The Energy Efficient Quarry: Towards improved understanding and optimisation of energy use and minimisation of CO₂ generation in the aggregates industry

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Complexities of Energy Efficiency in Aggregate Extraction

Aggregate quarrying is a complex operation, characterised as four generic high-energy operations (as shown in the image to the right). The details of each of these operations evolves continuously throughout the lifetime of the individual quarry, constrained by deposit location and deposit variability. Aggregate extraction operations are site specific.

In this project, research has focused on methodologies and best practice across each of the four key aggregate extraction operations to reduce energy-use and carbon emissions. These separate results may then be combined in a scenario-based modelling system to derive a solution for the optimum energy efficiency of operations in that specific quarry, an EE-Quarry model.

The EE-QUARRY Model simulates the complete processing flow of aggregate extraction through:
- simulation of different kinds of plants processing a range of common materials
- estimation of power consumption for varying configuration settings
- prediction of the impact of changes on site performance without the need for field trials
- providing a conceptual and practical approach to modeling that may be followed at a variety of sites and under different conditions of processing and end-product requirements
- predicting the outcome of “good practice” changes applied to processing within a quarry

Multiple software packages are integrated within an internet accessible Application Server and linked Database, enabling worldwide access to EE-Quarry modelling. Users may set up alternative scenarios for quarrying operations, and optimize energy efficiency and CO₂ reduction against capital and operational cost.

Dissemination – EE-Quarry Continuing Professional Development (CPD) Courses

The University of Leicester is developing a series of courses to be available for CPD, delivered by Distance Learning (DL) examining energy-efficiency in the following aspects of quarrying:
- Deposit Assessment
- Drilling and Blasting
- Loading and Hauling
- Crushing and Screening

The EE-Quarry Model

Develop your understanding of the complex interaction between energy consumption of the individual processes examined in previous courses and optimize the overall energy efficiency through the application of the EE-Quarry software.

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CPD Training
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