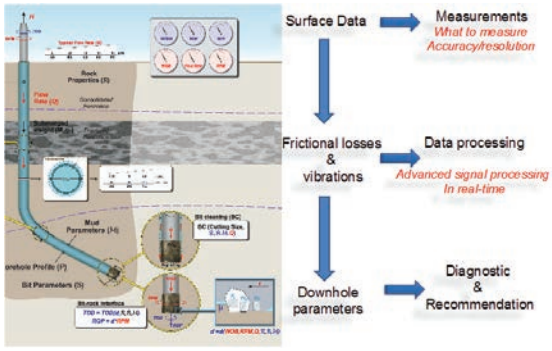
DEEP EXPLORATION TECHNOLOGIES CRC
Uncovering the future

Project 1.2: Fundamentals of Rock Fragmentation



PROGRAM 1: DRILLING

Program Leader	**Soren Soe (DET CRC)**
Project 1.2	**Fundamentals of Rock Fragmentation**
Project Leader	**Luiz Franca** (CSIRO)
Key Researchers	**Brett Wilkinson** (Globaltech), **Amirali Soroush** (CSIRO), **Stephen Banks** (CSIRO), **Thomas Richard** (Epslog), **Peter Jaensch** (Boart Longyear)
Participants	**Boart Longyear, CSIRO, Epslog, Globaltech**
Timing	1 March 2014 – 28 February 2017
Cash Funding	$1,000,000
In Kind Funding	$1,355,000
Review Panel Chair	Tony Macpherson (DET CRC Director)

"An innovative application of sensing and robust drilling interpretation and optimisation schemes are the pillars for a paradigm shift in the drilling industry toward safety, drilling efficiency and automation." **Luiz Franca, CSIRO**

OBJECTIVES

To develop a software package to process, display, manage and interpret drilling data, in order to directly improve drilling performance and to establish an engineering framework to monitor and report performance in a consistent way.

BACKGROUND AND AIMS

Drilling is commonly undertaken on the basis of the experience of engineers and drillers sometime combined with a trial and error approach. With digital measurements quite rare, drillers often refer to noise and vibrations emanating from the rig as the main monitoring variable to adjust drilling parameters and optimise drilling performance. Indeed, little effort has been devoted to improve drilling performance using systematic and robust approach, but even simply to document the methodologies followed by drillers or monitor and report drilling performance in a consistent format or document and codify know-how (e.g. via models, best drilling practices and training).

The overarching aim of the project is to combine reliable real time drilling measurements with interpretation tools (software) to improve productivity on the rig by processing, displaying, managing and interpreting drilling data, in order to provide alarms, warnings, and recommendations to drillers and produce a reliable and objective measure of performance.

SERVICE SECTOR ENGAGEMENT AND COMMERCIALISATION

This project closely involves the service sector and drilling operators. Service companies are engaged to accelerate the transfer of knowledge to the industry, for example on drilling best practice, training, software and/or hardware for the monitoring and optimisation of drilling performance and bit life.

LINKAGES TO OTHER DET CRC PROJECTS

This project is closely linked to Project 1.4 and Project 3.2 in particular for the design of field experiments at the Brukunga Drilling Research & Training Facility (DRTF) and the real-time information about the rock formation and the bit wear status for the Lab-at-Rig®.

YEAR 2 MILESTONES

- Drilling data collected (Brukunga and other) – drilling depth of minimum 400 meters recorded.
- Algorithms created to detect drilling regime in real-time: connection, off-bottom, on-bottom, on/off rotation and on/off flow rate etc…
- Algorithms created for estimating vibration index in real-time.
- Algorithms created for detecting wear in real time: polishing, stripping and ideal condition.
- Algorithm created to track the occurrence of inadequate bit cleaning in real time.

COMMONWEALTH AGREEMENT OUTPUT AND MILESTONES

- Minimum of 2 PhD candidates commenced.
- The fully instrumented drill rig and the drill hole at the test site will be utilised by all the researchers in the CRC for experimental work.
- Commercial roll out of basic sensors commenced and development of advanced sensors continued.
- First impact occurs from retrofitting drill rigs. Measurables to include one or more of; faster drill rates, less down time, longer bit life.
- Predictive model continues to be incorporated in next generation drilling systems and drilling optimisation.