



X-ray data acquisition systems for NDT applications



Sens-Tech Ltd

- ◆ UK based company
- ◆ 40 Staff
- ◆ Specialise in detection and data acquisition systems for light and X-rays
- ◆ OEM Customers
 - NDT
 - Security
 - Instrumentation



Presentation Content

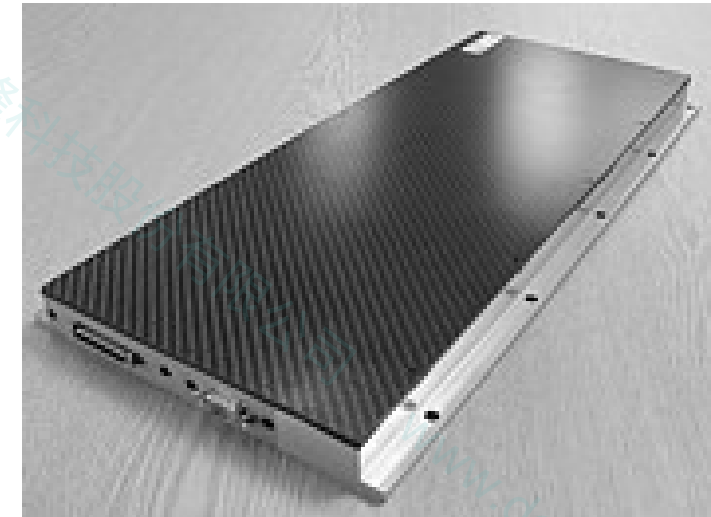
- ◆ X-ray detection and data acquisition systems
- ◆ Range of designs and capability – custom systems
- ◆ Describe specific applications

Applications in NDT Sector

- Process control for wood products
- Log Industry
- Steel thickness measurement
- Food X-ray
- Tyre Inspection
- Industrial sorting

X-ray detection and data acquisition systems

- ◆ Customised designs
 - Linescan (Linear Detector)
 - Computerised Tomography
 - Multi-row detectors
 - Dual energy systems

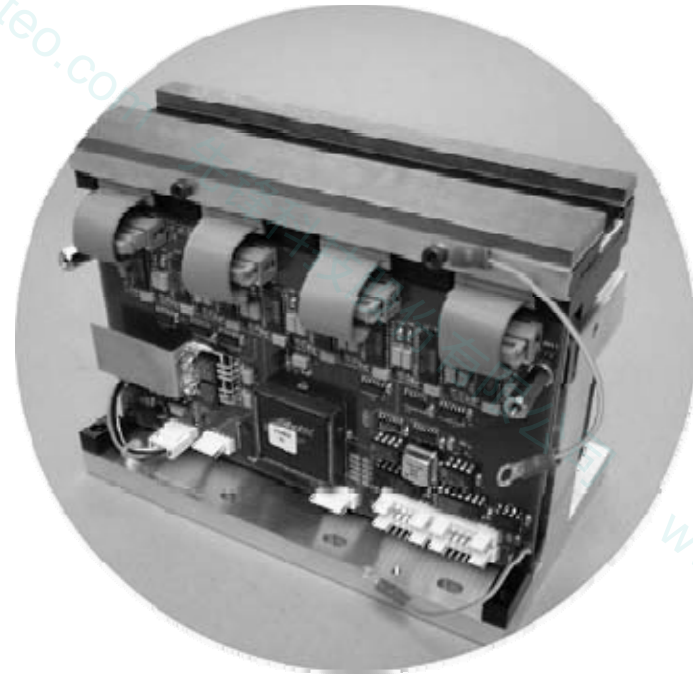


X-ray data acquisition systems

- X-ray detectors with 0.4mm to 2.5mm pitch
- Large number of channels
- 16 to 20 bit systems
- Signal to noise:
 - 30000: to 1 for 16 bit systems
 - 300000: 1 for 20 bit systems
- Scan time down to 100us
- Range of interfaces to processor

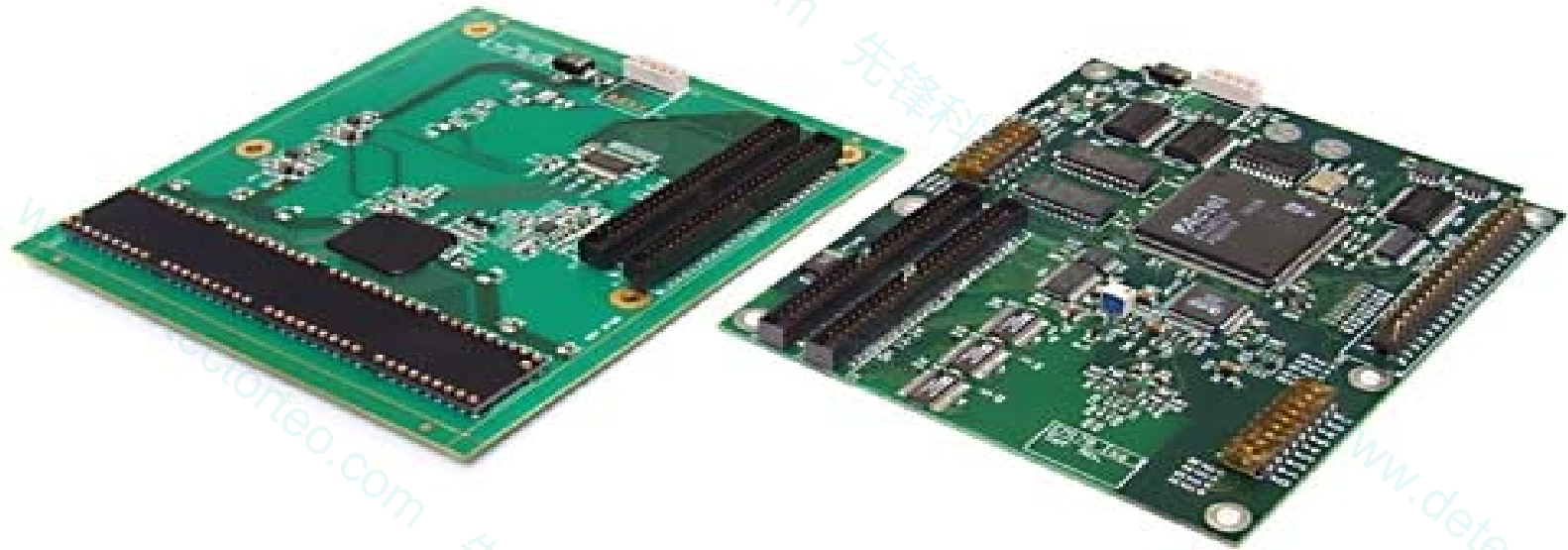
X-ray energy
200keV to 9MeV

XDM
6mm pitch
32 channel module
No limit on detector length
20 bit output
Noise 3 counts
350pC charge capacity



System Architecture

Detector Head (DH) Board *Analogue*



Signal processing (SP) Board *Digital*

System Architecture

Detector Head (DH) Board *Analogue*

Up to 24 per SP board

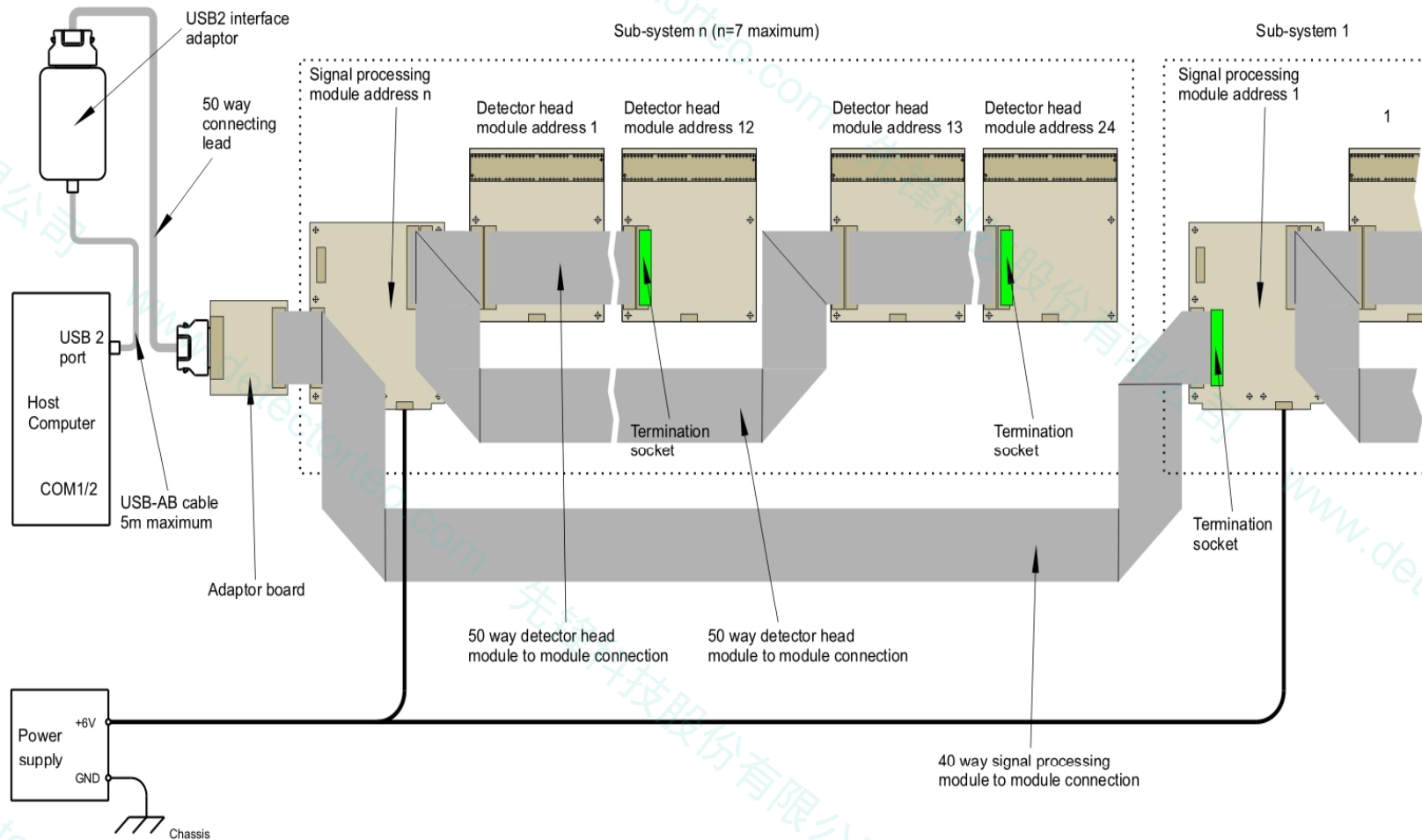
128 Channels per DH Board



Signal processing (SP) Board *Digital*

Up to 7 per system

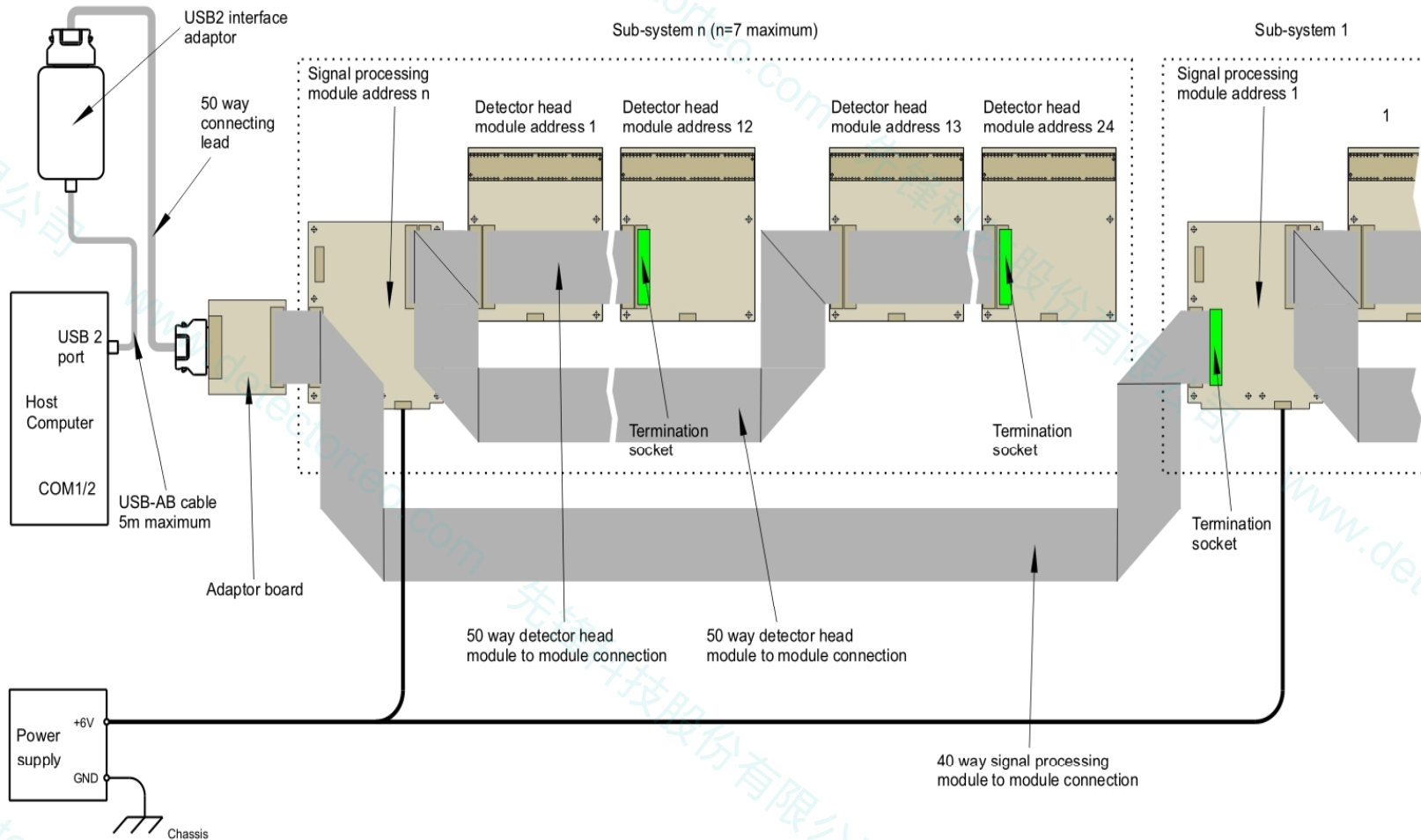
System Architecture



System Architecture

No. of channels 20000

Interface USB 2.0, giga-ethernet, frame grabber



X-ray Detectors

Silicon photodiodes plus scintillator

- Bare Silicon < 20keV direct conversion
- Gadox (Gd_2SO_2) up to 100keV
- CsI (TI) up to 160keV best light output
- CdWO₄ > 160keV fastest light decay time

Detector head board options

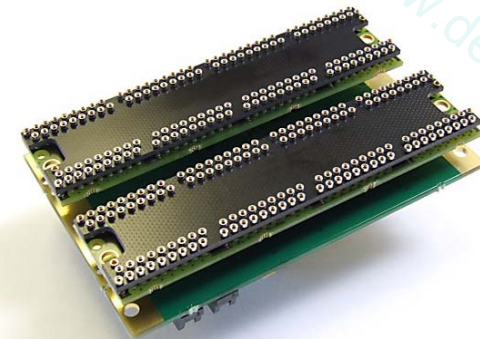
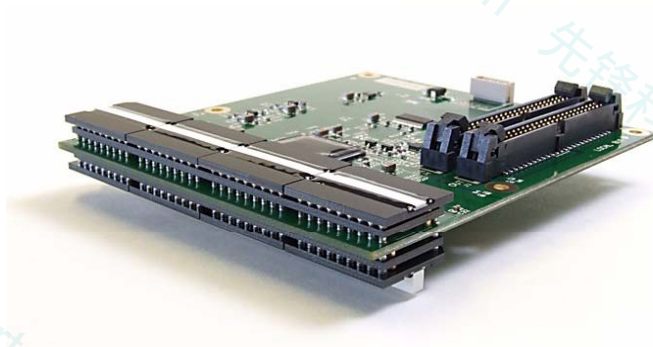
Pitch 0.4mm, 0.8mm, 1.6mm, 2.5mm

Single energy 0.8mm



Dual row 1.6mm

Dual energy 1.6mm





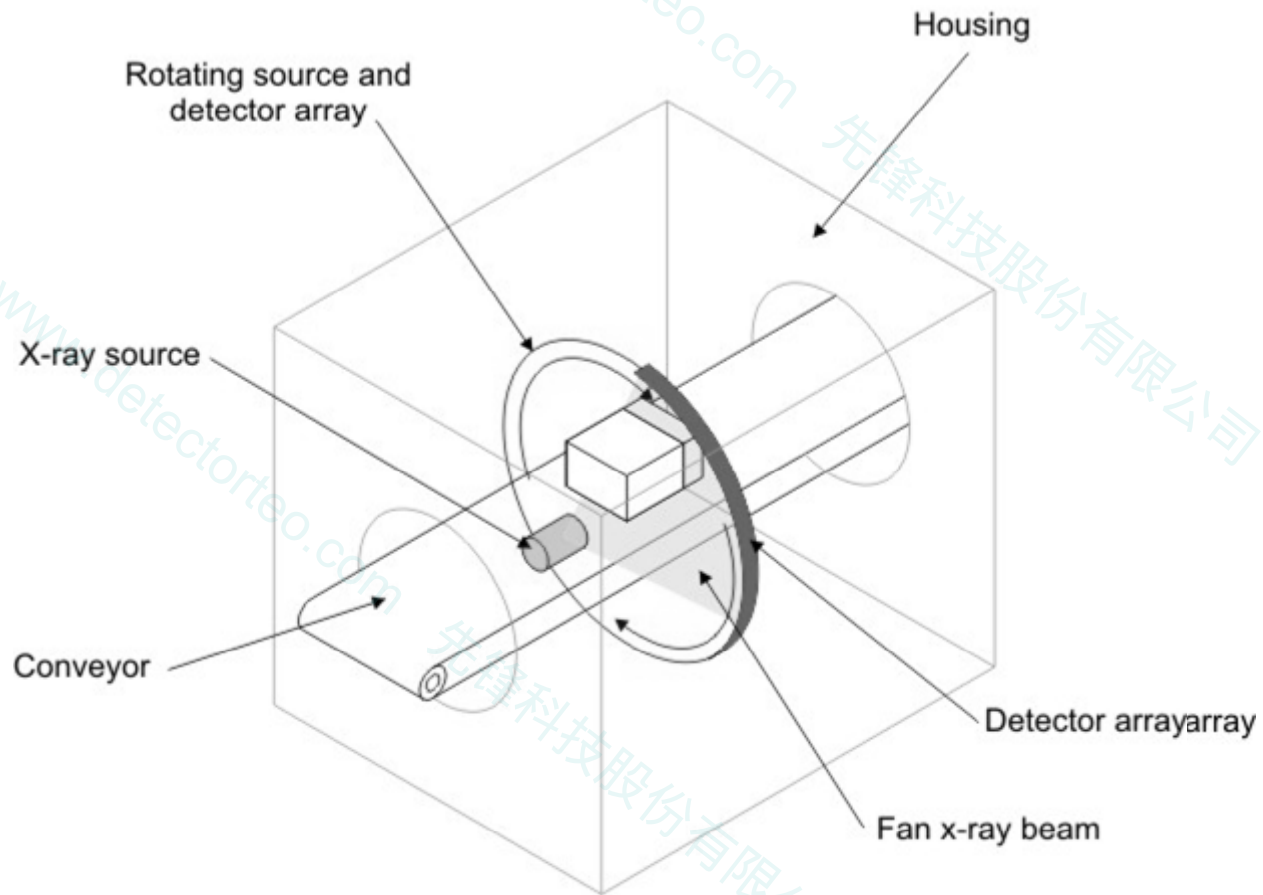
Applications

Log analysis using CT methods

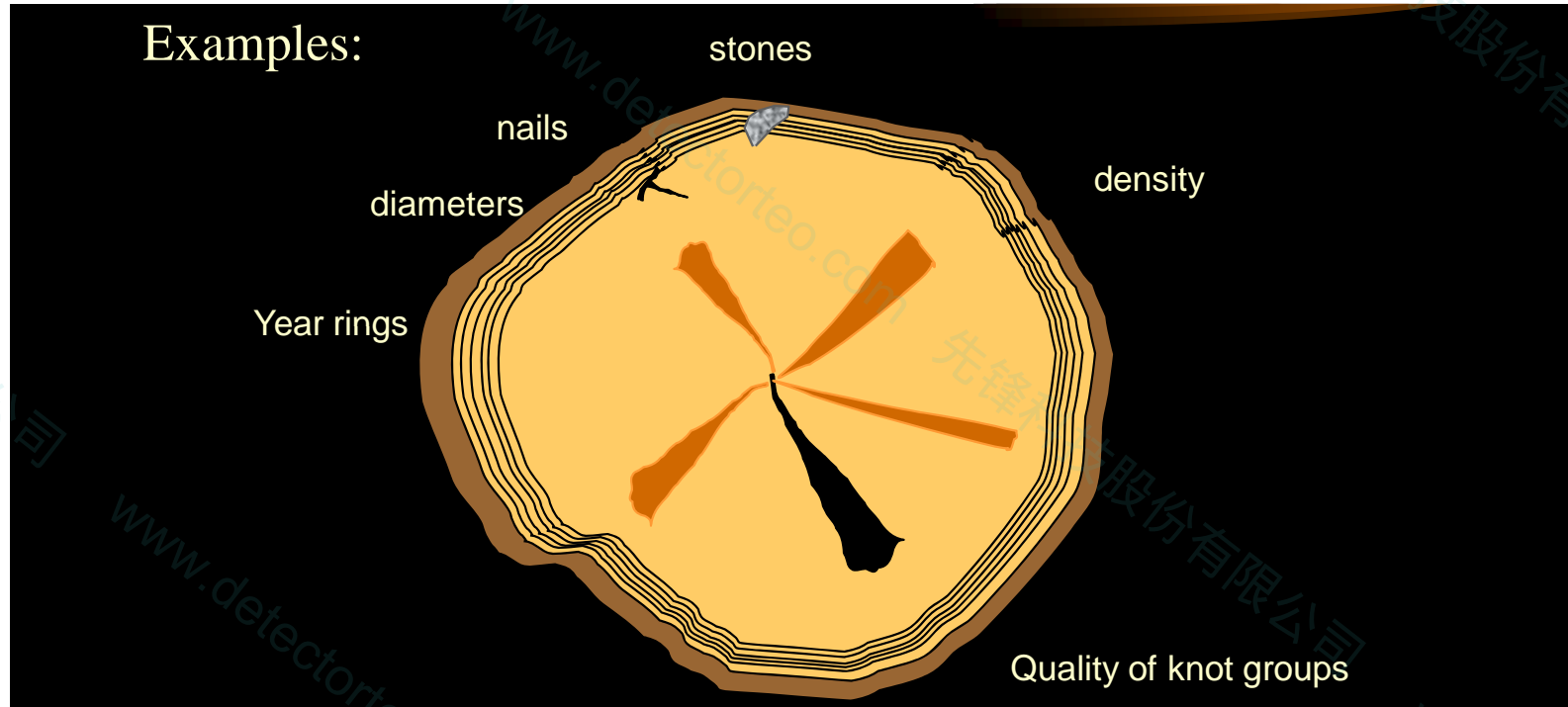
Particle Board process monitoring

Steel thickness measurement

X-ray CT system



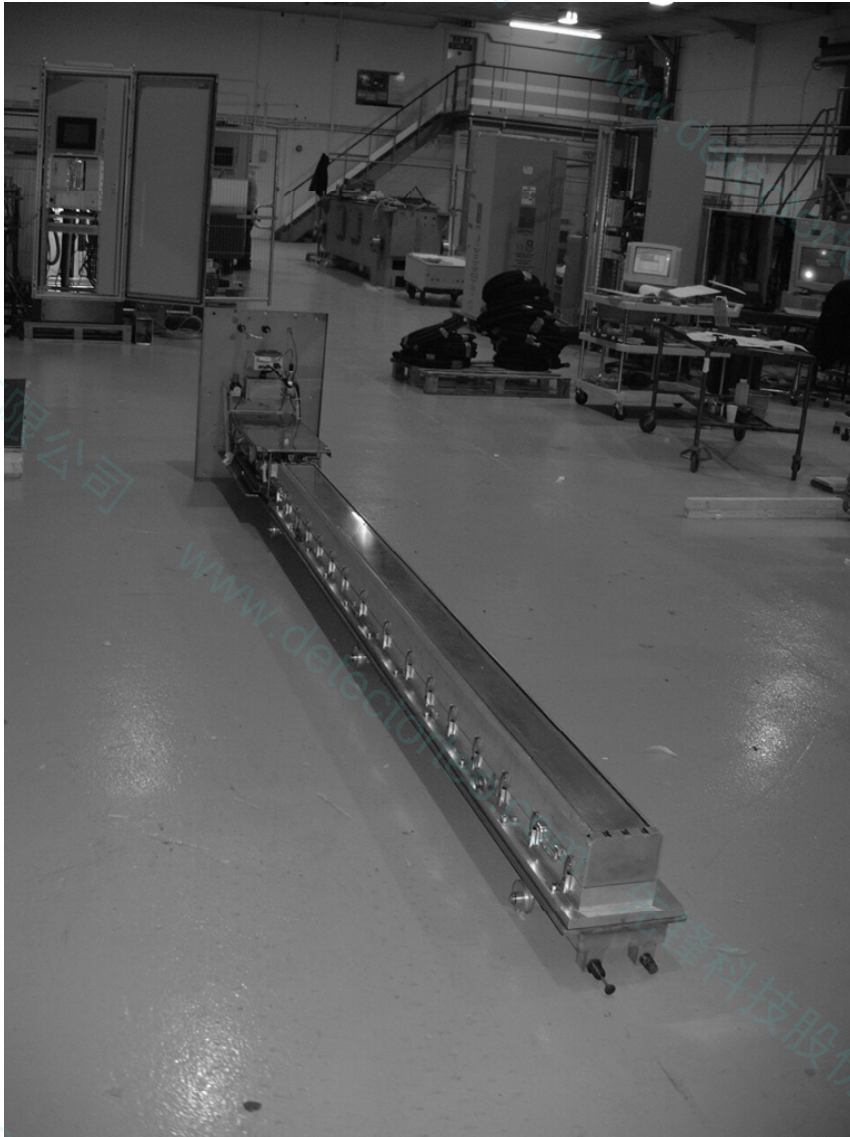
Log X-ray



Parameters measured

Volume of knots, foreign objects, density, rot, ring width, strength grading

Steel thickness measurement



3 metre detector

20-bit system

Peltier cooled

15911/8197-xx EM Phantom Profile Plate

Gauge Measurement

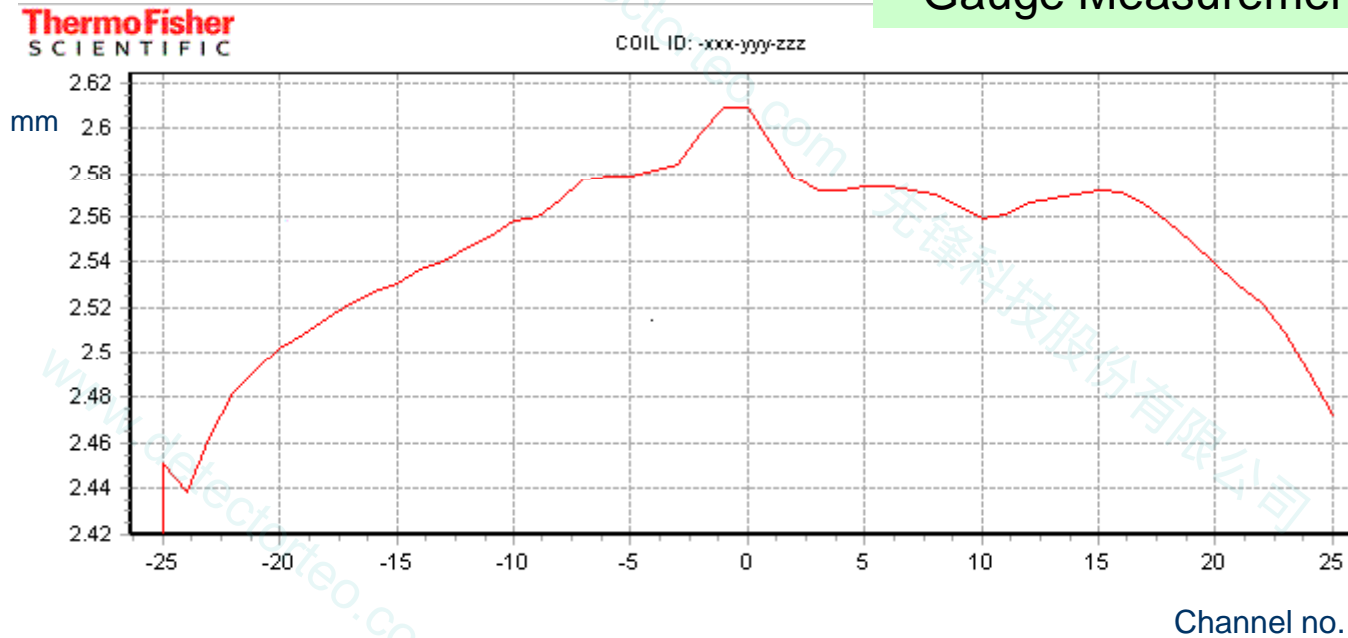


Image of phantom plate showing measurement of 30 micron ridge
and 10 micron groove in a 2.5mm plate



User Benefits Cost Saving and Quality Improvement

- ◆ Logs
 - optimum usage of raw material
 - select finished product by application

- ◆ Particle Board
 - on-line measurement of density optimises material usage
 - detection of foreign bodies

- ◆ Steel X-ray
 - On-line control of hot rolling process
 - High specification of finished product