
By Francien Troost, M.Sc. Mining Engineering at Delft University of Technology

This project stands under supervision of RWE Power AG in cooperation with Mátrai Erőmű ZRt.

This Thesis carried out research towards development of a coal quality concept on geological and mining engineering operational level of Mátrai Erőmű ZRt's Visonta and Bükkábrány open cast lignite mines, with objective to reduce and avoid sub-optimal combustion behaviour at Mátra Power plant. RWE Power AG is the major shareholder of Mátrai Erőmű ZRt (50.9%).

Three improvable sub-optimal combustion behaviours were determined based on power plant performance (2012-2014).

A coal quality handling recommendation was developed for Mátrai Erőmű ZRt based on results of coal quality modelling carried out within this Thesis. Through a coal sort algorithm the Visonta (V) and Bükkábrány (B) coal was divided into coal sorts (German: Kohlesorte). A programme was written which creates a block model assigned with quality data from geological samples. Subsequently, the coal sorts in the production profile were predicted by modelling the mining of the blocks within the block model. In- and Inter-pit supply strategies and blend ratios were determined to provide an optimal direct coal sort or blend of coal sorts to the Mátra Power plant. A preliminary mine scheduling programme was developed within this Thesis.

The Thesis was performed along the Mátrai Erőmű ZRt operational mining and processing value chain. A technical background introduces the deposit geology, Visonta and Bükkábrány Mine, fuels (i.e. coal and co-combusted biomass) and Mátra Power plant. A theoretical background describes the power plant components of focused sub-optimal combustion behaviour in theory and points out coal quality parameters and operational factors which potentially enhance sub-optimal combustion. The operational procedures at Mátrai Erőmű ZRt were studied on site, i.e.: sampling, geological modelling, mine planning, mining, transporting (logistics, rail supply of Bükkábrány coal and stockpiling facilities), blending and combustion. Historical operational data was used as modelling input, i.e.: geology database, overview on available qualities, technical constraints, blending constraints and acceptance algorithm. The quality modelling consists of determination of a coal quality algorithm (incl. power plant acceptance algorithm), coal quality modelling for the individual coal seams and evaluation of in- and inter-pit supply strategies. Finally, the coal quality handling description summarises the recommendations for the Mátrai Erőmű ZRt operation.

The resulting handling recommendation states the determined coal sorts, cutting technique guideline, power plant supply strategies, stockpile supply schedule and blending strategies.

The significant result from this Thesis is that the coal in Visonta and Bükkábrány Mine can be divided into minable coal sorts for which a standard combustion behaviour can be expected.