# Surface techniques for geo-sensing

PROJECT P1-007

To review surface analytical techniques and assess their application for conveyor belt sensing applications.

The aim is to assess existing and emerging surface-based sensing technologies and identify their potential for deployment in a range of sorting environments. The strengths and weaknesses of the different sensors will be articulated in a touchstone reference for the industry.

This will suggest designs for a series of tests that would move the most applicable methods to at least TRL5.

TRL 1 TRL 2 TRL 3 TRL 4 TRL 5 TRL 6 TRL 7 TRL 8 TRL 9

invent.

integrate.

implement.

introduce.
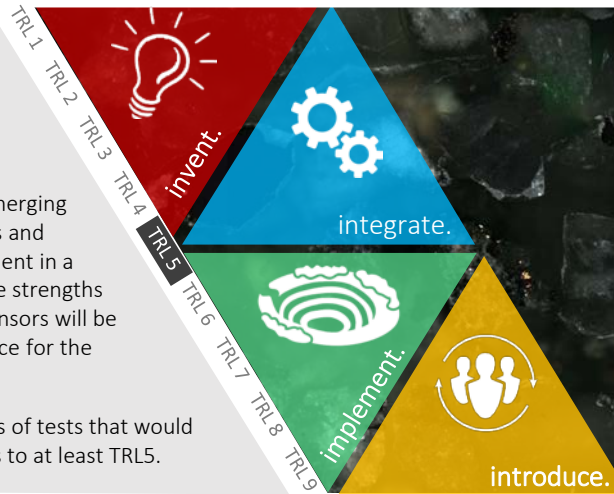
Research collaboration

The University of Tasmania hosts the world-leading ARC Centre of Excellence 'Centre in Ore Deposits' (CODES).

CODES is led by Professor Bruce Gemmell, and includes the resources of 35 research staff and over 100 post graduate students. Since its inception in 1989, CODES has delivered outstanding research outcomes for the mining industry in the fields of ore economic geology and geometallurgy.

The CODES team involved in this project includes Associate Professor Ron Berry, Professor Leonid Danyushevsky and Dr Thomas Rodemann who bring in excess of 60 years combined experience in the fields of laser, infra-red and XRF techniques and their application to the geological sciences and geometallurgical characterisation.

Program Coordinator:	Paul Revell, CRC ORE
Project Leader:	Prof Bruce Gemmell, UTAS
Timing:	August 2016 – March 2017
Participants:	UTAS, CODES, CRC ORE

Image: Particles as shown by X Polar, supplied by UTAS.

Background & aims

There are a range of analytical methods (e.g., LIBS, LIF, XRF) that measure surface and near surface characteristics of rocks. These typically have present laboratory applications and the aim is to consider how they would perform as remote measurement systems over-belt and in-pit or underground. The different techniques have differing limitations and sensitivities such as dust interference, sample stand-off distance, and sample-sensor presentation geometry. Additionally, sensing for conveyor belt applications presents new challenges for signal processing and data management/integration.

This project is designed to independently assess the strength, weaknesses, advantages and disadvantages or each technique and identify the critical system design success factors required for surface-based sensing techniques applied to Grade Engineering®. CRC ORE and the University of Tasmania will be publishing a touchstone report on key findings as an aid to industry assessment and development of surface based sensing techniques.

Focus on outcomes

- Review existing and emerging surface analytical techniques including LIBS, LIF, XRF, UF

- Assess over-belt and in-pit applications, instrument design and placement, data processing requirements

- Develop an independent set of tests for assessing each technique

- Publish touchstone report for industry

CRC ORE

Optimising Resource Extraction