POWER

- **COALSCAN 9500X** Full elemental analysis for quality control
- **COALSCAN 1500/2100/2800** Ash and/or moisture measurement in coal
- **TBM 210/230** Through Belt Moisture monitoring
- **CIFA 350** Carbon In Fly Ash monitoring for power stations

Product Technologies

Product	Measurement Technique
COALSCAN 1500, IRONSCAN 1500	Natural Gamma Ray Detection
COALSCAN 2100/2800	Dual Energy Gamma Ray Transmission
GEOSCAN, COALSCAN 9500X	Prompt Gamma Neutron Activation Analysis (PGNAA)
TBM 210/230	Microwave Transmission
CM 100	Fast Neutron and Gamma Transmission
CIFA 350	Microwave Resonance

A Global Presence

Americas

- United States
- Canada
- Costa Rica
- Dominican Republic
- Chile
- Mexico
- Argentina
- Uruguay
- Colombia
- Peru
- Brazil
- Venezuela

Africa

- South Africa
- Senegal
- Egypt
- Sudan
- Tunisia
- Ethiopia
- Libya

Middle-East

- Iran
- Iraq
- Saudi Arabia
- Jordan
- Yemen

Europe

- Ireland
- Spain
- France
- Slovakia
- Czech Republic
- Serbia
- Bulgaria
- Hungary
- Romania
- Russia
- Turkey
- Poland
- Lithuania
- Azerbaijan
- Germany
- United Kingdom

Asia & Oceania

- Australia
- China
- Thailand
- Vietnam
- South Korea
- Philippines
- Taiwan
- Malaysia
- New Zealand
- Indonesia
- Kazakhstan
- India
- Bhutan
- Japan
- Laos

Elemental Analysis using Prompt Gamma Neutron Activation Analysis (PGNAA)

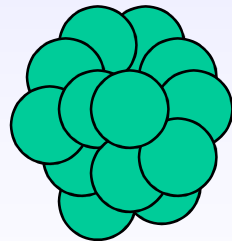
PGNAA - How it works

- A Californium 252 source emits neutrons
- Neutrons are absorbed by elements in the conveyed bulk material
- Each element emits a unique gamma ray spectrum

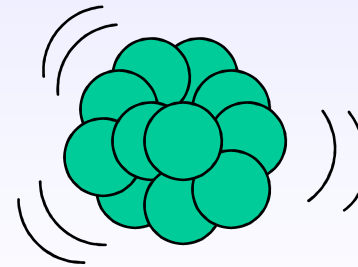
Neutron



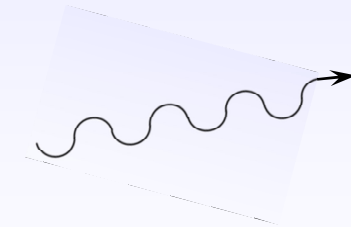
Element Nucleus



Nucleus becomes
excited

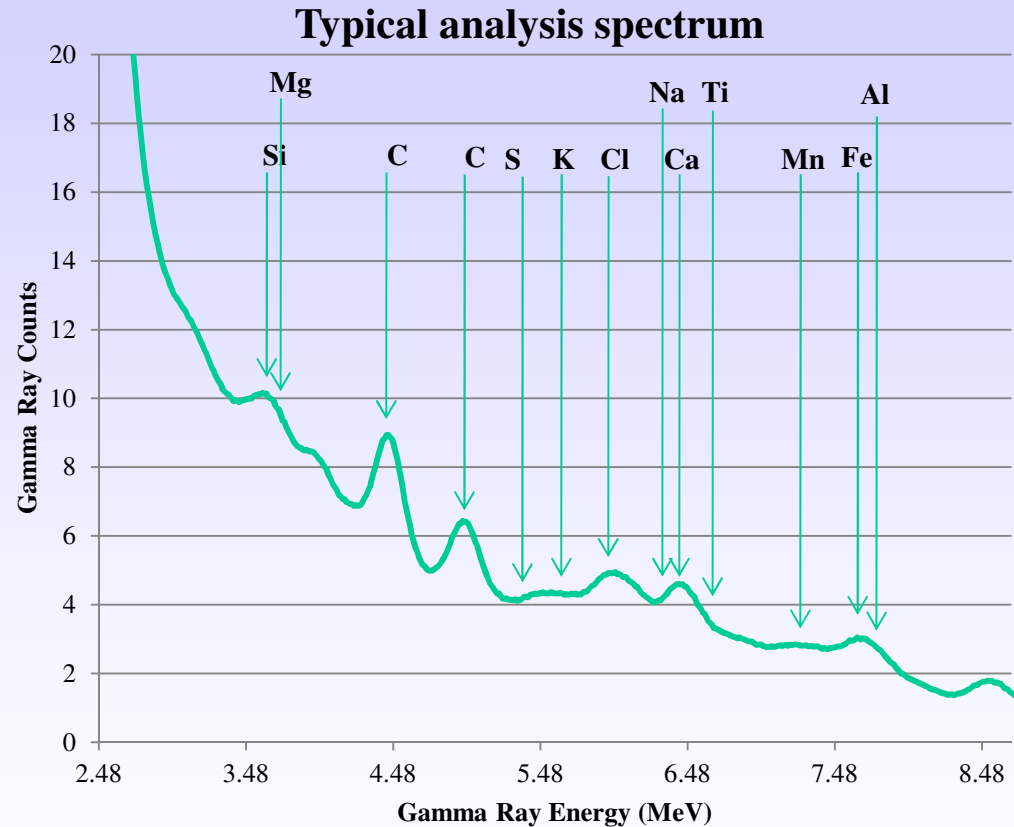


Prompt Gamma
ray emitted



PGNAA - How it works

- Entire gamma ray spectrum is analysed to determine bulk material composition
- Dry Basis Oxide results are reported



Elements Measured



Excellent
Very Good
Good
Satisfactory
Poor
Not applicable

Periodic Table Of The Elements PGNAA Repeatability

H Hydrogen 1																	He Helium 2	
Li Lithium 3	Be Beryllium 4											B Boron 5	C Carbon 6	N Nitrogen 7	O Oxygen 8	F Fluorine 9	Ne Neon 10	
Na Sodium 11	Mg Magnesium 12											Al Aluminum 13	Si Silicon 14	P Phosphorus 15	S Sulfur 16	Cl Chlorine 17	Ar Argon 18	
K Potassium 19	Ca Calcium 20	Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	Ga Gallium 31	Ge Germanium 32	As Arsenic 33	Se Selenium 34	Br Bromine 35	Kr Krypton 36	
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Tc Technetium 43	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48	In Indium 49	Sn Tin 50	Sb Antimony 51	Te Tellurium 52	I Iodine 53	Xe Xenon 54	
Cs Cesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Re Rhenium 75	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86	
Fr Francium 87	Ra Radium 88	Ac Actinium 89																
			Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Pm Promethium 61	Sm Samarium 62	Eu Europium 63	Gd Gadolinium 64	Tb Terbium 65	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	Tm Thulium 69	Yb Ytterbium 70	Lu Lutetium 71		
			Th Thorium 90	Pa Protactinium 91	U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103		



Commercial in Confidence



PGNAA Features

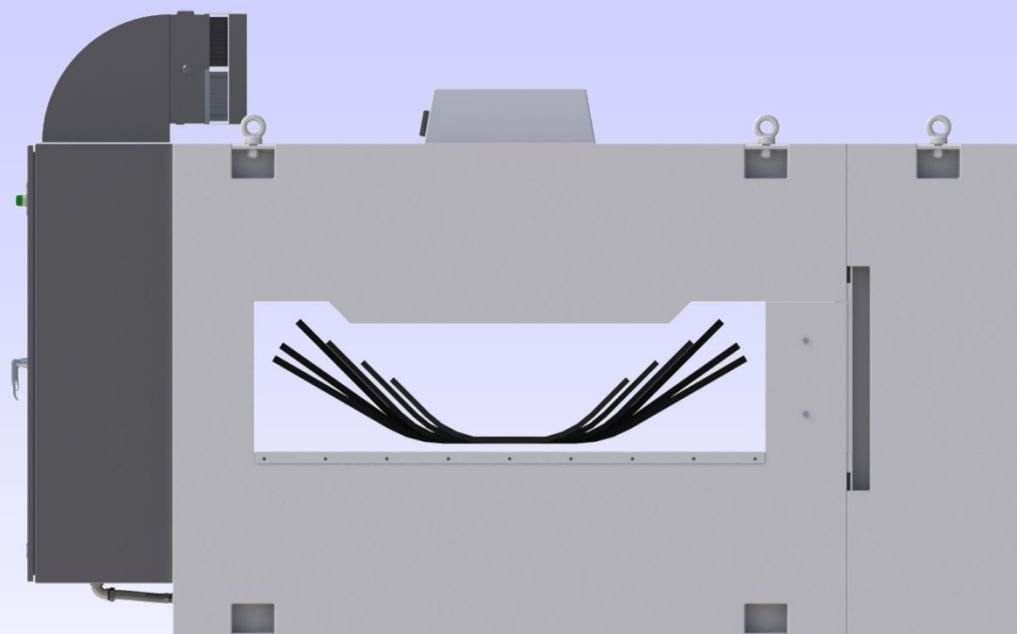
- Suitable for on belt analysis of a wide range of materials such as coal, iron ore, limestone, raw mix, metal concentrates, iron sinter materials.
- Provides accurate elemental analyses such as Si, Al, Fe, Ca, Mg, Na, Ti, K, Cl, S, Mn, Ni, P, Cu.
- Can be combined with a microwave moisture measurement.
- Provides accurate on line analysis of coal for ash, moisture, specific energy, sulphur and oxides in ash.

Introducing GEOSCAN

- **Real-Time On-Belt Analysis**
- **Monitors the full stream to avoid sampling errors and expenses**
- **3 frame sizes available to suit belt width and material depth**
- **Small footprint and very light**
- **Easy to install**
- **No contact with the belt**
- **High performance multi-detector system with digital electronics**

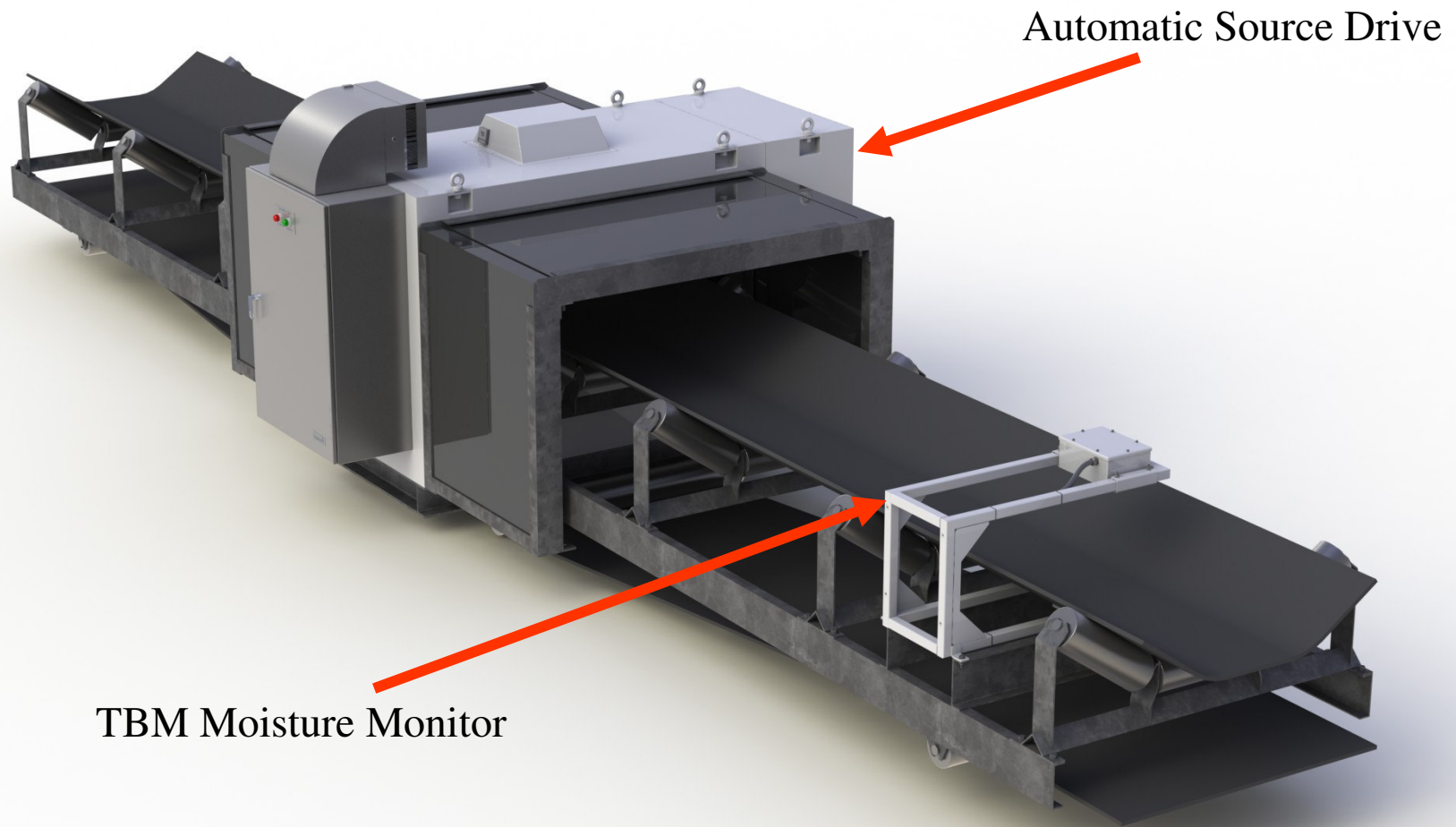


GEOSCAN – No belt contact



***Accommodates a range of belt widths & trough angles
No tunnel or idler modification required
No wear parts (sacrificial tunnel slider panels)
Belt clips & staples can not damage the Geoscan***

GEOSCAN – Options



GEOSCAN – TBM



GEOSCAN – Control Cabinet

Main ELCB

Input / Output
Controller

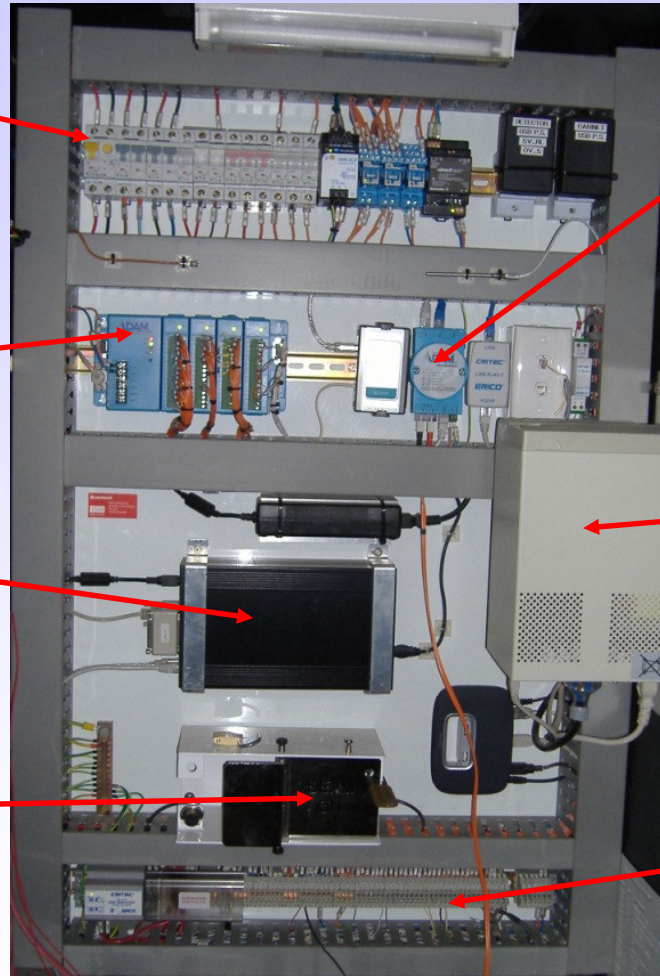
Analyser PC

Source access

Ethernet / Fibre hub

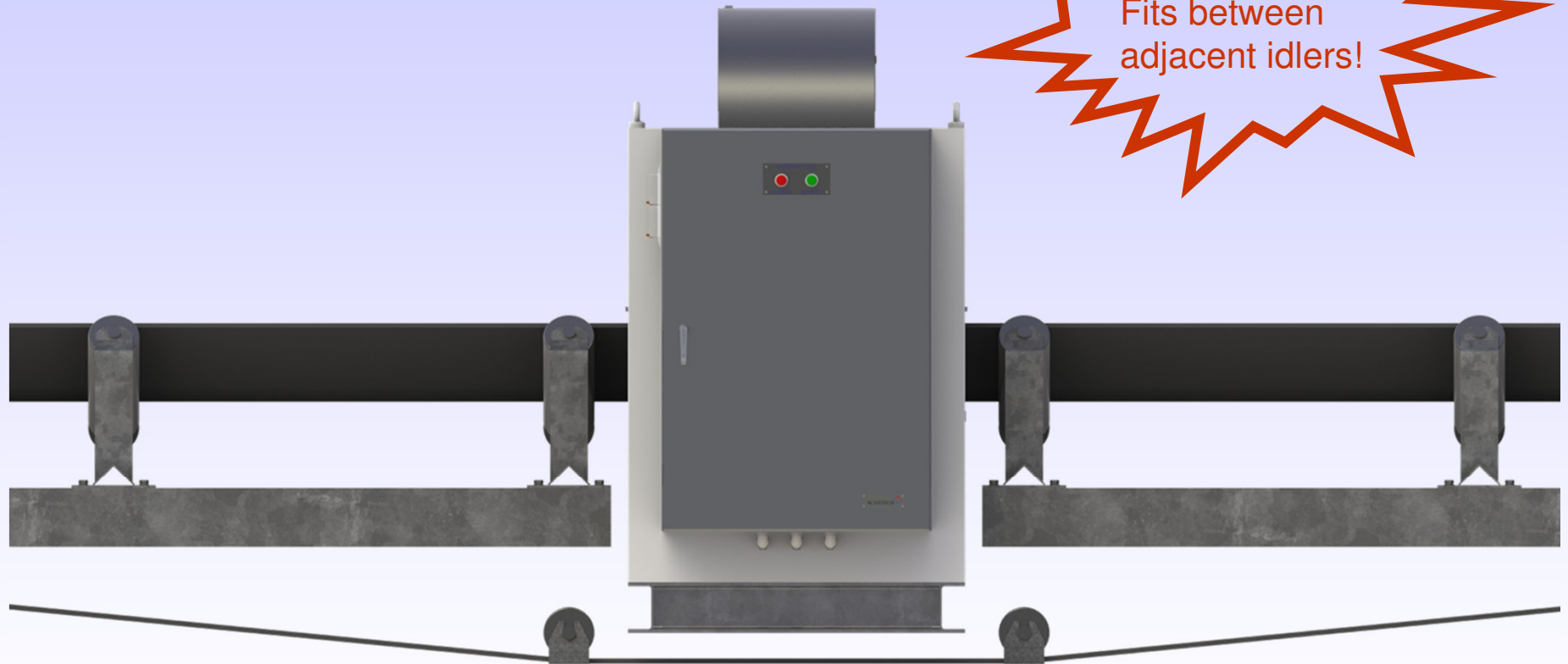
Uninterruptible
Power Supply

Plant Input Wiring



GEOSCAN – Simple Installation

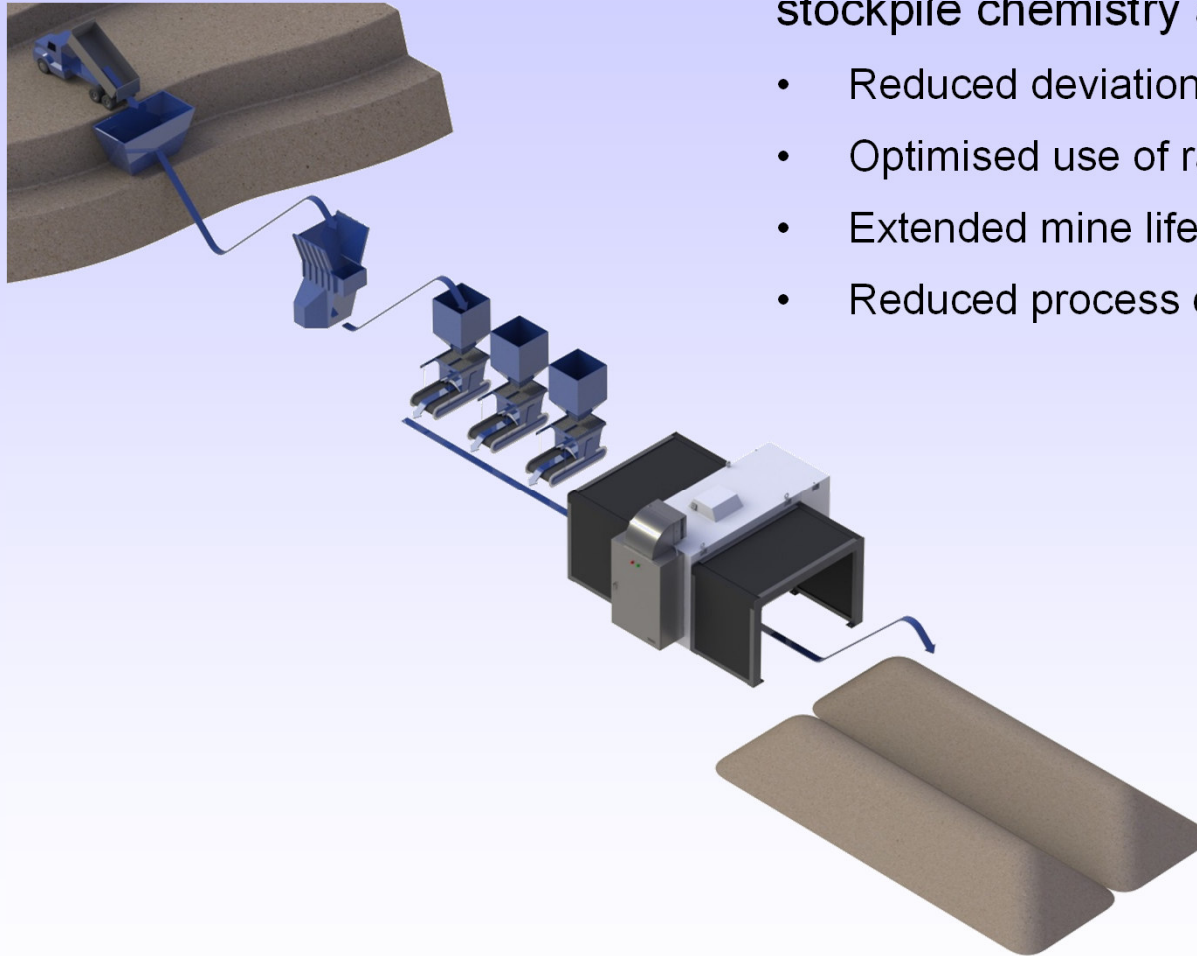
Fits between adjacent idlers!



GEOSCAN – Health and Safety

- Steel enclosure filled with fire-resistant Cast Neutron Shielding
- Polyethylene tunnel extensions reduce the radiation to safe levels
- Optional automatic source drive kit
- Beam On / Off door lights clearly indicate source location
- Radiation Safety training provided during commissioning and on request

GEOSCAN (Stockpile control)



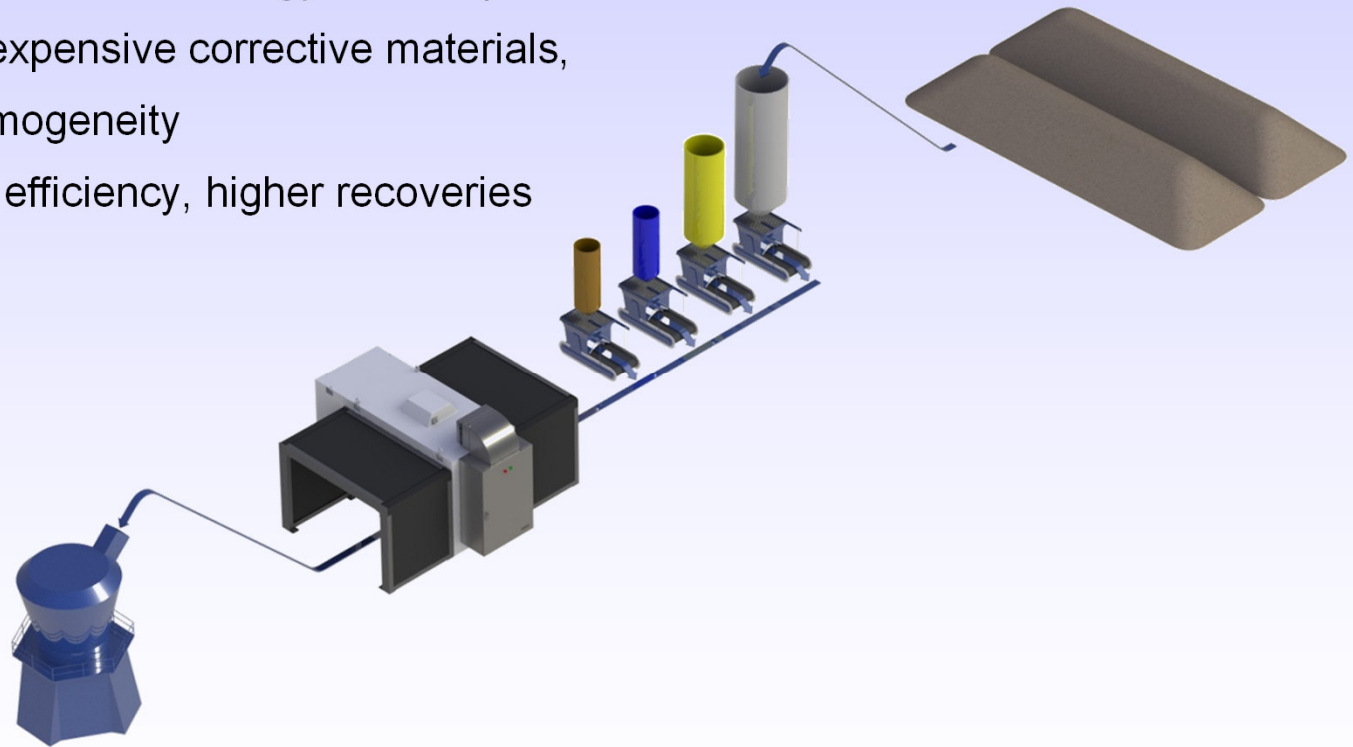
Real-time updates of average stockpile chemistry allows:

- Reduced deviations within stockpile
- Optimised use of raw materials
- Extended mine life
- Reduced process costs and energy consumption

GEOSCAN (Blending or additive control)

Real-time analysis of combined chemistry allows:

- Control of blended quality (reduced variability)
- Reduced process costs and energy consumption
- Minimised use of expensive corrective materials,
- Improved feed homogeneity
- Improved process efficiency, higher recoveries



GEOSCAN-C - Static Calibration

- Typically 3-5 static samples are used
- Samples span expected chemistry range
- Static samples analysed at various loads for belt load compensation
- Samples are analysed in factory and again on site during commissioning



Bagged samples

GEOSCAN – Dynamic Calibration

- For most applications, samples are collected during normal operation at higher frequency over short time interval
- Plant laboratory performs XRF/typical analysis
- Geoscan results are adjusted to best match XRF analysis
- Typically performed approx. every 6 months

Joint Assessment Process

STAGE I – data assessment

- Data review of detailed analyses to establish that Targets and Guarantees are achievable

STAGE II - testwork on ore samples

- Send samples to Adelaide
- or elemental analysis, dual lab analyses for comparison with GEOSCAN data
- Performance Guarantee presented – compare with Targets

Factory Test Program

- Scantech offers to perform tests on your ore using a full sized analyser at its Adelaide Factory.
- Test program needs 10 samples, each representing the load of one metre of belt length.
- Your only cost would be shipping the samples to us, after taking a sample of each and analysing it.
- Scantech would cover all other costs, including the technical report.

Performances

Can be used for on-line analysis of:

- Nickel, copper, zinc, lead, manganese, ores and concentrates
- Iron and other ferrous ores
- Phosphates, mineral sands, bauxite
- Coal and Cement
- applications where elemental content or ratios are important for process control on a conveyor stream

WHY SHOULD YOU CHOOSE A GEOSCAN

SMALL FOOTPRINT VERY LIGHT	<ul style="list-style-type: none"> • Compact main frame – Only 1m along the belt. • 2,500 Kg plus 1,200 Kg shielding panels for Geoscan-M • 3,400 Kg plus 1,300 Kg shielding panels for Geoscan-M -L • 4,000 Kg plus 1,500 Kg shielding panels for Geoscan-M -XL
NO CONTACT WITH THE BELT	<ul style="list-style-type: none"> • 30mm distance between tunnel and underneath of the belt. • No need for sliders. No wear parts. • No need to customize the tunnel to the belt size; • Geoscan-M 600mm to 1400mm belt, bed depth to 280mm • Geoscan-M -L 600mm to 2200mm belt, bed to 380mm • Geoscan-M -XL belt to 2400mm, bed to 530mm.
MULTI-DETECTORS CONFIGURATION	<ul style="list-style-type: none"> • The Geoscan can keep on running with one detector out of order • No need for keeping detectors as spare parts, no failures yet • No need to recalibrate when replaced
DIGITAL MULTI CHANNEL ANALYSER DMCA	<ul style="list-style-type: none"> • Better linearity • Better spectral resolution • Simplified electronics
HIGH PERFORMANCE DETECTORS	<ul style="list-style-type: none"> • BGO Type – Higher crystal density • Better signal to noise ratio and linearity
WORLD LEADING CUSTOMISED SUPPORT	<ul style="list-style-type: none"> • First year technical support included ensures optimal performance • 24 month standard warranty • Customised Product Support Agreements • Emergency Spares only

Through Belt Moisture (TBM 210 & TBM 230) Analysers

Microwave transmission

- **Scantech's Through Belt Moisture (TBM) analysers use the Microwave Transmission technique to measure the moisture content of bulk materials on moving conveyor belts**
- **Scantech's TBM210 and TBM230 use high and low frequency microwaves, respectively, to suit requirements**
- **Microwaves interact with free (surface) water molecules, causing them to oscillate**
- **Water molecules which oscillate will be detected, so ice and inherent (chemically bound) moisture are not detected; Microwave Transmission is not suitable for electrically-conductive materials**
- **Changing moisture levels influence the microwave beam's attenuation and delay (phase shift), which are both measured by the TBM**

Scantech's TBM developments

First Generation

- 1992 – Scantech licensed microwave technology from CSIRO (“DC” technology using microwave diodes, subject to drift and limited dynamic range)

Second Generation

- 1995 – Scantech-designed microwave mixer technology to overcome stability problems with microwave diodes and to increase dynamic range

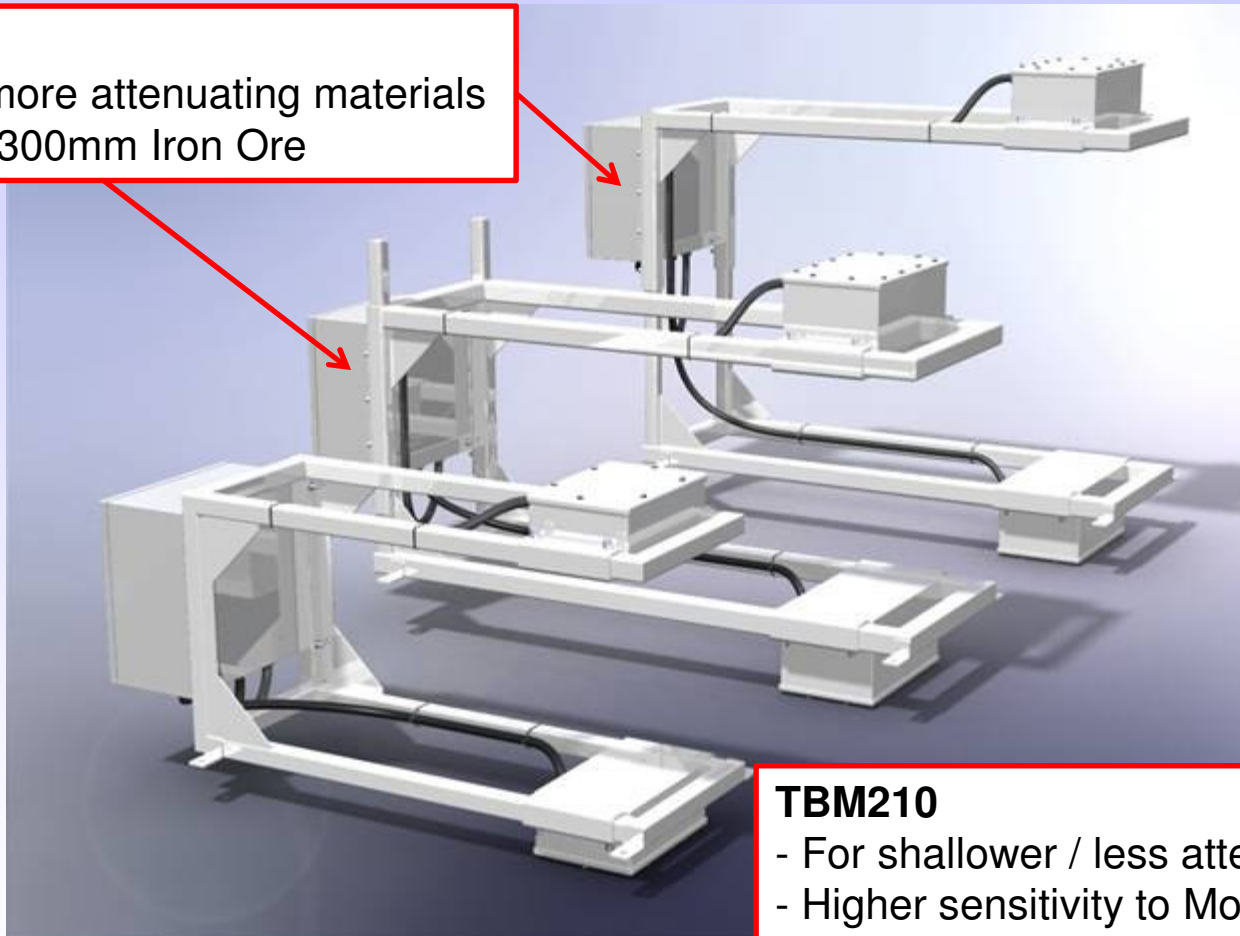
Third Generation

- 2005 – TBM210 developed with fully-digital frequency synthesis and signal analysis in a compact board to provide excellent stability (removing the need for temperature control and regular recalibration) and further increase dynamic range
- 2008 – TBM230 low frequency version developed to complement the TBM210
- 2011 – TBM210/230 became PC-based to offer greater ease of use and plant interfacing options

TBM Series

TBM230

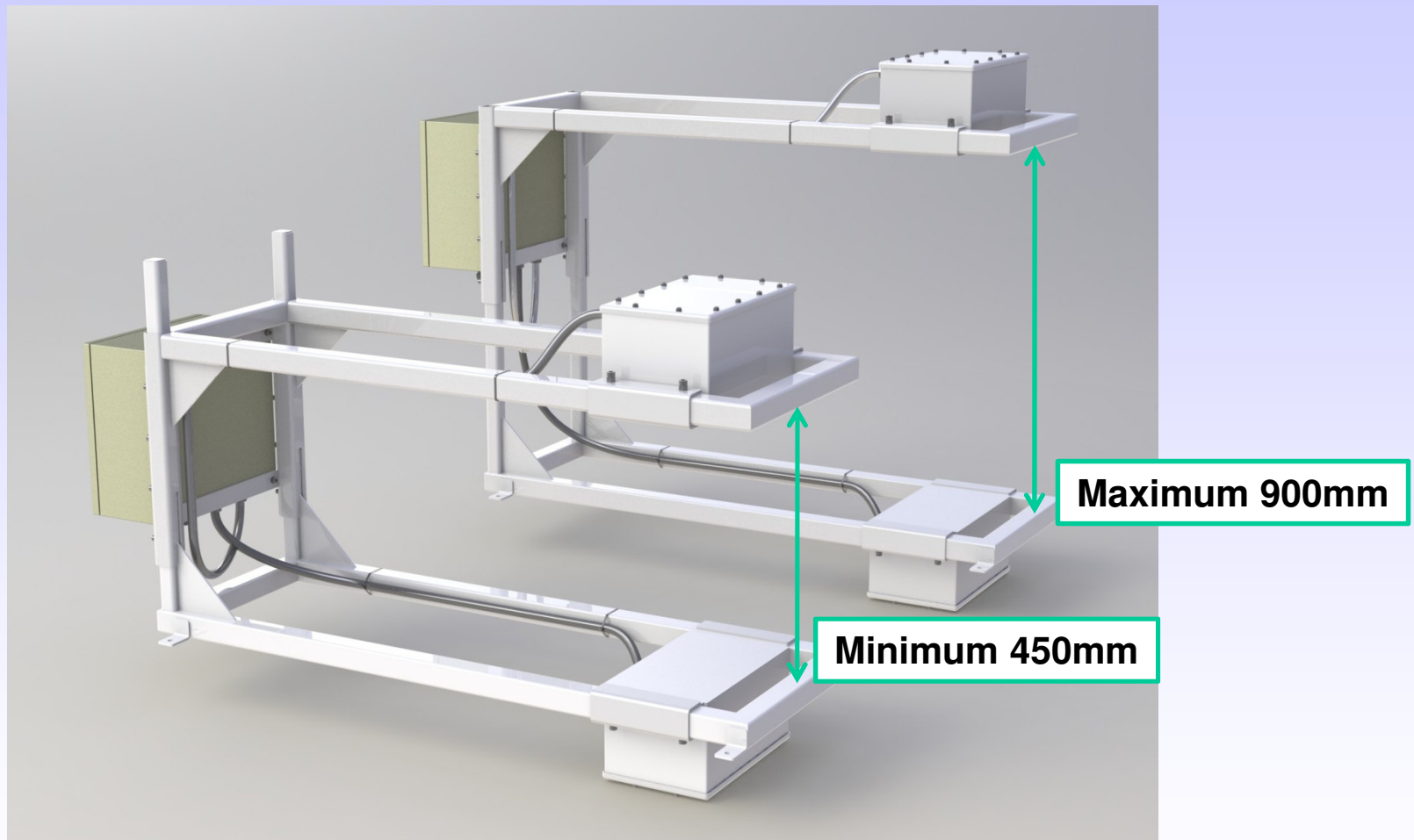
- For deeper / more attenuating materials
For example, >300mm Iron Ore



TBM210

- For shallower / less attenuating materials
- Higher sensitivity to Moisture

TBM230 Adjustable Frame



TBM Electronics Cabinet - NEW



Plant Interface modules:

- Digital Inputs (Belt Run)
- Digital Outputs (Critical Alarm)
- Analogue Inputs (TPH / Depth)
- Analogue Outputs (%Moisture)
- Modbus protocol over RS422, Ethernet, Optical Fibre

Industrial PC

- Reliable
- Flexible configuration
- Remote Access

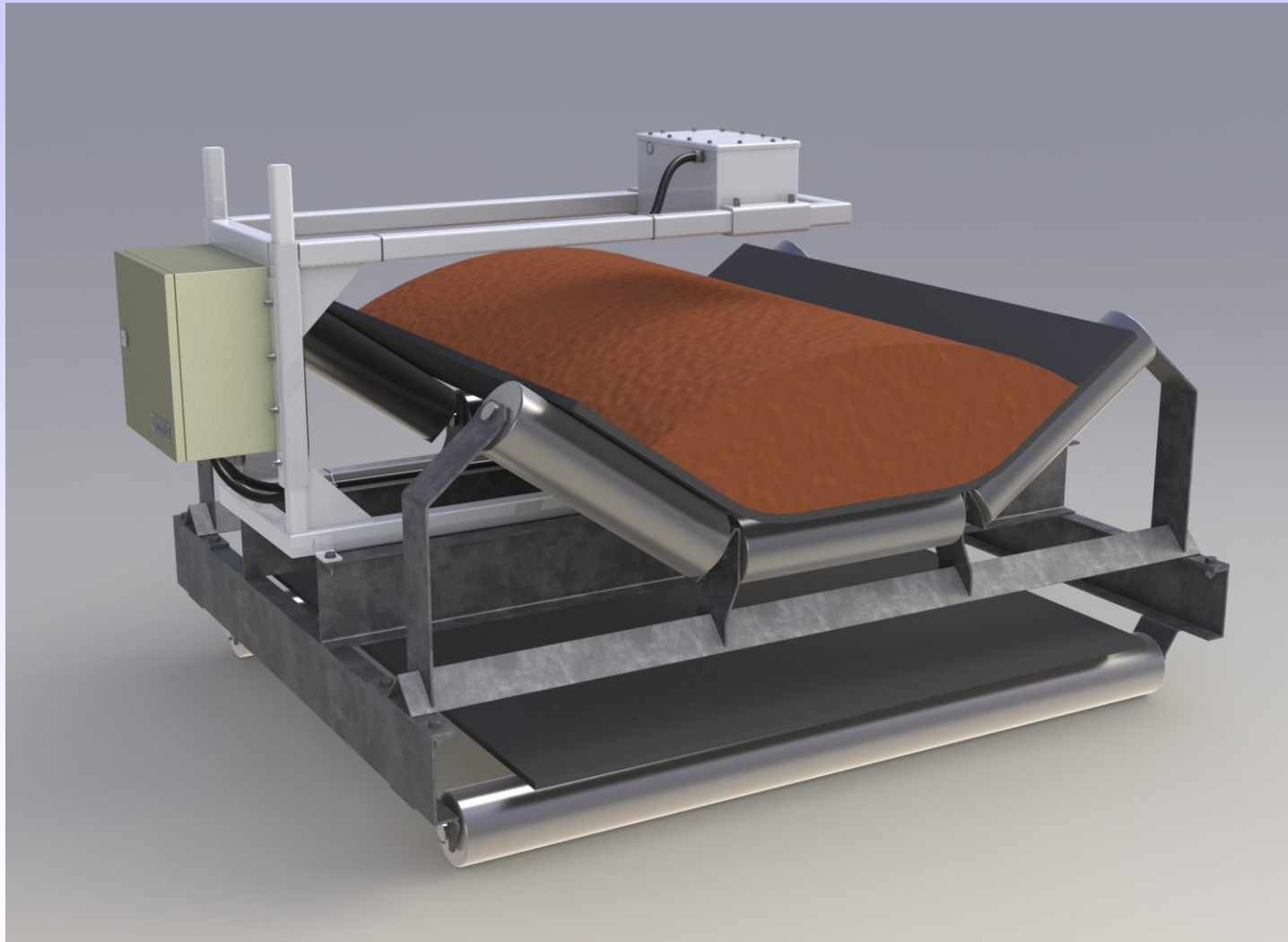
Wiring terminals

TBM230 Shipment



TBM230 shipping crate bound for Alcoa in Brazil
Options selected: Door LCD display for %Moisture
Material Level Sensor

TBM230 Installation



TBM Installation & Commissioning

- Mechanical and electrical installation typically less than 1 day
- Scantech Service Engineer attends site for typically 3 days:

Day 1 Inspect installation work, check plant wiring connections

Day 2 Static calibration using prepared crushed, oven-dried sample

(Stopped empty belt for 5 hours)

Day 3 Collection of dynamic or stop belt samples, client training

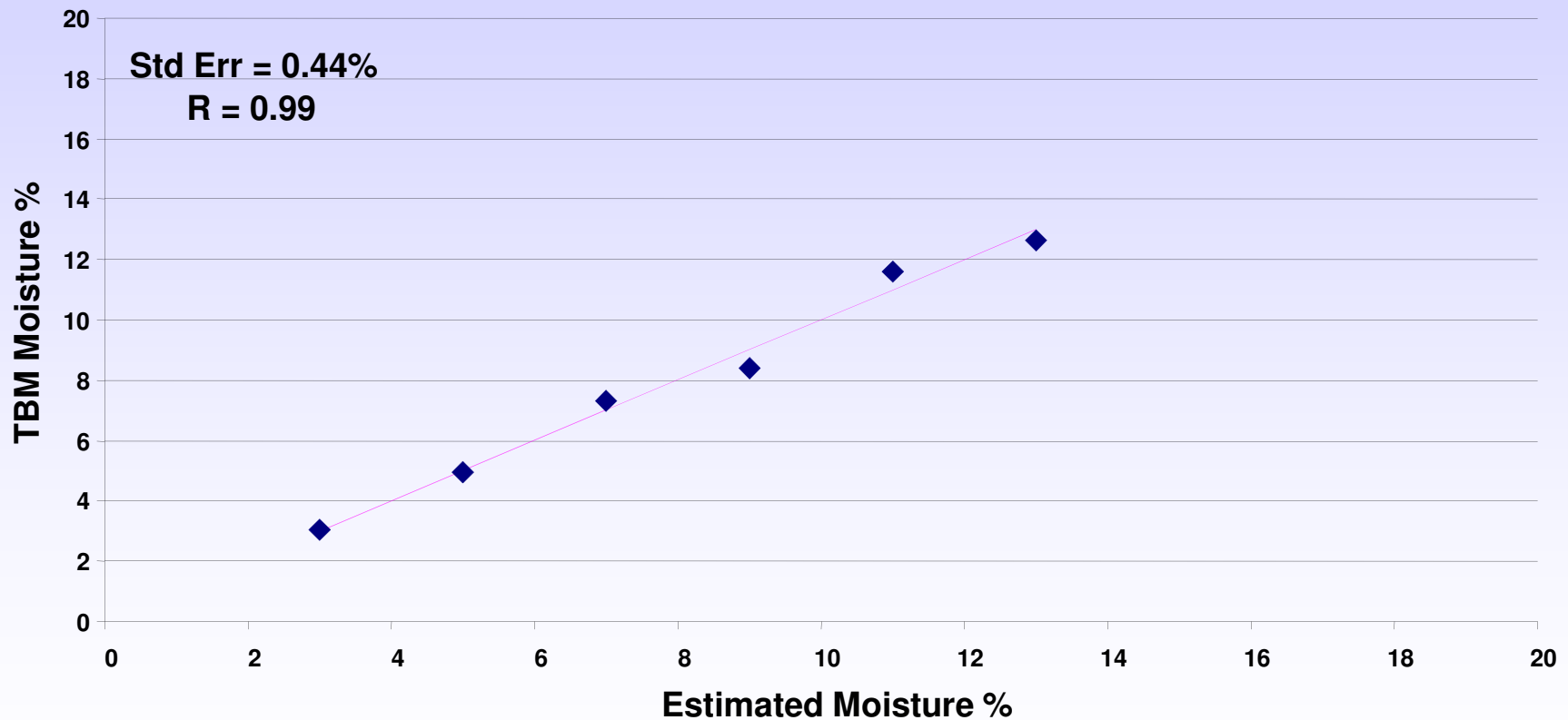
(Normal plant production; belt stopped for 30 minutes per sample if no sampler)

TBM – Typical Installation



TBM – Typical Performance

Static Calibration on limestone / raw mix



Thank You

Any Questions?

DO YOU NEED MORE INFORMATION?

- Brochures
- Specifications
- Drawings
- Manuals
- Site data sheets
- Installation guides
- Graphs of results
- Application advice
- Hardcopy
- Electronic
- CD-ROM
- Training



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