DEEP EXPLORATION TECHNOLOGIES CRC
Uncovering the future

Project 2.2: Sensors for Rapid Down-Hole Rock Characterisation

PROGRAM 2: LOGGING & SENSING

Program Leader	**Brett Harris (Curtin University)**
Project 2.2	**Sensors for Rapid Down-Hole Rock Characterisation**
Project Leader	**Anton Kepic** (Curtin University)
Key Researchers	**Andrew Greenwood** (Curtin University), **Anna Podolska** (Curtin University), **Brett Wilkinson** (Globaltech), **Gordon Stewart** (Globaltech)
Participants	**Curtin University, Globaltech**
Timing	1 March 2014 – 31 March 2018
Cash Funding	$1,670,000
In Kind Funding	$2,307,000
Review Panel Chair	Anousha Hashemi (BHP)

"In the near future having petrophysical log data with a drill hole will be as natural as having a mobile phone in your pocket. People will wonder how we ever explored without it." **Anton Kepic, Curtin University**

OBJECTIVES

To improve the efficiency and effectiveness of drilling by developing sensors to characterise hard rock geology while it is being drilled. These measurements of physical, petrophysical and chemical properties may be used for immediate feedback in ongoing drilling activity.

BACKGROUND AND AIMS

This project will create sensor packages that are run by the driller as part of the drilling process. The technology will provide geological data that wasn't available or practical with wireline logging.

Logging While Drilling (LWD) implements two concepts, the AutoSonde™ and the Autonomous Shuttle, to measure during the drilling process. The AutoSonde™ is lowered into the bottom of the drill string and data is collected as the drill string is pulled out of the hole, the Autonomous Shuttle measures as drilling advances with the sensors attached to the core-barrel assembly. Both can log without impacting drilling significantly.

This project will further sensor development to a wider range of petrophysical measurements and integrate compatible sensors to gather data on multiple rock properties in one logging run. Imaging sensors are also planned to be implemented. Additionally, the AutoSonde™/Autonomous Shuttle will be reconfigured to be compatible with a greater range of drilling methodologies.

SERVICE SECTOR ENGAGEMENT AND COMMERCIALISATION

Globaltech will contribute significantly to the design, engineering and testing of the AutoSonde™ and Autonomous Shuttle. Teakle Composites may supply composite barrels for the Autonomous Shuttle. The major commercial outcomes will be logging tools for downhole petrophysical and elemental determinations; and these are intended to be commercialised via equipment suppliers and logging contractors, such as Globaltech, Boart Longyear and Imdex.

LINKAGES TO OTHER DET CRC PROJECTS

This project will use measurement-while-drilling, and data integration results from Projects 1.1, 1.2, 2.3 and 3.2. Research paths will be influenced by developments in Projects 1.1, 2.3, 2.4 and 3.2. The Brukunga Drilling Research & Training Facility (Project 1.4) will be used to evaluate the tools developed in this project.

YEAR 2 MILESTONES

- Produce video of driller independently deploying and recovering the AutoSonde™/Autonomous Shuttle with transmission of data from rig to remote office (complete independent operation of the sonde or shuttle).
- Field testing of prototype of AutoSonde™ modified for reverse circulation drilling with at least one sensor (e.g. total count gamma).
- Definition of technical operating specifications (and performance targets) for the AutoSondeTM/Autonomous Shuttle in total count gamma, spectral gamma, induction resistivity and magnetic susceptibility.
- Develop short course on LWD for Geologists.
- Field tests of a AutoSonde™/Autonomous Shuttle incorporating multiple petrophysical sensors – multi-parameter logging (eg sonic, spectral gamma, induction, and magnetic susceptibility).

COMMONWEALTH AGREEMENT OUTPUT AND MILESTONES

- Minimum of 2 PhD candidates commenced.
- Determination of lithological changes, faults, and geologic boundaries is demonstrated.
- First commercialisation of downhole sensing tool.
- First impact from retrofitting drill rigs – drillers trained in the usage of new sensors.
- Deployment of downhole sensing or top of hole sensing technology in government or industry facilitated regional drilling program.