

Simulation of the merging of two limestone quarries in the Tournai area of Belgium

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Lemay and Antoing quarries near Tournai (Belgium) are two adjacent limestone quarries reaching the limits of their current permit. To extend their life, the owners plan to exploit the rock mass left as a wall between the two quarries, which could constitute a significant part of the reserves still mineable. This work aimed to determine the recoverable reserves within the wall while proposing a mining scenario that meets the production objectives of both quarries. Indeed, the Lemay quarry produces stone blocks and aggregates, while the Antoing quarry produces cement, thanks to the high CaO content of some strata, and aggregates. The first step consisted of creating a 3D geological model of both quarries. This model was built based on drillholes carried out on site and the geological data allowing to take the faults into account in the model. New “virtual” drillholes based on the geology knowledge were implemented to overcome the lack of data in some areas. The 3D model allowed to understand the thickness evolution of geological layers. The second step was to create a block model of the geochemical parameters, which is essential for classifying rocks for cement or aggregate production. Based on geochemical data from drillholes, a discretization of the ore body in blocks, and the application of inverse distance weighing, a 3D geochemical model was created to understand the variation of the content of useful minerals in the ore body. The last step was planning the open-pit exploitation of the wall based on geological and geochemical models. A scenario was proposed to achieve the operating company's objectives while keeping a permanent passage between the two quarries during the exploitation. The proposed new mining scenario extends the life of both operations by 06 years.