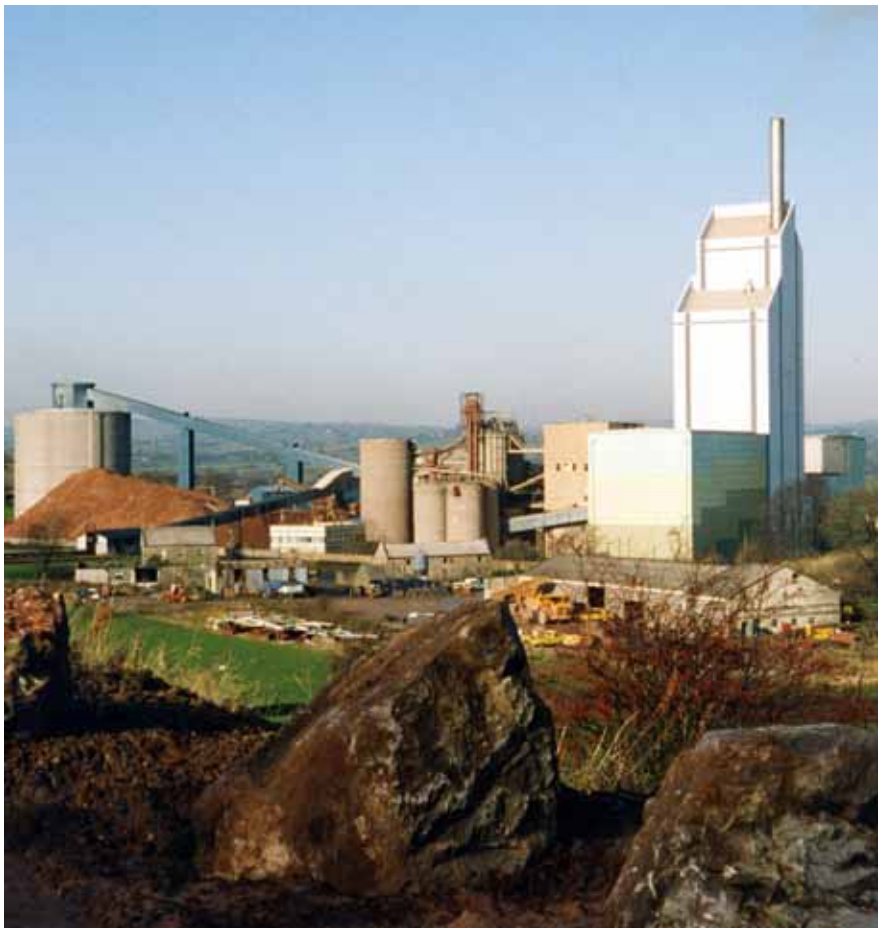
LAND
instruments international



MINERAL PROCESSING

Infrared temperature measurement
Application Information

SPECIALISTS IN NON CONTACT TEMPERATURE MEASUREMENT

LAND, acknowledged leaders in the field of temperature measurement, have supplied the Mineral Processing industry throughout the world with temperature measuring equipment for over 55 years. Today, LAND manufacture a whole range of measurement instruments designed specifically for use in the Mineral Processing industry. All are designed to the highest standards of quality and reliability to ensure accurate measurements under plant operating conditions.

LAND's reputation for quality, products and service is attributable to good product design, technical expertise and especially to application know-how.

This know-how has been gained by providing effective solutions to the varied problems of temperature measurement within the mineral processing industry.

Each system recommended here is supported by its own sales literature, freely available from LAND.

WHY USE LAND NON CONTACT RADIATION THERMOMETERS?

- Radiation thermometers need no contact with the measured object, which means no contamination, no interference with processes, no seeding or bubbling.
- Accurate, reliable and stable measurement increases confidence in long-term product quality.
- Virtually maintenance free, which means 'set and forget' once correctly installed.
- Fast response and high sensitivity offers tighter temperature control.
- Flexibility in the choice of fixed, fibre optics or portable systems to give comprehensive cover for nearly all temperature measurement needs.
- All Land Instruments International products are backed by BS EN ISO9001:2000 Quality Management System Approval backed by BS EN ISO/IEC 17025.
- Traceability of calibration is to National Standards. Calibration certificates are available from our UKAS accredited calibration laboratory No.0034 in the U.K. and NIST (National Institute of Standards and Technology) in the U.S.A.
- LAND know-how, expertise, and support - world wide.

SELECTING THE THERMOMETER TO MATCH THE APPLICATION

	TYPE OF INSTRUMENT									
	ON-LINE THERMOMETERS				PORTABLE THERMOMETERS & THERMAL CAMERAS			PROCESS IMAGERS		
MEASUREMENT Nº LOCATION	M8	R1	SOLO 3	RT3	Thermal Imager	CYCLOPS 300AF	PT3	LSP Kiln Scanner	FTI6	Conveyor Belt Monitor
1 Rotary Kiln Shell	*				*	*	*	*	*	
2 Product Temperature	*									
3 Burning Zone		*								
4 Clinker	*		*	*		*	*			
5 Conveyor Belt										*
6 General Maintenance					*	*	*			

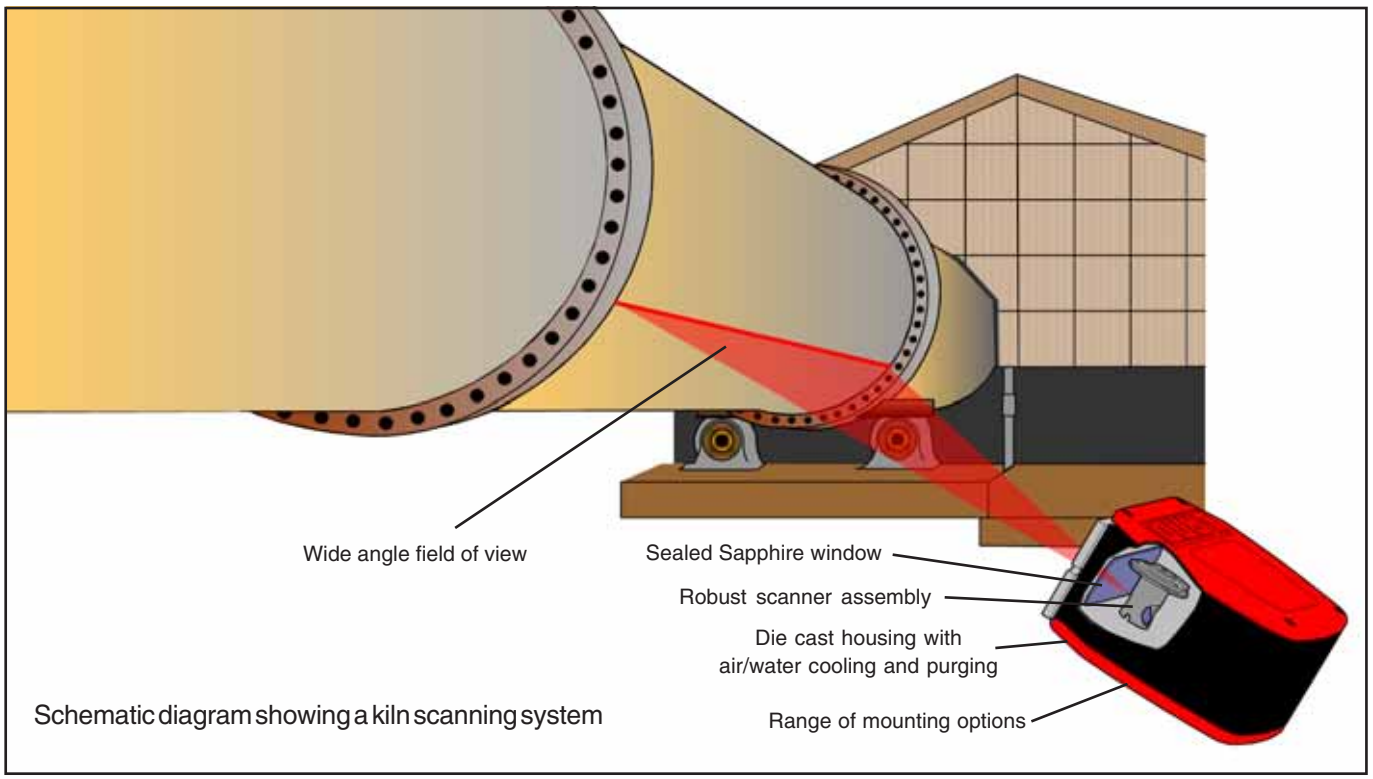
The above table gives options for continuous on-line thermometer and process imaging systems or portable spot thermometers and thermal imagers to meet your individual needs. Within both of these categories are flexible packages which can be field-tuned to your application.

TYPICAL ELEMENTS OF AN ON-LINE INFRARED THERMOMETER SYSTEM

1 A radiation thermometer which detects infrared energy emitted from a target surface and converts it into an electrical signal for transmission to a signal processor.

2 A signal processor which takes the electrical signal and produces an output suitable for use with any indicating, recording or control equipment.

3 Protection against the measurement environment. In the on-line systems this may involve the use of a protection jacket and end cap.



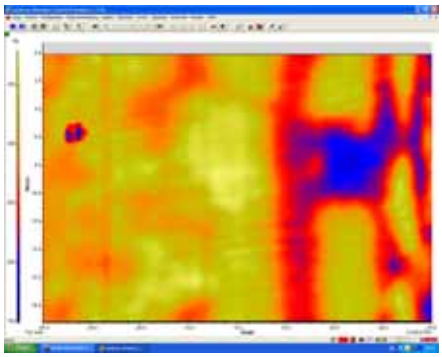
Schematic diagram showing a kiln scanning system

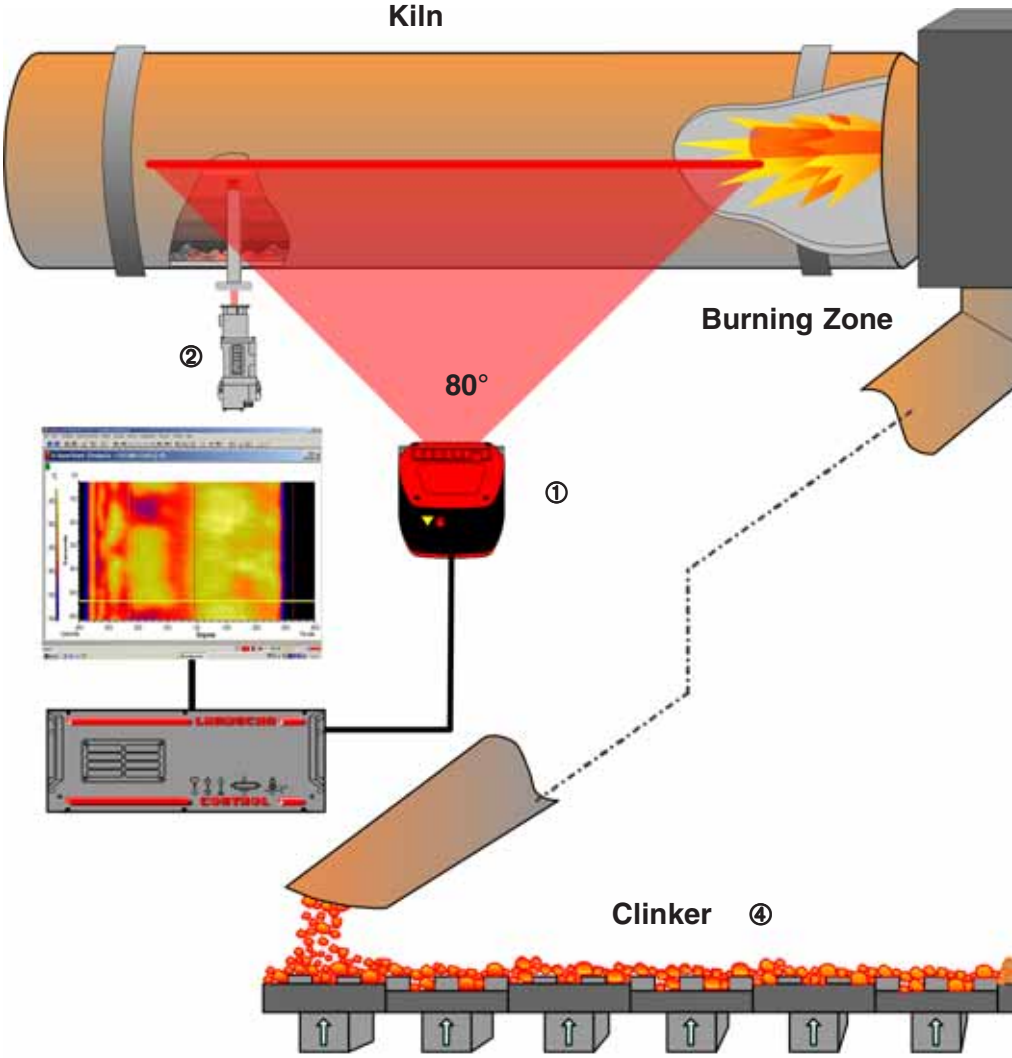
The schematic diagram detailed here illustrates the essential features of a modern mineral processing works. The areas highlighted offer measurement reference points, where LAND's infrared thermometry know-how can really benefit you. If the specific area of concern is not covered here our engineers will be pleased to discuss your requirements with you.

① Rotary Kiln Shell Temperature

The early detection of 'hot' or 'cold' spots is vital to avoid costly maintenance or an unplanned shutdown. Continuous monitoring of the kiln shell along its length, day and night will provide the earliest possible indication of potential problem spots.

The LAND Kiln Scanning System comprising an LSP6 infrared linescanner, Landscan Control processor and rugged housing can scan continuously for extended periods linked to the plant host computer or as a continuous monitoring device. Alternatively an FTI6 fixed thermal imager may be used.

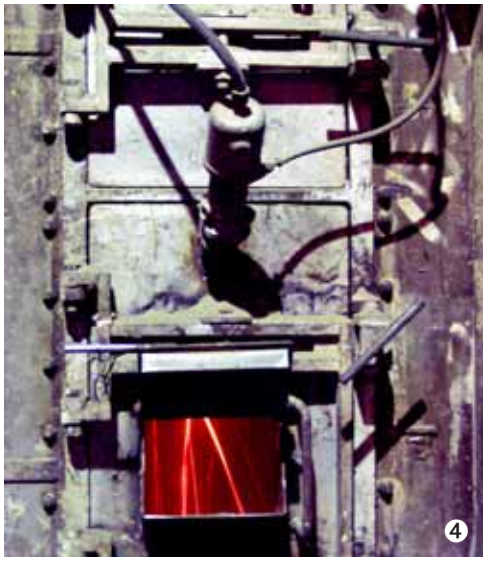


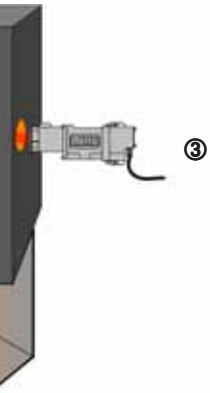


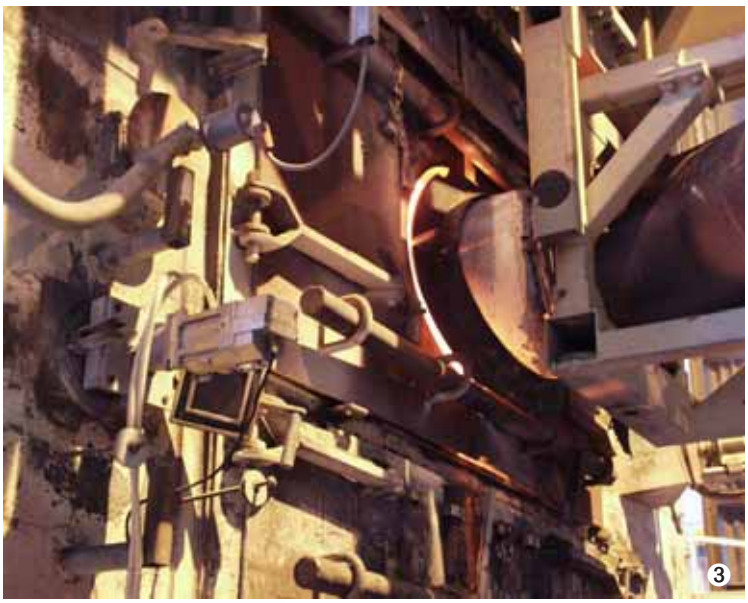
② Rotary Kiln Product Temperature

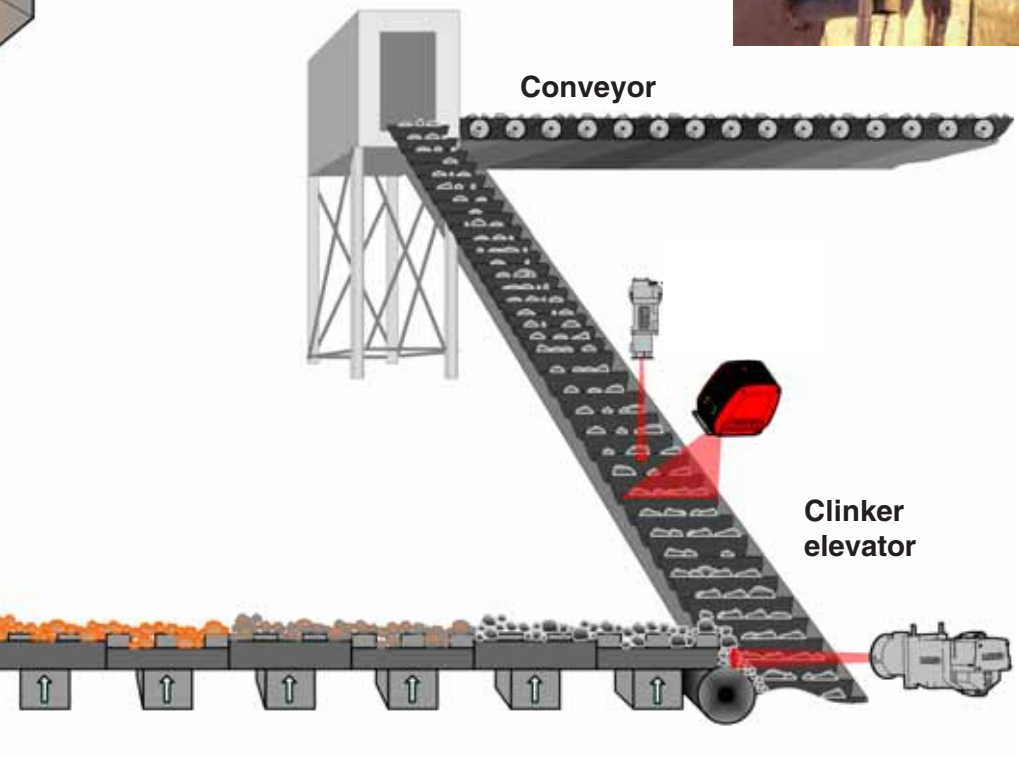
Installation of blind sighting tubes of various lengths and in various kiln positions - the alignment of a radiation thermometer to take the temperature at the bottom of the tube once very rotation - permits accurate, reliable temperature measurement of the solids or gases inside the kiln (dependant on location).

The speed of response enables kiln temperature control 'measuring' both kiln efficiency and product quality.









③ Rotary Kiln Burning Zone Temperature

Measurement of the temperature in the kiln burning zone is vital for maintaining both product quality and kiln efficiency.

A dual wavelength (ratio) thermometer is used to overcome the inherent problems of dust etc. which obscure the thermometer sight path. This system can be applied equally to both wet and dry processes.

④ Cement Clinker System Temperature

A thermometer is mounted to monitor the temperature of clinker in a bucket elevator prior to reaching the rubber conveyor.

The air cooler system operating on the elevator is a safeguard against either fire or belt burn out before the clinker reaches the rubber conveyor system.

A closed loop control system using the thermometer to set cooler levels, improves efficiency and operates effectively.

BRIEF OUTLINE SPECIFICATIONS

TYPE	MODEL	TEMPERATURE RANGE	SPECTRAL RESPONSE	RESPONSE SPEED	ACCURACY (UNCERTAINTY)
ON-LINE THERMOMETERS	SYSTEM 4 M8	0 to 1000°C/ 30 to1830°F	8 to 14µm	100ms (to 95%)	1%K + 1K
	SYSTEM 4 R1	600 to 1600°C/ 1100 to 2900°F	0.85 to 1.1µm	15ms (to 98%)	0.65%K
	SOLO 3	0 to 250 or 100 to 600°C / 0 to 500 or 200 to 1000°F	8 to 14µm	1 to 40s (to 98%) adjustable	±3.5°C/6°F
	RT3	0 to 250 or 0 to 500°C/ 0 to 500 or 0 to 1000°F	8 to 14µm	1 to 10s (to 95%) adjustable	0.75% of span (absolute)
PORTABLE THERMOMETERS AND THERMAL CAMERAS	THERMAL IMAGER	-25 to 1500°C/ -13 to 2732°F	8 to 14µm	-	±2°C or ±2%
	CYCLOPS 300AF	-50 to 1000°C/ -50 to 1800°F	8 to 13µm	0.5s (to 90%)	>200°C/390°F ±1% ±1 digit <200°C/390°F ±2°C/4°F ±1 digit
	POCKETHERM	-50 to 500°C/ -50 to 950°F	8 to 14µm	1.5s	±1% ±1 digit
PROCESS IMAGERS	LSP 6 Series	20 to 600°C/ 122 to 752°F	3 to 5µm	10Hz to 100Hz	<±2°C/2.6°F
	FTI 6	-20 to 2000°C/ -5 to 3600°F	'L' range 3.2 to 4.2µm 'M/H' range 3.9µm	20Hz (Frame frequency)	-
	Conveyor Belt Monitor	20 to 600°C/ 122 to 752°F	3 to 5µm	10Hz to 100Hz	-

ON-LINE THERMOMETERS

System 4 operates as a three part system incorporating a high precision thermometer, a range of protection jackets, mountings and purges, and a range of LANDMARK signal processing units which give a choice of 0 to 20 or 4 to 20mA and 1mV/° outputs.

M1 and R1 have focusable optics within each series of thermometers to provide optimum measurement spot sizes at any given working distance. Both of these thermometers are also available as fibroptic versions allowing the detector and electronics to be located in an area where the ambient temperature is much lower than encountered at the measuring point.

Solo and **Land RT3**, rugged two-wire infrared radiation thermometers provide continuous cost effective non contact temperature measurement in hostile operating conditions.

All thermometers are available with a range of protection and mounting accessories enabling use in the most hostile of environments.

PORTABLE THERMOMETERS & IMAGING CAMERAS

Land Cyclops portable thermometers provide high precision spot temperature measurement. Features include either a laser targeting system, or thru-the-lens optics with a temperature display in the viewfinder. A digital output is also provided.

An optional data processor, data logger and digital printer are also available. The DP-C2 data processor greatly expands the measurement and data analysis capabilities of Cyclops.

PockeTherm thermometers offer a lower cost alternative to the high precision Cyclops portable thermometers.

Thermal imaging cameras combines high performance thermal imaging with accurate temperature measurement.

Used with LIPS analysis and report generation software, they answer the maintenance engineer's thermographic needs at an affordable price.

	REPEATABILITY	SIGHTING	FIELD OF VIEW/ SIGHTING ANGLE	MINIMUM TARGET SIZE	LITERATURE CODE
	<0.3K/K	Thru-the-lens or optional laser targeting	100:1	5.0mm/0.20in	S4T
	1K	Optional laser targeting	25:1	4.0mm/0.15in	S4T/UNO100
	-	Fixed focus	-	12.5mm/0.49in at 150mm/6.0in or 55mm/2.25in at 600mm/24.0in	S301
	-	-	-	42 at 500mm/1.7 at 19.7in	RT3
	-	Colour LCD (TFT) or viewfinder	21 x 16° (11° x 8° optional)	-	PDS017
	±1°C/2°F	Auto focus, thru-the-lens	8° FOV, 1° measuring	9mm/0.35in at 500mm/19.6in	C300AF
	±1°C/2°F	Laser targeting	Defined by laser	70mm/2.76in at 1.0m/39.37in	PDS PT
	<0.5°C/0.9°F	Laser targeting	100:1, 80° scan angle	-	PDS013
	-	-	From 16° x 16° to 60° x 60°	-	TIFB
	-	Laser targeting	100:1, 80° scan angle	-	-

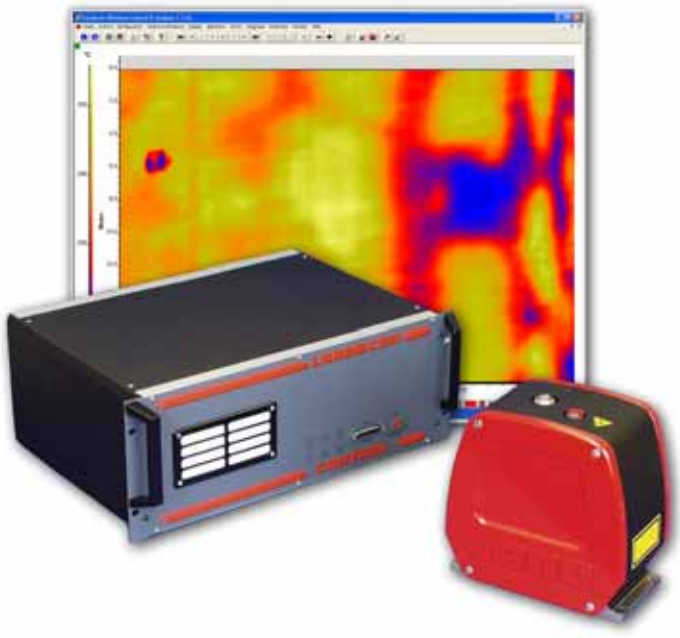
LSP KILN SCANNER

A series of infrared linescanning systems designed specifically for use in the mineral processing industry.

The LSP Kiln Scanner compises an extremely compact LSP linescanning head and a Landscan Control signal processor using Windows-based Lanscan Control and Analyse (WCA) software.

These systems have extensive storage, display and analysis capabilities processing temperature data from multiple sensor heads, and database and archive files simultaneously.

Dedicated ruggedized protection and mounting accessories are also available.



CONVEYOR BELT MONITORING

The Conveyor Belt Monitoring System provides reliable detection of over-temperature clinker on the clinker conveyor eliminating instances of conveyor burn-through with associated costly down time for repair.

The Conveyor Belt Monitor is a cost effective system comprising: a high speed LSP6 linescanner, set in peak scan mode, and a dedicated signal processor, which provides power to the scanner, graphical and numerical displays of temperature, alarm contacts and analog outputs for automatic control of water sprays.

ON-LINE THERMAL IMAGERS

The FTI 6 thermal imager is ruggedly constructed to cope with demanding industrial environments as either a permanently mounted plant sensor or as a transportable process imaging system.

An integral visual video camera enables scenes to be viewed as thermal, visual or in combination.

For more than fifty five years LAND has supplied temperature measuring systems and instruments to many different industries all over the world. Now the world leader in non contact thermometry, our expert advice and support is never far away.

WORLD LEADERS

LAND is one of the world leaders in the manufacture of non contact temperature measurement systems, thermal imagers and linescanners.

WORLDWIDE SUPPORT

In addition to the companies established in the USA, Europe, Mexico and Japan, **LAND** is represented by distributors in most of the major industrial countries throughout the world.

Our customers benefit, on a global basis, from practical and expert advice from fully trained technicians who are aware of specific requirements for their country and industry.

APPLICATIONS

LAND has solved many different temperature measurement problems in a wide variety of industries from food to atomic energy, some of which are listed below:

- Iron & Steel
- Petrochemical
- Heat Treatment
- Minerals
- Glass
- Maintenance
- Power & Utilities
- Aerospace
- Electronics
- Pharmaceuticals
- Plastics
- Paper
- Rubber
- Textiles
- Non-ferrous Metals

For further information or free advice on specific temperature measurement problems within these or any other industry, contact your nearest Land office.

PRODUCT ASSURANCE

When you specify **LAND** products you are assured of receiving a completely pretested, calibrated working product. Each instrument is carefully checked to ensure complete compliance with specification and is fully guaranteed. **LAND** was the first manufacturer of infrared instruments to successfully obtain ISO 9001 Quality Management System Approval for both design and manufacture of non contact infrared temperature measuring equipment.

CE These products comply with current European directives relating to electromagnetic compatibility and safety (EMC directive 89/336/EEC; Low voltage directive 73/23/EEC).

The Quality Management System of Land Instruments International Ltd. is approved to BS EN ISO9001:2000 for the design and manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software designed and developed in accordance with TickIT. Calibration certificates are available from our UKAS accredited Calibration Laboratory No. 0034. The Land calibration laboratory complies with the requirements of the international standard BS EN/IEC17025.

CALIBRATION

LAND operates an extensive calibration service. All calibrations made are traceable to National Standards. In the USA a traceable calibration certificate can be issued complying with the National and International Standards. In the UK, **LAND** can issue a UKAS calibration certificate.

LAND also supplies a full range of temperature reference sources which are used to verify or re-establish the accuracy of calibration in the field or in the laboratory.

A consultancy service is also available for those companies who wish to establish their own in-house calibration facility.

UKAS CALIBRATION 0034

UKAS QUALITY MANAGEMENT 001

LAND instruments international

Infrared Temperature Measurement

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