

## **2. Blasting Method to Reduce Overbreaks Using Notched Blast Holes on Outer Circumference Line of Tunnel**

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In projects involving the construction of long-distance mountain tunnels having large cross sections, there is a growing need to accelerate the construction process, both to reduce costs and to achieve the project goals faster. To accelerate the construction of mountain tunnels, it is important to reduce overbreaks and establish ground stability in order to ensure efficient excavation. In this study, we focused on the use of notched blast holes around tunnel contours as an effective method to make blasting more efficient. Based on numerical analyses, element experiment, and field studies, we confirmed the effectiveness of the proposed blasting method in reducing overbreaks.

**Key words:** mountain tunnels, controlled blasting, notch, waterjet