Pre-splitting Application for Wings Stability in Secondary Stopes

Case study of an underground mine

Introduction

A study was conducted to mitigate the risk of wings failure in a secondary stope blasting in a transverse long hole stoping.

The study consisted of using the presplit concept for final crown wall protection from an existing drill design pattern to prevent wings instability after blasting effects .

Analysis conducted for one blast in a stope shape as per below:

- Stope (blast#4 - Cap blasting with 17 rings)

Tools and software used for the presplit blasting

- Aegis Designer and Aegis Analyzer
- UG Shotplus

Methodology

Design the stope shape with site guidelines with first and last holes to be used as presplit holes and add easer rings as presplit rings with 2 presplit holes per each only.

Use bulk emulsion pumped with Maclean charge rig @ full coupling in normal holes and decoupling in the presplit holes using Riosplit package explosive pushed with Charge rig unit horse pusher.

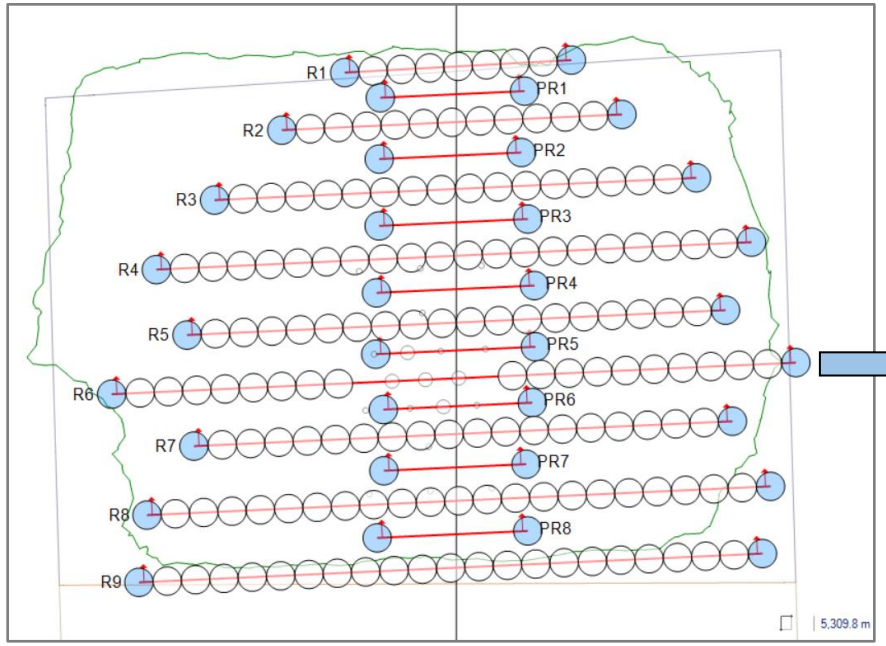
Prime holes with Trajan booster 250g and Electronic detonators.

Presplit holes to be timed with the same delays and initiated after floor/breakthrough holes being fired and before side holes firing.

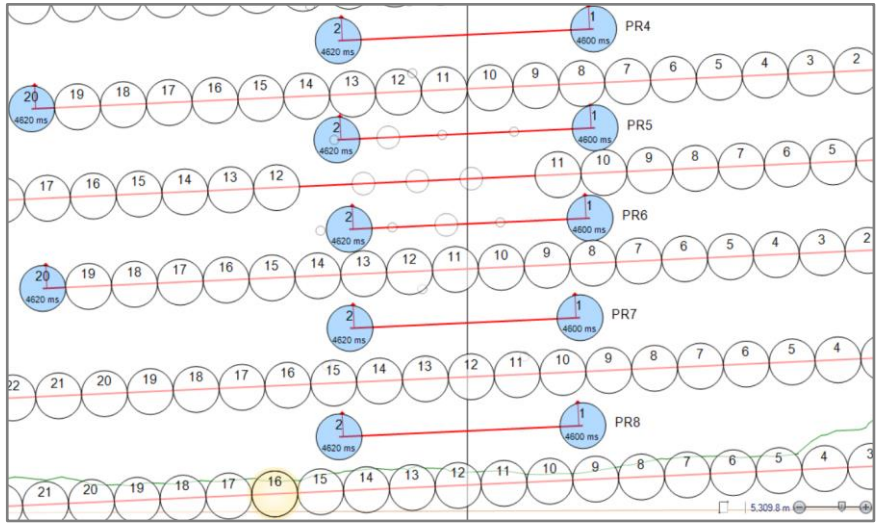
Simulate the breaking with Aegis Analyzer for blasting prediction and compare the blast shape prediction with the CMS as blast out comes and make recommendations for crown stability.

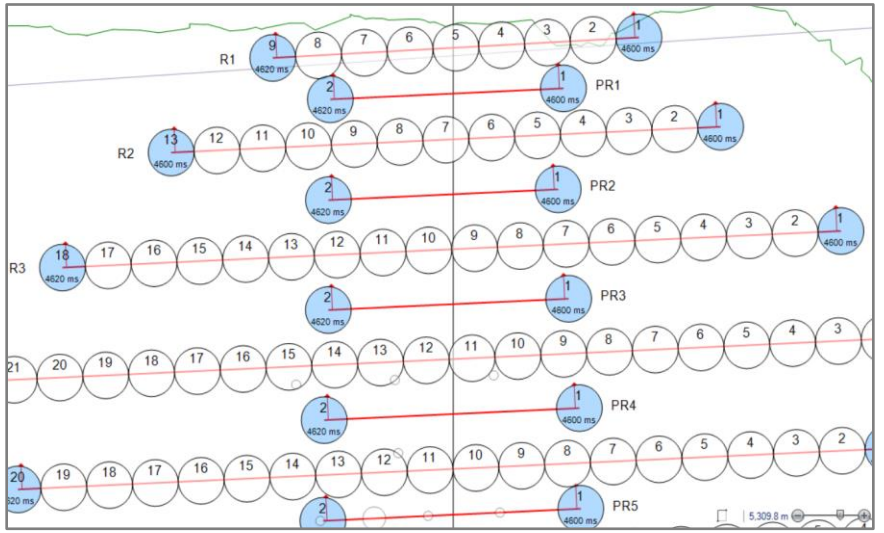
Timing

Blast#4, Rings



Presplit hole





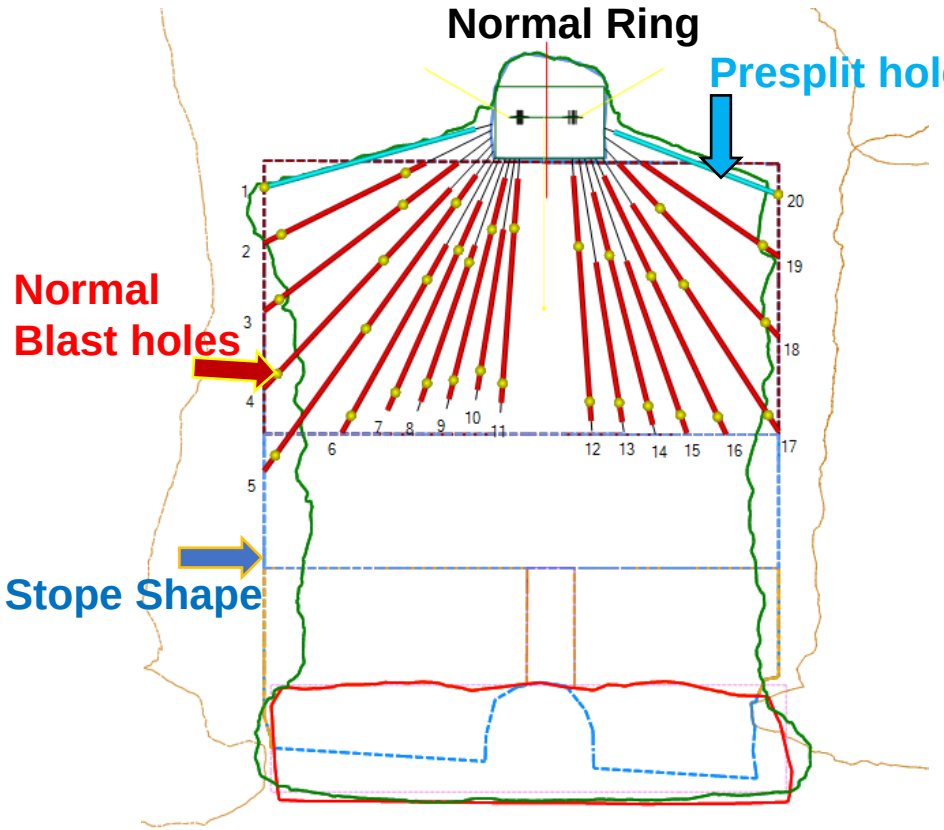
Simulation

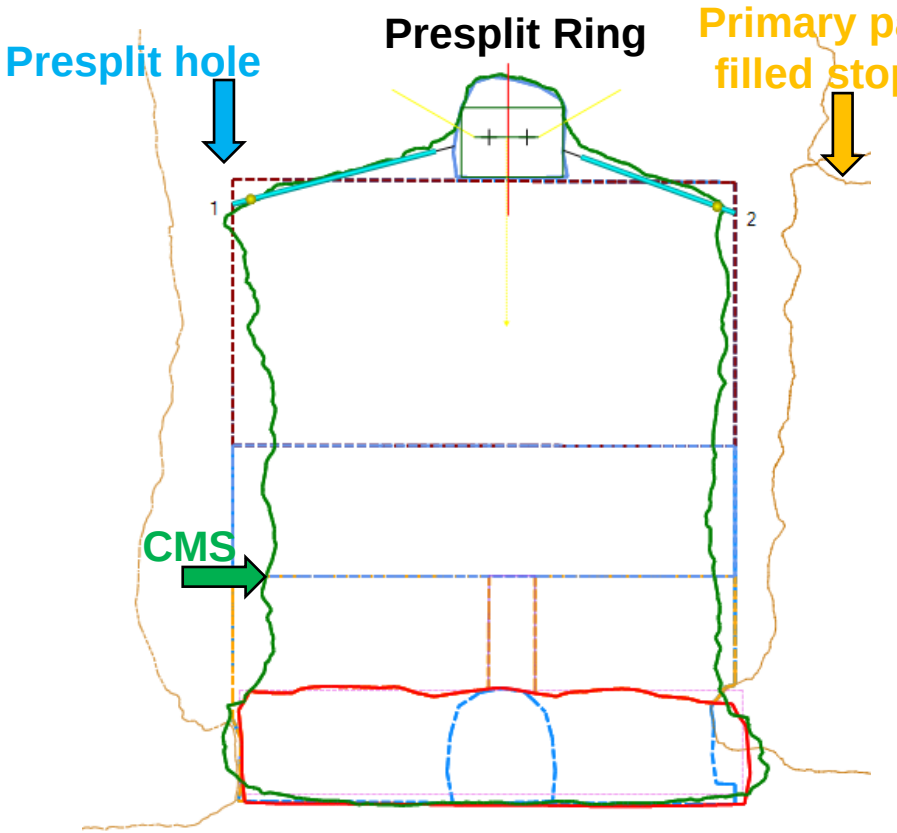
Raise + Floor holes (1)

Presplit Holes (2)

Side Holes (3)

Results and Analysis





❑Presplit blasting out comes vs CMS (cavity monitoring system)

Conclusion and Recommendations

The crown profile remained stable when comparing the designed wings holes shapes versus the cavity monitoring system of the blasting out comes.

Recommended presplit drill & blast design parameters;

- Burden = 1.3m
- Spacing = 2.7 or 2.8m
- Hole diameter = 102mm
- Charging with decoupled explosive (Riosplit)
- Electronic delay

Note: Keeping stope open for a long time should be avoided to avoid long exposure of the wings which could result on failure.

References and Bibliography

- Open cast mine, exposure and site visit during presplit charging & blasting;
- Underground practical Drill & Blast knowledge and experience.
- https://www.dataminesoftware.com/solutions/aegis-underground-drill-and-blast/

Disclaimer…

This website is operated by Mining-Doc. Throughout the site, the terms "we", "us" and "our" refer to Mining-Doc. Mining-Doc offers this website, including all information, tools and services available from this site to you, the user, conditioned upon your acceptance of all terms, conditions, policies and notices stated here. These Terms of Service apply to all users of the site, including without limitation users who are browsers, vendors, customers, merchants, and/ or contributors of content. We are not responsible if information made available on this site is not accurate, complete or current. The material on this site is provided for general information only and should not be relied upon or used as the sole basis for making decisions without consulting primary, more accurate, more complete or more timely sources of information. Any reliance on the material on this site is at your own risk.

The case studies provided are for educational and knowledge sharing purpose only. The document is not intended to be considered for investment purpose, engineering design and should not be applied without consulting a professional engineer or competent person.

We do not warrant that the quality of any case study or profile information, or other material obtained by you will meet your expectations, or that any errors in the Service will be corrected. We are not responsible for examining or evaluating the content or accuracy of case studies that are presented by candidates and we do not warrant and will not have any liability or responsibility for any candidate's materials or for any services of third-parties. We are not liable for any harm or damages related to download of any case study or services by candidates.

You expressly agree that your use of, or inability to use, the service is at your sole risk. The service delivered to you through our platform (except as expressly stated by us) provided 'as is' and 'as available' for your use, without any representation, warranties or conditions of any kind, either express or implied, including all implied warranties or conditions of merchantability, merchantable quality, fitness for a particular purpose, durability, title, and non-infringement.
In no case shall Mining-Doc, our directors, officers, employees, affiliates, agents, contractors, interns, suppliers, service providers or licensors be liable for any injury, loss, claim, or any direct, indirect, incidental, punitive, special, or consequential damages of any kind, including, without limitation lost profits, lost revenue, lost savings, loss of data, replacement costs, or any similar damages, whether based in contract, tort (including negligence), strict liability or otherwise, arising from your use of any of the service or for any other claim related in any way to your use of the service, including, but not limited to, any errors or omissions in any content, or any loss or damage of any kind incurred as a result of the use of the service or any content posted, transmitted, or otherwise made available via the service, even if advised of their possibility. Because some states or jurisdictions do not allow the exclusion or the limitation of liability for consequential or incidental damages, in such states or jurisdictions, our liability shall be limited to the maximum extent permitted by law.