

# Motor Management Plays a Key Role at Rock Quarry



## Application Profile — Rock Crusher

Retrofitting a high-tech rock crusher with advanced motor protection technology helped Tarmac Roadstone's Cliffe Hill granite quarry in Leicestershire, England, improve reliability, reduce downtime and achieve greater control of its quarry crusher operations.

The Cliffe Hill Granite quarry, one of the most advanced quarry crusher operations in the United Kingdom, has a long history of producing crushed stone and rock materials dating back to the late 1800s. Acquired in 1965 by Tarmac Limited from the Cliffe Hill Granite Company, the Cliffe Hill quarry has gone from producing 10,000 tons in 1891, to today producing an average of four million tons a year.

An American GATX Fuller 54 X 74 gyratory crusher operates completely unmanned at the Cliffe Hill quarry, being microprocessor-controlled and monitored via closed circuit TV from a remote site. Because of the heavy production demands placed on the gyratory crusher, reliable and accurate protection is critical



*Producing an average of four million tons a year, Tarmac Roadstone's Cliffe Hill granite quarry in Leicestershire, England, incorporated advanced motor management technology to improve productivity and achieve greater control of its quarry crusher operations.*

to protect the motor and motor circuits from overheating due to excessive current.

During a period of modification work to the crusher, it was realized that the protection device fitted to the crusher's 650 Hp, 12-pole slip ring (wound rotor) Class F motor was incorrectly matched for the motor's size, seriously limiting its protective functions and capabilities.

“As a result, the motor was never all that reliable because of the excessive level of tripping,” said Mark Hamilton, electrical engineering manager at Cliffe Hill quarry. “But there was little on the market that was much better.”

It was during that same time that the Allen-Bradley Bulletin 825 Smart Motor Manager, a programmable electronic overload protection and control device, was



*The American GATX Fuller 54 x 74 gyratory crusher at Tarmac Roadstone's Cliffe Hill granite quarry operates completely unmanned via microprocessor control. An Allen-Bradley Bulletin 825 Smart Motor Manager provides advanced motor protection and communicates real-time operating information to help diagnose and troubleshoot potential problems.*

introduced by Rockwell Automation in Europe. Using microprocessor technology, the device precisely simulates the thermal conditions of a motor and monitors whether the motor is cold or warm and whether it is partially or fully loaded. This information, which is held in the memory and communicated via a text display, is used as part of the trip characteristics to closely follow that of the motor's own capacity.

"The Bulletin 825 appeared on paper to be the ideal solution and has subsequently proved so in practice," Hamilton said. "We've used it for more than three years now and have been very pleased. In fact, we have since installed another unit for use on a pump motor."

The Smart Motor Manager offers a range of basic protective features including thermal overload, phase loss, stall protection, ground fault, limited starts per hour, and emergency start. The unit also can be used for

various control functions, made possible by four optional boards which enable the device to be optimally matched for a particular application.

Tarmac Roadstone started out using the basic unit but since its installation has also incorporated two of the available option cards — the standard

option and the medium voltage option. These options offer additional protection and control functions, including short circuit, ground fault (via a core balance), stall during starting, thermistor RTD inputs, and analog outputs.

"We have not used the device to its full potential yet," Hamilton said. "Since it's modular, we have been adding to the basic unit as and when we want."

With optional communications capability, the Smart Motor Manager can be used as part of an integrated motor management system, communicating real-time, statistical and historical data, over DeviceNet (communication protocol), providing valuable information to help diagnose and troubleshoot problems before they occur.

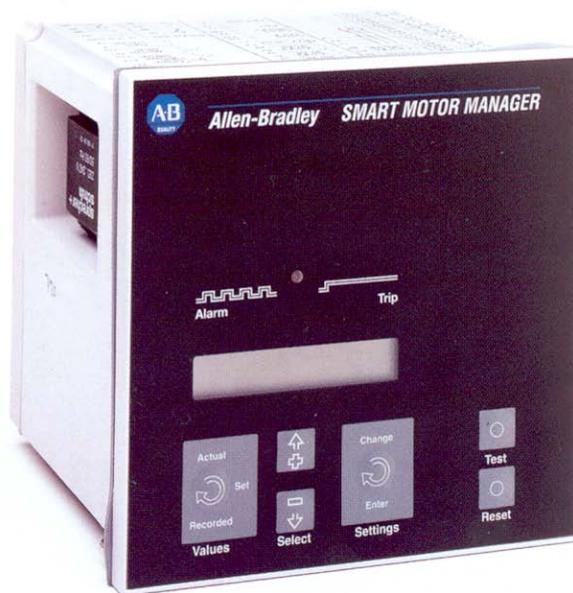
Tarmac has been particularly impressed with the versatility of the Bulletin 825, as well as the diagnostics capability to keep the gyratory crusher operating at high



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efficiency. Plus, with access to real-time application data, operators have the ability to prevent trips before they occur and avoid conditions that could result in equipment damage and production downtime.

The successful operation of the Crusher at Cliffe Hill Granite quarry depends on reliable motor performance. With the Smart Motor Manager, Tarmac has found the answer to its reliability problem.



*As part of effective motor management, the Smart Motor Manager from Allen-Bradley warns you about conditions that may cause motor failure — allowing you to take corrective action before damage occurs.*

### **Smart Motor Manager At a Glance**

Unmanaged current and heat are negative forces that can shorten motor life and cause costly, unanticipated downtime. The Smart Motor Manager protection relay with communication capability is an intelligent protection device that lets your motor safely reach its maximum operating level, without damage or unavoidable downtime.

The device accomplishes this through current monitoring and sophisticated algorithms that model the motor's thermal conditions, resulting in effective motor management. Additionally, by keeping close watch on current, the SMM protection relay guards against thermal overload, ground faults, and stalling.

# Spare Allen-Bradley Parts

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