

[Back to Latest News](#)

## Motorized Pulleys at Lafarge's Mountsorrel Quarry

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(UK) -- Lafarge Aggregates at their quarry in Mountsorrel, Leicestershire have been using Rulmecca Motorized Pulleys for quite some time and have had them working in the most arduous conditions in numerous locations on their plant conveyors for many years. The travelling and reversible shuttle conveyor over their toast-rack system has had dual drive 800mm diameter 37kw drives in there working for 17 years carrying up to 5 million tonnes per year! The secondary toast-rack conveyor also has been recently fitted with a Rulmecca Motorized Pulley.



Rulmecca Motorized Pulleys

As one of the largest granite quarries in Europe, most of its produce has to be carried away by rail to avoid an extreme amount of road journeys and to be commercially viable. The rail-head is situated at Barrow village over 2 km away with the produce being carried there by conveyor.

As part of a recent large multi-million pound upgrade of their rail load out system, a new storage facility was ordered to be erected at the Barrow site to give extra on-demand volume for immediate use. Part of the investment of the new bins and conveyors was to also upgrade the drive system of the main 1200mm wide overland conveyor that travels over the river Soar and under the A6 dual carriageway to the rail head at Barrow. This conveyor, (Conveyor 41) is 1.3 km long and follows the route of the old shuttle railway that used to carry the material many years ago. It is required to work 16 hours a day to keep the bins full and ready for rail loading.

Historically, the overland conveyor had always been driven by a twin pulley drive system which had each pulley driven by 2: 145kW external electric motors coupled through a 90 degree gearbox. These had provided good service through the years but were now proving to be costly to maintain with spares at a premium and frequent rewinds a regular occurrence. Keith Tarry, the overall plant maintenance manger and Dick Bates, the electrical installation manager from Lafarge were also very conscious and aware of the amount of electricity the inefficient drives were using and wanted as part of their group philosophy to reduce this significantly.

Their experience of the toast-rack shuttle conveyor and its efficient and cost effective motors provided the inspiration for them to consider a dual drive Motorized Pulley arrangement on the main overland conveyor. The two drive pulleys are unusually situated approximately 15 metres apart with a tension unit working within this tight area, so due consideration was taken to ensure all would work into this retro-fit. The drives had to be designed to pull peaks of 2000t/hr with a proviso that the conveyor would be able to start fully loaded and that it could still function with only one drive present. (Albeit with a lesser load)

So all dimensions, capacities and relevant data were used to form the final calculations which suggested twin Motorized Pulleys could indeed be utilised. Rulmecca recommended the use of twin 110kW Motorized pulleys working at 3.15m/sec complete with 'Ceragrip' ceramic lagging to ensure a good and consistent belt drive due the distance between the two pulleys. These two synchronised drives would provide enough belt pull at the required speed to give the conveyor power to work in all weathers and temperatures. Some minor fabrication changes by Lafarge were required for new mounting points which proved to fit extremely well.

The work was carried out during the Easter holiday of 2006 and the conveyors started again on resumption of production thereafter.

As part of the upgrade, a new ABB frequency inverter system was installed to control the conveyor. This enabled an obvious soft start facility but also allowed the No. 1 primary drive to 'talk' to the No. 2 secondary drive within milliseconds and hence keep the two motor's rotor speeds at almost exactly the same RPM. This was particularly important due to the aforementioned distance between the drive pulleys to control the belt tensions between them.

Tests carried out by Lafarge indicate electricity savings of between £7000 and £10000 per year on this conveyor alone. Lafarge should also regain 30% capital expenditure savings under the government ECA system and so quicken the pay back time for this part of the investment. Even further savings can be expected when the inverters will be set to provide an infinite conveyor speed variation in future when they are finally linked to loading sensors to speed up and slow down to match conveyor throughput.

The new plant at Barrow incorporates numerous conveyors to feed the new storage bins and include another travelling, reversible shuttle conveyor. All of these conveyors are driven by Rulmeca Motorized Pulleys from 500mm to 800mm diameter and up to 110kW. The new plant is expected to be fully operational by the end of 2006.

The Rulmeca Motorized Pulley was first produced in 1953 specifically for belt conveyor systems. The aim was to produce an extremely compact, totally enclosed and highly efficient belt conveyor drive, resistant to dust, water, oil, grease or harmful substances and a device which would be quick and simple to install and would require virtually no maintenance. These aims were achieved and today the Rulmeca Motorized Pulley is considered to be one of the most reliable and effective belt conveyor drives available throughout the world.

The Motorized Pulley is a highly efficient geared motor drive, which is hermetically sealed within a steel cylindrical shell. The shell, which is usually crowned to ensure central belt tracking, is fitted with bearing housings incorporating precision bearings, double lipped seals and rotates about a static pair of shafts. The motor stator is fixed to the shafts and the motor winding cables pass through one of the shafts, eliminating the need for slip rings and brushes.

The squirrel cage induction motor, manufactured in steel laminate, is machined concentric to high tolerances and designed to give 200% starting torque for 3 phase versions. The rotor pinion is coupled directly to the gearbox which transmits torque to the shell through a geared rim and provides a highly efficiency motor with very little frictional losses.

The Motorized Pulley is oil filled, which acts as both a lubricant and coolant. Heat is dissipated through the shell and the conveyor belt.

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