Optimizing earthmoving operations with minimal emissions cost

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ABSTRACT

This research presents a simulation-based genetic optimization approach to optimize earthmoving operation by selecting the optimal fleet configuration. The paper underlines the relation between the Profit & Loss (P&L) function and the utilization of each equipment type within the fleet. The proposed methodology investigates the impact of the optimized fleet configuration on the emissions cost. The model monitors the emissions cost and the P&L function, against the total cost of ownership (TCO) of each of the loading and hauling machine types, as the number of haulers in the fleet varies. The methodology is applied on a real case study that took place in Lebanon. The proposed approach is shown to yield significant improvements in the objective function of the optimized fleet selection, and investigates the relationship between the operational efficiency and the total pollutant emissions.