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## A Study in Cost Analysis of Aggregate Production as Depending on Drilling and Blasting Design

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### Abstract

Since aggregate production has vital importance for many engineering projects—such as construction, highway and plant-mixed concrete production—this study was undertaken to determine how the costs for such production are affected by the design of drilling and blasting processes used. Aggregates are used in the production of concrete and asphalt, which are critical resources for the construction sector. The ongoing population increase and the growth of living standards around the world drive the increasing demand for these products. As demand grows, competition has naturally arisen among producers in the industry. Competition in the market has directly affected prices, which leads to the need for new measures and cost analysis on production costs. The cost calculation is one of the most important parameters in mining activities. Aggregate production operations include drilling, blasting, secondary crushing (if necessary), loading, hauling and crushing-screening, and each of these factors affects cost.

In this study, drilling and blasting design parameters (such as hole diameter, hole depth, hole distance and burden) were investigated and evaluated for their effect on the total cost of quarrying these products, based on a particular quarry selected for this research. As the result of evaluation, the parameters actually driving costs have been identified, and their effects on the cost have been determined. In addition, some suggestions are presented regarding production design which may lead to avoiding increased production costs.

**Keywords:** *Aggregate, drilling-blasting, unit cost, quarry*

### 1 INTRODUCTION

Aggregates are used as raw materials in engineering applications such as roads, bridges, ports, airports, and water structures. Also, they are the most important raw material for the manufacture of concrete and asphalt, which is a significant part of the construction sector. About 87 percent of Portland cement concrete and about 95 percent of asphalt are composed of aggregates (Herrick, 1994). Total aggregate production in 28 EU countries reached 2.7 billion tons. That output is provided by 25 000 stone quarries that are operated by 15,000 companies employing 230 000 workers. The yearly revenue of the aggregate industry in Europe is €15 billion (Web, 2016). Producing quality products with low costs increases competitive power. Aggregate production throughout the world has a 58% share of all mining operations—the largest of all worldwide (Öztürk et al, 2007).

It is very important to conduct correct and appropriate cost analysis in a high-production and high-use field. Various engineering measures have to be taken in order to enable decreasing costs

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