Case Study
Improving Fragmentation to Drive Shovel Productivity and Improve Mill Feed
Gibraltar Mine, Canada

Site Profile
- A low-grade bulk tonnage deposit consisting of four separate open pits.
- A joint venture project owned by Taseko Mines Ltd & operated by Ledcor Mining Ltd.
- Annual production of 70 million pounds of copper & 980,000 pounds of molybdenum.
- Estimated copper reserves of 760 million tonnes, containing 4.7 billion pounds of copper.
- Located 45km Northeast of Williams Lake, B.C.

The Situation
- Mine re-opened November 2004 after 5 year closure.
- Higher copper prices made reopening viable but mine management has a 15 year strategic plan to achieve long term objectives.
- Grinding mill horsepower id fixed, requiring optimum fragmentation to maximise throughput.
- One of the lowest grade operating mines in British Columbia.

Mining Issues
- Diggability and fragmentation problematic due to hardness of the ore.
- Pit wall stability has been a continuing issue.
- Need a large percentage of fines in the ore blasts to maximise mill throughput.

Technical Solutions
- Introduced i-kon™ approximately one year ago. Now using tough i-kon™ RX to minimise possible stemming damage.
- Increased pattern in waste rock from 24 x 28 with conventional dets to 26 x 30 with i-kon™ dets. Subgrade drilling reduced from 7 feet to 5 feet with the possibility of more reduction in the future.
- Using 20 x 23 pattern in ore body with holes 12 ¼ in, 50 ft deep and short collars of19 ft in ore body.
- Using 8 ms delays for optimum rock movement, and backing off near walls and edges to protect against damage.
- Introduced combination of i-kon™ dets and air decking to maximise blast energy.
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Demonstrated Benefits

- Dramatically improved fragmentation going to the mill, with reduced muck size.
- Maximised overall production at a time of high metal pricing:
  - Increased shovel productivity over 40%.
  - Doubled copper production.
  - Allowed further potential improvements in haul truck load efficiency.
- Pit was scheduled to run up to 3 drills but now able to run with less than 2 for production of 120,000 tonnes per day.
- Extremely clean pit walls and floor, reducing maintenance costs.

Testimonials

“This site has never experienced such good fragmentation in the hole history of Gibraltar. After a couple of minor adjustments with the help of Orica, to define the proper delays, the i-kon™ technology enabled us to increase the size of our blasts, and get better fragmentation. Diggability has substantially improved and we are now capable of reaching productivity levels on our loading cycle that can be compared to anywhere in the world. Our overall size is now running at about 130,000 tonnes per day versus only 75-90,000 tonnes per day before i-kon™ has given us confidence in our ability to push the envelope in several areas, like waste stripping ratios and mining sequence planning, so now we can accelerate the process and feel comfortable about investing in the future of Gibraltar."

Richard Quensnel
General Manager
Ledcor, Gibraltar Ltd

“It’s great that Gibraltar is looking at the bigger picture. That’s one of the reasons that they looked at i-kon™. They stepped back and looked at the benefits that they would gain further down the line, and then they switched to i-kon™. Gibraltar is also very conscious of safety and with i-kon™ we know if there are any problems before we shoot.”

Wade Jackson
Site Manager – Gibraltar Mines
Orica Canada

“We did a first i-kon™ blast and we were impressed right off the bat with the fragmentation that we got from it. And we noticed an increase in shovel productivity right away. Next we increased the size of the pattern enough to offset the incremental costs of the i-kon™ dets and found that we still had the diggability that we needed.”

Vince Miller
Manager of Mining Operations
Ledcor, Gibraltar Ltd.
“We said, let’s try i-kon™ in a couple of these tough areas and see what it does. And we never looked back. It was day and night. The digging got significantly better instantly and other things started to happen as well. The production levels today have never been this high going right back to 1971. Now with our 26 x 30 pattern, 19 ft collars and air decking we’re getting 40% fines for the mill, that’s material that doesn’t need to get crushed. That’s phenomenal in anybody’s book.”

Don Aaltonen
Mine General Foreman
Ledcor, Gibraltar