Materials Processing Institute

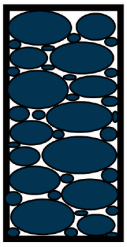
CASE STUDY

Coke Oven Productivity Improvements

Coal Handleability Monitor for Blend Oiling Evaluation

Crushing optimisation & yield improvement by blend oiling

As part of a European Research Fund for Coal and Steel project, a series of evaluations of coal blend crushing levels achieved on coke plants in the UK and the Netherlands were carried out in comparison to blend crushes prepared on pilot plant at the Materials Processing Institute. The aim was to determine the effect that the level of crush has on coke quality for particular blends and to see if there was room for improvement by better control of crushing. It was demonstrated that the level of crush at one UK plant was less than that achieved at two other UK plants in the study and that the excessive level of larger size fractions adversely affected the packing density of coal in the ovens, leading to lower coke quality. Measures were put in place to improve control and consistency and increase the level of crush to reduce the quantity of larger size fractions, but maintain the optimum range for a Normal size distribution. The result was a sustained improvement in coke quality, which with other measures allowed a £12 per tonne reduction in blend costs.



Optimum density requires large lumps with the correct number of medium lumps to fit between them, and the correct number of small lumps to fit between them, and the correct number of very small lumps to fit between them = **'Normal size distribution' = optimised coal particle interaction in the coke oven**

Packing density = $\frac{\text{solid volume}}{\text{total volume}}$

Also, the positive effects of oiling on coal handleability and bulk density control of a coal blend have been demonstrated. It was shown that bulk flow of a coal blend, as determined by the Handleability Monitor, improved on adding oil at just 0.1% by weight to the blend. This gave a simultaneous increase in bulk and packing densities on charging to the coke oven, leading to improved coke yield. Two different oil sources were identified as giving beneficial improvements of around 2% in coke yield over the un-oiled blend. This work led to the adoption of oiling of the blend at the coke plant, where improvements in coal flow gave better filling of the ovens with higher bulk density. The overall result was a 500-tonne improvement in weekly coke yield.

Blend Properties		No Oil	Oil 1	Oil 2
Charge density	kg/m^3	723	772	774
Additive	%	-	0.1	0.1
Coking pressure	kPa	2.6	3.9	2.6
Coke Properties				
Coke fracture strength index*		82.3	84.5	83.7
Coke abrasion index^		6.7	6.6	6.8
CRI		24.0	23.2	23.8
CSR		65.9	67.8	66.7
Yield increase	%	-	+1.7	+2.6

Coke Quality Improvements on Oiling the Blend
*Higher = better
^Lower = better

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