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Geotechnica 2017



“Cable Percussion – a proposition”



- Chairman of the Safety, Standards and Technical Committee
- Compliance Controller BAM Ritchies
- Chairman Beyond Zero
- UK expert in drilling and foundation equipment
 - British Standards Institute
 - CEN
- Member of the Association of Geotechnical and Geo-environmental Specialists safety working group



This presentation follows up from the BDA
proposition paper -
'Cable Percussion Drilling'



The background



- 29th October 2015
- Single snatch block
- Safety swivel SWL of 3.15 tonnes
- Safety swivel proof loaded to 6.3 tonnes
- The rig can only generate 2.0 tonnes





Causation



- The accessories
- Human error, and or
- The Cable Percussion Drilling Rig



Accessories



- Approved and reputable supplier
- Fully audited
- No previous issues with quality
- Supplier keen to be involved in the investigation
- SWL 3.15 tonnes
- Proof loaded and certified to 6.3 tonnes
- The loads, as specified by the manufacturer, should not have compromised the safety swivel



Human Error



- Fully BDA Accredited
- NVQ Level 2
- 10 years cable percussion drilling experience
- Good reputation
- Self reported



The Cable Percussion Drilling Rig



- No obvious failings in composition of the accessories
- Reputable Lead Driller
- Manufacturer specification implies compliance
- Question over load generation



Load testing



Establish the load generated by the cable percussion drilling rig in comparison to the manufacturers specification document



Testing





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2.0 tonne CP specification



- 18hp or 13kW at 1800rpm
- 100Nm at 1770rpm
- 2 tonne single line pull
- 8 tonne derrick S.W.L
- 20 tonnes derrick failure load
- 40m
- European Certificate of Declaration



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3.0 tonne CP specification



- 25.9hp or 19.3kW at 1870rpm
- 100Nm at 1870rpm
- 3 tonne single line pull
- 10 tonnes derrick SWL
- 23.7 tonne derrick failure load
- 61m
- European Certificate of Declaration



The snatch block



- 2.0 tonne
- 3.0 tonne
- Zero snatch blocks – 2.0 tonnes
- Zero snatch blocks – 3.0 tonnes
- 1 snatch block – 4.0 tonnes
- 1 snatch block – 6.0 tonnes
- 2 snatch blocks – 6.0 tonnes
- 2 snatch blocks – 9.0 tonnes



Wire rope



- 16mm diameter
- 1960 grade left hand lay
- 3.63 tonne safe working load

- Safety swivel, SWL 3.15 tonnes;
- Conventional 'D' shackle, SWL 4.75 tonnes;
- Rod swivel, SWL 5.00 tonne;
- Sinker bar, SWL 5.00 tonne;
- Recovery tool, SWL 5.00 tonne;
- Snatch block, SWL 8.00 tonne, and;
- 'D' shackle, SWL 6.00 tonnes (when implementing a snatch block).

2.0 tonne capacity cable percussion rig

	No snatch block		One snatch block		Two snatch blocks	
Attempt	1	2	1	2	1	2
Steady Pull (tonnes)	<i>Data missing</i> 2.7	<i>Data missing</i> 2.85	4.21 6.39	4.35 7.2	6.1 7.11	7.46 7.27
Snatch Pull (tonnes)	4 4.01	4.3 Abandoned	6.6 8.6*	7.05 Abandoned	11.12* 8.2*	11.6* Abandoned

DERRICK SWL 8 tonnes



The results

3.0 tonne capacity cable percussion rig

	No snatch block		One snatch block		Two snatch blocks	
Attempt	1	2	1	2	1	2
Steady Pull (tonnes)	3.84 3.4	3.91 3.58	8.53 6.84	9.3 7.25	12* 10.1*	Abandoned 10.6*
Snatch Pull (tonnes)	6 5	5.9 Abandoned	9.6 8.85	Abandoned Abandoned	Abandoned 13.8*	Abandoned Abandoned

DERRICK SWL 10 tonnes



Accessories

- Wire rope SWL 3.63 tonnes
- Wire rope with grips SWL 2.90 tonnes
- Safety swivel, SWL 3.15 tonnes;
- Conventional 'D' shackle, SWL 4.75 tonnes;
- Rod swivel, SWL 5.00 tonne;
- Sinker bar, SWL 5.00 tonne;
- Recovery tool, SWL 5.00 tonne;
- Snatch block, SWL 8.00 tonne, and;
- 'D' shackle, SWL 6.00 tonnes (when implementing a snatch block).



Legislative review



- LIFTING OPERATIONS AND LIFTING EQUIPMENT REGULATIONS 1998
- THE PROVISION AND USE OF WORK EQUIPMENT REGULATIONS 1998
- BS ISO 4308-1:2003 CRANES AND LIFTING APPLIANCES—SELECTION OF WIRE ROPES—PRT 1:GENERAL
- BS ISO 4301-1:2016 CRANES-CLASSIFICATION-PRT1 GENERAL
- BS EN 292-1:1991 SAFETY OF MACHINERY-BASIC CONCEPTS, GENERAL PRINCIPALS FOR DESIGN-PRT 1: BASIC TERMINOLOGY, METHODOLOGY
- BS EN 292-2:1991 SAFETY OF MACHINERY-BASIC CONCEPTS, GENERAL PRINCIPALS FOR DESIGN-PRT2: TECHNICAL PRINCIPLES AND SPECIFICATIONS
- BS EN 16228-1:2014 DRILLING AND FOUNDATION EQUIPMENT-SAFETY PRT 1 COMMON REQUIREMENTS



The wire rope



- Factor of safety of 5
- SWL 3.63 tonnes
- With wire rope grips SWL 2.90 tonnes
- With a snatch block SWL 2.61 tonnes



Pulley / sheaves



Pulley / sheave	Actual measurement	Theoretical measurement
Crown Wheel	185mm	448mm
Winch drum	140mm	448mm



Brakes / Clutch



- Does not fail to safe



- Additional testing
- The sheave diameters
- Engine output
- The braking mechanism



Closing thoughts



- Bulletin No.9 BDA/AGS
- “Some of the prevailing practices in the UK GI industry are no longer ‘fit for purpose’.”
- 38% agreed
- 45% cite Cable Percussion Drilling
- The most commonly used method for borehole formation in the UK
- The BDA is working with the manufacturers and industry to address these concerns



Thank you



- I welcome any questions



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Awards 2017
*recognising achievement
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