

BRADLEY PULVERIZER MILL OVERHAUL AND VBC UPGRADE RESULTS IN:  
• INCREASED UP-TIME • HIGHER YIELDS • LOWER OPERATING COSTS

## MARKET

Civil Construction/Limestone Quarry.

## APPLICATION

Grinding of limestone for use in tarmac for road manufacturing.

## THE CHALLENGE

[LKAB Minerals](#) needed to increase production rates and reduce maintenance downtime at the [Hanson Aggregates Shap Quarry](#), where limestone is currently ground to 70-75% passing 63 micron for use in tarmac for road manufacturing. Outside of regularly scheduled maintenance, no major updates had been made to the existing Bradley air-swept mill for over 13 years, and the mill has been continuously grinding coarse limestone materials for over 43 years.

Additionally, the existing mill system needed to process a wider variety of material grades to service a more diverse customer base. Finding a partner who could satisfy all requirements while following CDM guidelines was further complicated by the confined workspace around the mill, short installation time frame, and winter weather conditions.

Increased up-time of the Bradley mill would both improve efficiencies and lower annual production costs.



*Figure 1: Mill and Classifier BEFORE overhaul.  
Note the confined workspace.*

## THE SOLUTION

The Bradley Pulverizer team was selected as turnkey manager responsible for all aspects of the project including all risk assessments, securing permits to work with exclusion zones, design and fabrication, installation, start-up, and training. All safe systems of work (SSOW) prepared by subcontractors were submitted to Bradley for conformity and became part of the Bradley safety work file. CDM regulations were followed and documented throughout, and "all work was completed on schedule in extreme weather conditions," as stated by Lee Dursley, Plant Manager at LKAB.

### Vertical Blade Classifier (VBC) Upgrade

The primary goals of increased production and the ability to process a wider range of material grades were solved by replacing the original static classifier with a vertical blade classifier (VBC). The VBC was selected because of its effectiveness at reducing the circulating load hence reducing the oversize return to the mill for further processing until they meet the required size specification. Early results are impressive with up to 19% increases in output, which equates to almost two-ton per hour higher yield without introducing any additional energy requirements into the system.

Installation of the vertical blade classifier required several ancillary changes to the electrical and control systems of the mill as well as structural modifications due to the confined space in which the system resides. New ductwork and support platforms needed to be built and installed to accommodate the new VBC, while exercising extreme caution to maintain all safety protocols and avoid compromising the integrity of adjacent machinery.



Figure 2: New VBC installation.

The Bradley Vertical Blade Classifiers (VBC) was also selected because it is equipped with an inverter which enables maximum flexibility on rotor speed to grind multiple products of varying grades. Particle size can be controlled quickly by simply adjusting the separator rotor speed.

### On-Site Mill Overhaul

The mill's first major overhaul in over 13 years accomplished improvements in mill reliability and increased up-times. The mill mechanics were stripped down and rebuilt on-site, including a rebuilt gearbox for much-improved oil retention. The existing roll carrier was retrofitted with new rolls and re-installed. Further mechanical upgrades included a new motor for the VBC. New cabling and switch gear was added to meet current electrical UK regulations. All-new controls were integrated into the existing motor control cabinet for a more user-friendly experience for the machine operator.

*"All work was completed on schedule in extreme weather conditions,"*  
**Lee Dursley - Plant Manager at LKAB**



## Bradley Training & Support

Post-installation support included training for mill operators following COVID guidelines for running the new VBC. A maintenance guide was provided with daily, weekly, and monthly guidelines to follow and Bradley has been contracted to provide bi-annual maintenance on-site.

### BENEFITS

Bradley Pulverizer accomplished a complete on-site mill overhaul and classifier upgrade in a tightly confined space and poor weather conditions, ahead of schedule, in just 17 days! The new vertical blade classifier expanded the range of material grades that the mill can process and increased yields by two-tons (19% increase) per hour. Mill upgrades improved the overall performance and up-time, including better oil retention, fewer work stoppages for maintenance, and lower operating costs.



Figure 3: Completed mill overhaul with new VBC

### PROJECT RESULTS



19% INCREASED  
YIELDS



PERFORMANCE  
UPGRADE



MAINTENANCE  
REDUCTIONS



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