



MANDELA MINING PRECINCT
MINDS FOR MINES

Corner Carlow & Rustenburg Road
PO Box 91230, Auckland Park, 2006



+27 11 358 0003



enquiries@MandelaMiningPrecinct.org.za

TECHNICAL SUMMARY REPORT

Programme	LoCM	Work Package Name	WP2: Underground Demonstration of Capabilities of Remote charging		
Milestone #	LoCM22WP2-6	Milestone Name	Close-out report		
Service Provider	UP	Research Lead	Wolter de Graaf		
Start Date	01/04/2022	End Date	31/08/2023	Funding Source	DSI
Aim of Work package The aim of this work package is to demonstrate the capabilities of the remote charging systems in the underground mining environment which will remove the explosives handling and loading personnel from the high-risk area. The aim of this milestone deliverable is to conclude the work package deliverables with a close-out report.					
Methodology Testing of the Remote Control Unit (RCU) in underground mining environment deliverables consist of the following 6 milestones: ▪ Start-up, and project initiation; ▪ Secure test site & pre-plan preparation; ▪ Equipment and site preparation; ▪ Underground testing; ▪ Performance results outcome; and ▪ Close-out and approval of final report. These tests provide crucial information about the RCU's performance and abilities in underground mining operations.			Research Findings The evaluation of the results and outcomes during the underground testing of the RCU indicated that the prototype unit was successful in achieving the set-out objectives identified for proof-of-concept. The platform of the unit was more than capable and could also serve as a basis for alternative uses such as lidar scanning or mine rescue applications. The arm and charging lance configuration were both sufficient for proof-of-concept as the operator was able to identify and mock charge drilled holes. However, this part of the RCU will require further development to decrease time and improve operator efficiency. Compared to the surface testing, the unit performed similarly and was able to reaffirm the success in meeting the objectives for proof-of-concept.		
Conclusions Testing the prototype remote charging unit was successfully achieved. The performance of the unit exceeded expectations in terms of the unit's ability to handle sloped and uneven terrain underground. The unit's battery and hardware performed beyond the initial expectations. A panel of drilled holes was successfully mock charged with prototype unit. Although there is room for improvement on some of the elements of the design, as a proof of concept, the prototype unit successfully demonstrated its ability to meet the criteria established. Challenges in securing the test site, significantly delayed the completion of the work in this work package. Additionally, the compilation of standard operating procedures, risk assessments and training competency documents proved challenging as there were no precedent cases to refer to. Minor modifications were made to the unit to account for the risks identified in the risk assessment process. These			Recommendations The remote charging unit has high potential for development into a successful charging unit. Discussions with an interested explosive manufacturer and potential mining company/companies could extend this prototype development, where the project team will further partake in establishing the collaboration initiative.		



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changes included the addition of loading bars/bull bars as well as an additional spotlight on the rear of the unit. Challenges in aligning the unit to the face as well as identifying and inserting the lance into drilled holes were experienced because of the camera configuration. These issues could be rectified in future iterations through the incorporation of an improved camera system. Beyond these challenges the remote charging unit exceeded the expectations of the research team and successfully met the criteria set in the work package.	
Category (RDI)	Development

Attachments

Milestone Report

[MMP REP 2022 LoCM22WP2MS6 \[2023-07-25\]A.pdf](#)

Figures

[Figure 1 - Proof of Concept Criteria.PNG](#)

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