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Implementation of mechanized roof-bolters for low-seam hard-rock mining

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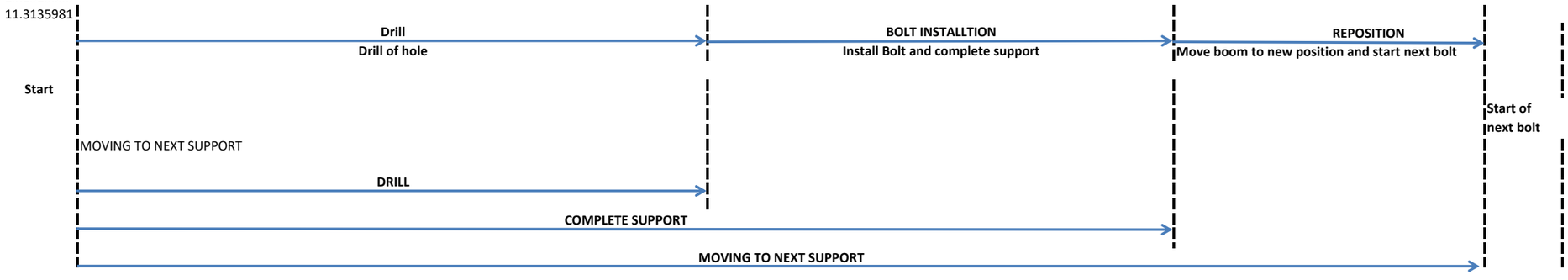
GHH MINE MASTER ROOF BOLTER (RLP1400-1B) - SITE TEST 26 Feb2013 tot 5 March 2013

	26/02/13				N7H	26/02/13				N7I	25/02/13				N7C	25/02/13				N7I
	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT
Hole 1	2.28	0.92	3.2	2.14	5.34	3.21	1.19	4.4	0.7	5.1	2.24	2.13	4.37	1.03	5.4	3.53	1.47	5	2.13	7.13
Hole 2	3.07	1.16	4.23	1.05	5.28	2.15	1.16	3.31	0.69	4	2.53	1.67	4.2	0.8	5	3.29	1.07	4.36	1.12	5.48
Hole 3	2.05	1.2	3.25	1.25	4.5	4.18	1.18	5.36	0.97	6.33	2.58	1.89	4.47	0.63	5.1	4.05	1.24	5.29	0.73	6.02
Hole 4	2.26	1.16	3.42	0.68	4.1	3.21	1.16	4.37	1.05	5.42	3.28	1.95	5.23	0.88	6.11	4.45	3.6	8.05	2.06	10.11
Hole 5	2.55	1.66	4.21	1.24	5.45	4.25	1.1	5.35	0.75	6.1	3.26	1.8	5.06	1.09	6.15	4.46	1.75	6.21	0.24	6.45
Hole 6	2.44	1.64	4.08	0.45	4.53	4.24	1.16	5.4	0.86	6.26	3.17	1.28	4.45	0.63	5.08	5.42	1.6	7.02		
Hole 7	2.23	1.27	3.5	2.57	6.07	2.57	1.52	4.09	0.43	4.52	3.06	1.14	4.2	1.87	6.07					
Hole 8	2.52	1.51	4.03	1.08	5.11	2.15	2.09	4.24	0.92	5.16	4.33	1.94	6.27	0.77	7.04					
Hole 9	2.26	1.01	3.27	0.75	4.02	2.05	0.97	3.02	1.55	4.57	3.25	1.98	5.23	0.9	6.13					
Hole 10	2.18	1.12	3.3	0.8	4.1	3.37	0.9	4.27	0	4.27	3.05	1.24	4.29	2.19	6.48					
Hole 11	3.37	1.03	4.4	0.86	5.26	3.21	0.96	4.17	0.4	4.57	3.27	1.09	4.36	1.16	5.52					
Hole 12	3.07	0.94	4.01	1.09	5.1	2.52	1.48	4	1.03	5.03	2.55	1.46	4.01	3.06	7.07					
Hole 13	2.41	1.59	4	0.38	4.38	2.32	0.96	3.28	1.02	4.3	3.29	1.88	5.17	0.83	6					
Hole 14	2.57	1.55	4.12	1.05	5.17	2.22	1.06	3.28	0.29	3.57	4.11	1.36	5.47	0.77	6.24					
Hole 15	3.03	1.07	4.1	1.07	5.17	2.3	2.22	4.52	0.83	5.35	3.25	2.76	6.01	0.24	6.25					
Hole 16	2.44	1.73	4.17	1.18	5.35	3.42	1.6	5.02	1.35	6.37										
Hole 17	3.15	0.96	4.11	1.42	5.53	2.12	1.08	3.2	1.06	4.26										
Hole 18	2.34	1.16	3.5	0.88	4.38	2.05	0.97	3.02	1.55	4.57										
Hole 19	2.47	0.9	3.37	0.78	4.15	4.2	1.19	5.39	0.73	6.12										
Hole 20	2.4	1.07	3.47																	
Hole 21																				
Hole 22																				
Hole 23																				
Hole 24																				
Hole 25																				
Hole 26																				
Hole 27																				
Total Drill Time	51.1					55.7					47.2					25.2				
Avg Drill Time per Hole	2.6					2.9					3.1					4.2				
Time Complete Support			75.7					79.7					72.8					35.9		
Avg Complete per Support			3.8					4.2					4.9					6.0		
Complete Support Time					93.0					95.9					89.6					35.2
Number of Bolts					21.0					19.0					15.0					6.0
Number of Bits used					4.0					3.0					3.0					2.0
Time to Install bolt (Machine to Hole)(minutes)					24.7					24.0					25.6					10.7
Time per bolt (avg)					1.2					1.3					1.7					1.8
					13.5498441					11.8911025					10.0401606					

Total Number of holes drilled	173.0		
Total Drilling time	558.4	3.2	minutes per hole
Total Support time	851.1	4.9	minutes per hole
Total Complete time	917.5	5.3	Minutes per bolt installation
	15.2913333		
	11.3135981		



24/02/13				N7C	23/02/13				N7A	23/02/13				N7C	22/02/13				N7G	21/02/13				N7G
DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT
2.35	1.92	4.27	1.03	5.3	2.57	2.43	5	0.37	5.37	3.25	2.01	5.26	0.3	5.56	6	1.4	7.4	0.85	8.25	3.3	1.76	5.06	0.94	6
2.36	1.93	4.29	1.19	5.48	3.08	1.12	4.2	0.8	5	3.47	1.68	5.15	1.03	6.18	3.09	3.47	6.56	0.84	7.4	5.15	1.88	7.03	0.44	7.47
2.05	2.14	4.19	1.07	5.26	2.51	1.84	4.35	1.82	6.17	4.25	4.75	9	2.05	11.05	5.26	2.33	7.59	2.62	10.21	3.56	1.99	5.55	0.96	6.51
2.15	1.11	3.26	1.14	4.4	3.35	1.85	5.2	1.2	6.4	6.53	2.92	9.45	3.55	13	4.37	2.87	7.24	2.16	9.4	2.5	1.65	4.15	0.92	5.07
4.19	1.82	6.01	1.01	7.02	2.4	3.6	6	0.3	6.3	2.17	1.37	3.54	0.76	4.3	2.4	1.9	4.3	1	5.3	3.1	1.97	5.07	0.94	6.01
2.27	1.25	3.52	0.78	4.3	3.09	2.26	5.35	1.72	7.07	3.57	1.69	5.26			3.12	2.03	5.15	0.9	6.05	19.5	3.94	23.44	1.56	25
2.54	1.69	4.23	1.17	5.4	1.54	1.91	3.45	0.82	4.27						2.29	2.71	5	2.21	7.21					
3.23	1.17	4.4	0.65	5.05	2.35	1.7	4.05	0.22	4.27						4.57	1.87	6.44	0.92	7.36					
2.16	1.19	3.35	0.9	4.25	2.35	1.1	3.45	0.82	4.27						3.08	3.02	6.1	0.9	7					
2.39	1.18	3.57	1.54	5.11	2.35	1.7	4.05	2.27	6.32						2.57	7.63	10.2	1.37	11.57					
2.4	1.65	4.05	0.25	4.3	6.25	3.05	9.3	0.94	10.24						2.45	7.95	10.4	1.12	11.52					
2.05	1.24	3.29	0.74	4.03	2.2	1.97	4.17	0.89	5.06						2.52	1.78	4.3	1.05	5.35					
2.53	1.65	4.18	0.92	5.1	3.17	1.4	4.57	0.83	5.4						3.5	2.97	6.47	1.78	8.25					
3.27	1.13	4.4	1.17	5.57	3.46	0.64	4.1	0.4	4.5						3.23	2.17	5.4	0.72	6.12					
2.2	1.2	3.4	1.9	5.3	2.57	1.73	4.3	0.81	5.11						2.4	2.69	5.09	1.02	6.11					
2.41	1.16	3.57	2.5	6.07	2.3	1.28	3.58	0.72	4.3						3.52	3.05	6.57	0.78	7.35					
1.57	1.63	3.2	0.87	4.07	2.3	1.28	3.58	0.72	4.3						3.47	1.83	5.3	0.91	6.21					
2.23	1.15	3.38	0.71	4.09	2.3	1.82	4.12	1.08	5.2						4.06	2.24	6.3	1.27	7.57					
2.43	1.58	4.01	1.25	5.26	2.12	1.36	3.48	1.52	5						3.3	2.88	6.18	1.1	7.28					
3.4	1.77	5.17			4.45	1.62	6.07	1.06	7.13						2.59	2.55	5.14	0.41	5.55					
					3.25	0.93	4.18	0	4.18						4.16	1.84	6	0.57	6.57					
															3.45	1.9	5.35	0.74	6.09					
															2.46	1.79	4.25	1	5.25					
															3.1	1.23	4.33							
50.2					60.0					23.2					81.0					37.1				
2.5					2.9					3.9					3.4					6.2				
		79.7					96.6					37.7					147.1					50.3		
		4.0					4.6					6.3					6.1					8.4		
				95.4					115.9					40.1					169.0					56.1
				20.0					21.0					6.0					24.0					6.0
				4.0					4.0					1.0					5.0					4.0
				29.6					36.6					14.4					66.1					13.2
				1.5					1.7					2.4					2.8					2.2
				12.5838926					10.8751942					8.97979546					8.52222288					6.42169105

05/03/13				N11A	05/03/13				N11F	05/03/13				N11F_U D	
DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	DRILL	BOLT INSTALLATION	COMPLETE SUPPORT	REPOSITION	MOVING TO NEXT SUPPORT	Avg.
3.47	1.63	5.1	0.47	5.57	3.05	2.3	5.35	0.72	6.07	2.42	1.75	4.17	1.86	6.03	
2.59	0.83	3.42	0.88	4.3	3	1.26	4.26	0.8	5.06	3.02	1.07	4.09	0.31	4.4	
3.05	1.25	4.3	0.79	5.09	3.4	1.16	4.56	0.74	5.3	3.14	0.91	4.05	0.32	4.37	
5.11	1.23	6.34	0.78	7.12	2.4	1.17	3.57	1.46	5.03	4.52	-0.47	4.05	0.32	4.37	
2.18	0.94	3.12	0.89	4.01	5.27	2.04	7.31	0.9	8.21	3.4	1.06	4.46	0.83	5.29	
3.51	1.68	5.19	0.85	6.04	4.21	2.82	7.03	0.37	7.4	3.35	1.83	5.18	0.94	6.12	
2.28	1.12	3.4	1.11	4.51	3.55	1.52	5.07	0.43	5.5	2.3	1.1	3.4	1.05	4.45	
3.27	1.03	4.3	0.99	5.29	4.45	1.55	6	1.1	7.1	3.56	0.91	4.47	-4.47		
					3.3	1.23	4.53	1.87	6.4						
					4.2	1.14	5.34	1.14	6.48						
					3.5	1.68	5.18	0.82	6						
					2.35	1.07	3.42	0.83	4.25						
					2.55	1.57	4.12	0.31	4.43						
					6.35	1.85	8.2	0.8	9						
					3.35	1.74	5.09	1.22	6.31						
					2.19	1.16	3.35	0.89	4.24						
					2.04	1.23	3.27	1.13	4.4						
					3.01	1.44	4.45	0.92	5.37						
					14.37	2.08	16.45	-16.45							
25.5					76.5					25.7					46.5
3.2					4.0					3.2					
		35.2					106.6					33.9			70.9
		4.4					5.6					4.2			
				41.9					106.6					35.0	81.1
				8.0					19.0					8.0	
				2.0					6.0					2.0	
				9.7					30.0					8.2	
				1.2					1.6					1.0	24.4
				11.4476508					10.6992023					13.7025407	