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# DCi™ DRILL CONTROL INTERFACE

Technical Overview

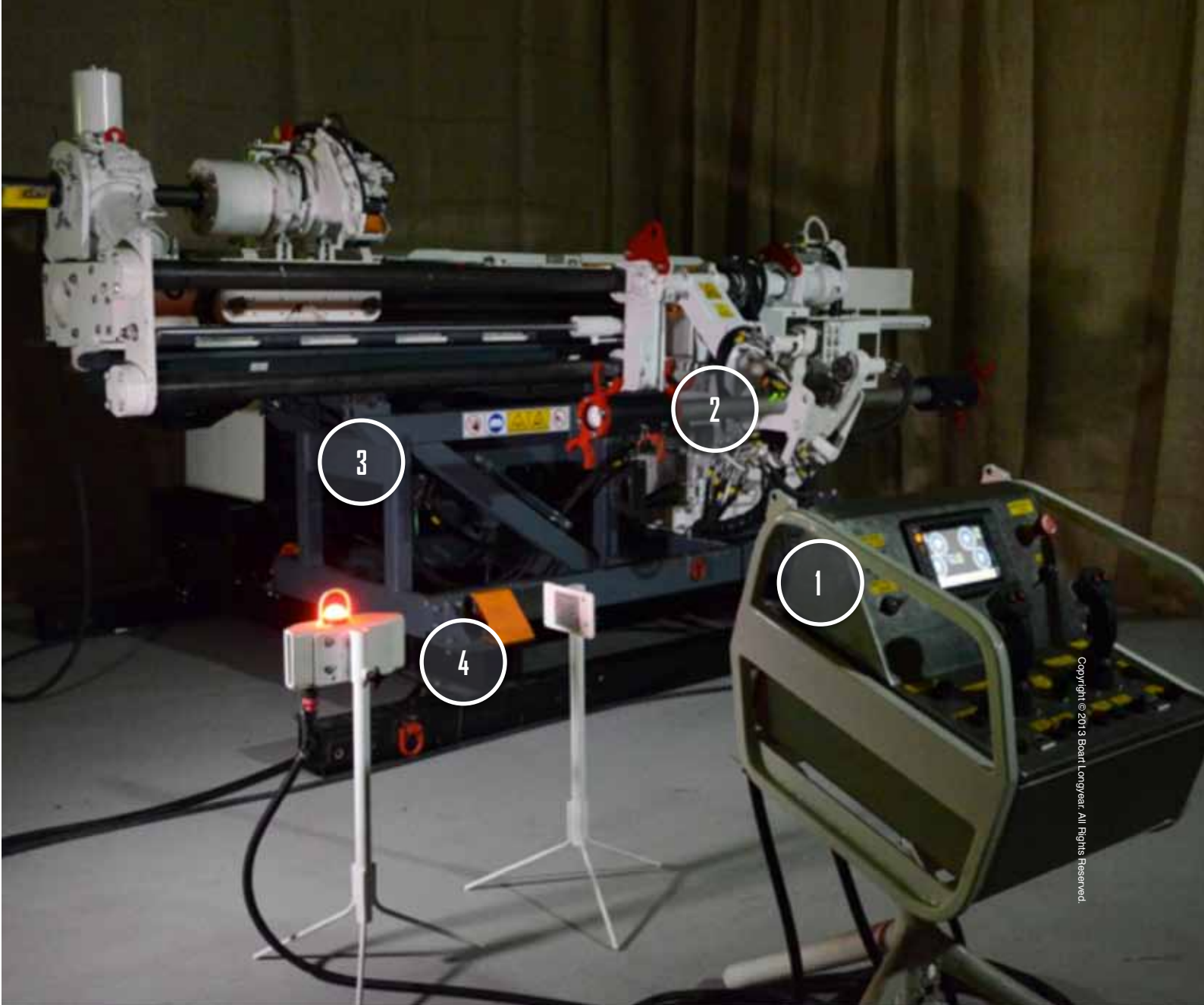
## DCi™ DRILL CONTROL INTERFACE

The DCi is a new control system designed to increase the efficiency, productivity and safety of the Boart Longyear LM™ series of drilling rigs through a range of new automated features, including unattended 3M drilling and semi-automated rod feed and pull functions.

The DCi will initially be available for purchase as a retrofit option for existing LM Rigs already in the field and eventually as an optional feature with all new LM™75 and LM™90 rigs coming off the Boart Longyear production line.



For more information on the DCi scan with a QR code reader on your smart phone.



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### 1 OPERATOR CONTROL PANEL

Stainless steel construction housed in a lightweight and portable aluminium frame. Control layout includes a 7" Colour Screen and has been designed to ensure easy operator transition from pilot hydraulic to electric controls. Dual joysticks allow both rig and the latest version LM Rod Handler to be operated from a single control console for added ease and efficiency.

### 2 RIG UPGRADE KIT

A range of sensors control the automated functions and monitor all critical drilling parameters, returning this information back to the operator control panel for processing and retention.

### 3 DCI HYDRAULICS MODULE

A 'bolt-on' assembly containing all IO Modules and, hydraulic manifolds. Can be easily regressed to the original pilot hydraulic control console functionality if required.

### 4 PERIMETER LASER PROTECTION

Auto shutdown when security laser is breached, keeping workers safe from drilling operation hazards.

## The DCi features can be grouped in three main categories

### Safety

- Fully electronic user interface
- Lightweight control panel for increased mobility
- No hydraulic hoses at drill control panel – clean and uncluttered work area
- Combined control system fully compliant with latest requirement of ISO13849-1, PLd. Sil2
- Controlled auto shutdowns
- Shutdowns while drilling in unattended mode if pre-set parameters are exceeded
- Shutdowns at end of 3m unattended drill runs

### Productivity

Unattended 3m drilling function:

- 3m drill run is completed (including re-chucking and end of cycle hole flushing) once the 'Auto' button has been pressed.
- Frees driller up to perform other tasks
- Allows drilling continuation during shift changeovers and meal breaks
- Drilling continues as long as the above parameters remain within their predetermined ranges
- Shift supervisors can select parameters for less experienced drill crews
- Drilling stops if any of the above parameters moves outside of its range
- Automatic 3m rod feed/pull function:
  - Automatic feeding or pulling of 3m rod
  - Automatic thread making or braking
  - Automatic positioning of the carriage/rotation unit at the end of the cycle
  - Allows operation of rod handler while auto rod running continues
  - Semi-automated, hands-free Wireline descent/retrieve function
  - Easy operator transition for existing LM users
  - Easy 'bolt-on' addition to existing LM platforms

### Information

Additional instrumentation display on:

- Water flow
- Rotation RPM
- Bit rate
- Bit weight
- Head Position
- Penetration rate
- Control System Diagnostics – self reporting on rig operational equipment
- Early detection and reporting of operational errors and faults
- Data Logging

# TECHNICAL INFORMATION

Operational Functions	
Unattended Drilling	Drilling within Predetermined range c/w Auto Rechuck
“One Touch” Rod Pull	Semi-Automatic Single Rod Pull including joint breaking
“One Touch” Rod Feed	Semi-Automatic Single Rod Feed including joint tightening
Rod Handler*	Integrated Rod Handler Controls
Controllable Drilling Parameters	Supervisor “Setable” Parameters via USB Upload
Data Logging	USB Download of System Drilling Data

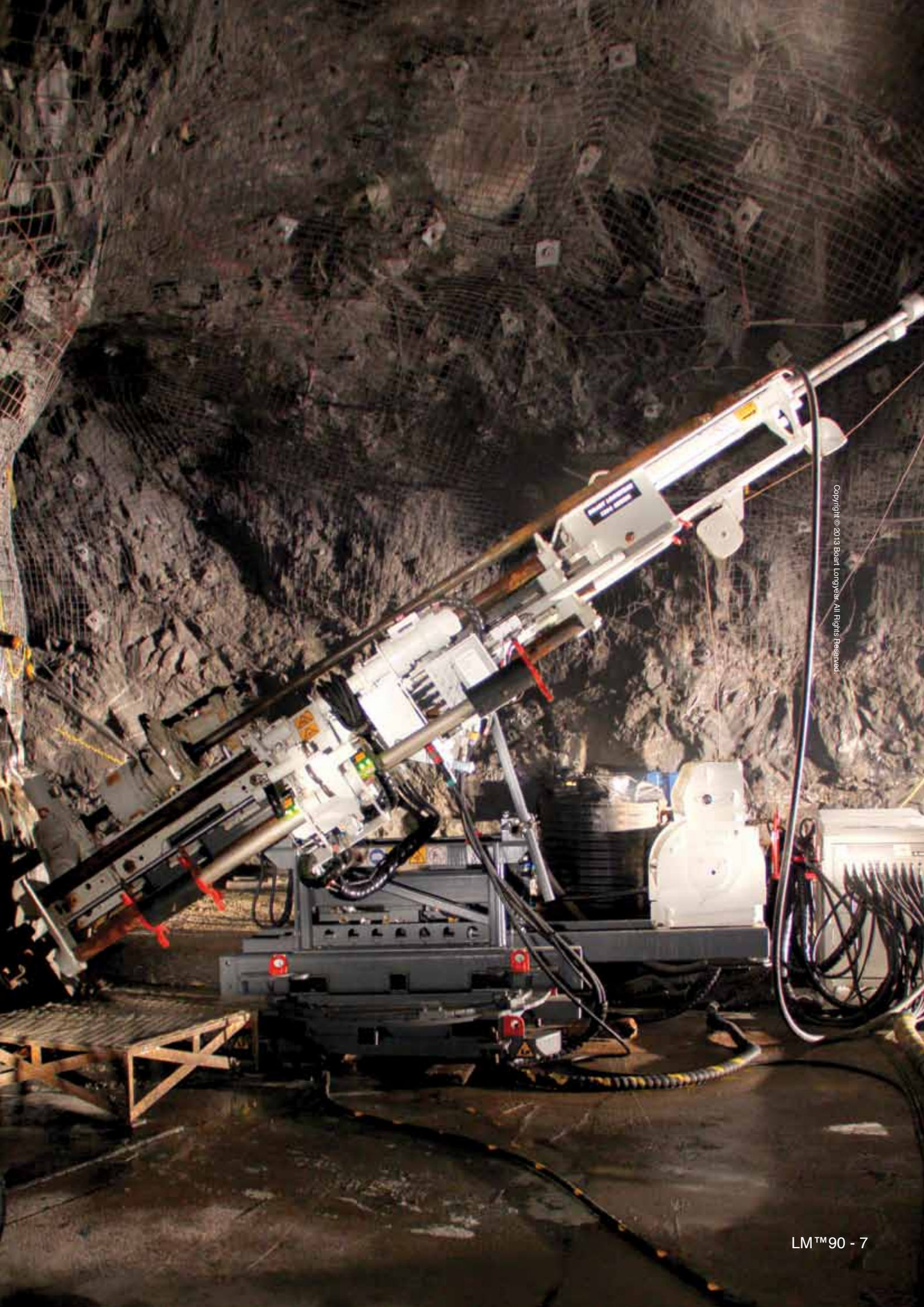
Operational Controls	
Control Panel Construction	Freestanding Stainless enclosure, Lightweight Aluminium Support Frame
Display Type	7” IFM Colour Display Screen
Drilling Control	Twin Electronic Joystick and Control Switches
Rod Handler*	Single Station Drilling/Rod Handler Control

\*PWM Rod Handler required

Display Information	
Rotation	Rotation Pressure/Torque [bar <math>\diamond</math> psi] and Speed [rpm]
Drilling Pressures	Feed Pressure [bar <math>\diamond</math> psi] and Holdback Pressure [bar <math>\diamond</math> psi]
Water Pump	Flowrate [lpm <math>\diamond</math> gal/min] and Water Pressure [bar <math>\diamond</math> psi]
Feed Rate	Drilling Penetration Rate [mm/min <math>\diamond</math> in/min]
Bit Weight	Drilling Force [kNf]
Wireline	Speed [rpm] and Total Count [revs]
Diagnostics and Alarms	On-Screen System Diagnostics and Alarm Messages

Rig Upgrades	
Rotation Unit Sensors	Rotation Speed and Rod “Stick Out” Monitoring
Load Sense Relief	Controlled Load Sense Limiting function for Feed and Rotation
Water Pump Sensors	Rotation and Pressure Monitoring
Wireline Counter	Directional Capable Rotation Count Sensing
Perimeter Laser Protection	Multifunction Tri-Colour Indication of Rig and Perimeter Clear Status
Aluminium Body Water Swivel	Non Contact End of Rod Detection for Auto Functions

Hydraulic & Control System	
Head Position Feedback	Non Contact Linear Transducer, IP67 Rated
Feedframe Hose Management	Bulkhead Controlled & Sleeved Hose Movement
Rod End "Stick Out" Detection	Non Contact Rod End Sensing and "Stick Out" Control
PLC Controller	IFM CAN based Mobile Controller, IP67/e1 Rated
ElectroHydraulic Control	PWM Electronic Pilot Pressure Control Valves
Robust System	IP67 Embeded Control System and Components



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