

Flyingbelt benefits

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When looking to reduce the environmental impact and enhance the energy efficiency of a new cement plant, innovative raw material transportation systems can make an important contribution. This is even more so when the surrounding landscape presents transportation challenges – as is the case with Holcim Brasil's new Barroso works where an unconventional system has brought additional benefits.

Raw material transportation is an area of cement production where effective solutions are often at hand. However, when faced with a challenging surrounding landscape, such as having to circumvent a nature reserve or cross a river valley, alternative solutions to traditional truck transportation can be a more cost-effective, efficient and environmentally-friendly option.

When Holcim Brasil was looking to deliver raw materials from its quarry to the Barroso works in the western state of Minas Gerais, it contracted Agudio SpA, part of the Poma Leitner Group, to provide a system that would address its specific needs. Based in Italy, Agudio specialises in the engineering and construction of customised and unconventional transportation systems using ropes.

Flyingbelt

For the Barroso project, Agudio proposed a 7.2km 'Flyingbelt' to connect the quarry to the plant, enabling Holcim to transport some 1500tph of crushed limestone and clay to the cement works.

Agudio's Flyingbelt is a patented raw material transportation system combining



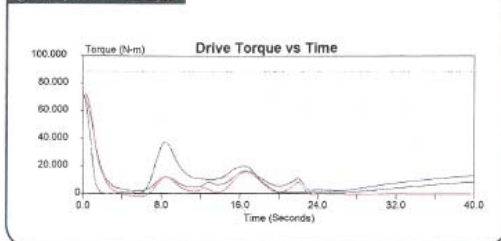
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a belt conveyor in a ropeway. The project involved the construction of a loading and unloading station, both designed by Agudio, and a single 14.4km-long belt suspended by four segments of tracking ropes through 18 support towers. The belt is designed to travel at a speed of 4m/s. The system also enables maintenance to be carried out 'in line' by four vehicles.

This solution is the result of a fully-customised and detailed study carried out by Agudio engineers specialised in several fields: rope design, belt analysis, mechanical design, geological analysis and constructability analysis. This study has been carried out following the BAT for ropeways and transportation systems design and software proprietary of Agudio and specifically developed to simulate the static and dynamic behaviour of the system in different conditions (start-up, shutdown, normal operation, emergency stop, partial load operation).

The Flyingbelt brings together the advantages of a conveyor belt system with a material ropeway system, resulting in the benefits described below.

Figure 1. dynamic motor analysis.



Revamping of coal handling terminal, Italy



Material	Petcoke
Horizontal length (m)	250
Height difference (m)	15
Support structure	Steel lattice
Haulage rope diameter (mm)	25
Maximum capacity (tph)	450
Number of vehicles	64
Belt speed (m/s)	1.1
No of supports	52
Nominal power (kW)	55

and, thanks to an Active Front End Filter, it is possible to generate power and directly feed the grid.

• CO₂ reduction

For the Barroso plant, to transport 3.4Mt/a of raw materials by truck over an approximate distance of 25km between the quarry and the cement plant over a one hour cycle, the annual CO₂ emissions is about 8500tpa. However, the Flyingbelt has a power consumption of 1400kWh for 2265 hours/year of operation. Taking into consideration the IEA composite electricity/heat factor for Brazil, CO₂ emissions from this solution are approximately 275tpa, a net saving of 8225tpa, or more than 95 per cent.

• Lower noise impact

The Flyingbelt has a reduced impact in terms of noise pollution compared to the road transport of raw materials.

Additional projects

Agudio has also supplied standard material ropeways to cement plants and coal handling terminals in Italy, Romania and Brazil (see technical panels).

Upgrade of cement plant, Brazil



Material	Limestone
Horizontal length (m)	9590
Height difference (m)	475
Total no of vehicles	275
Vehicle capacity (tph)	2.2
Maximum capacity (tph)	400
Main electric motor power	2 x 550
Track rope diameter	60
No of supports	52

• Reduced visual impact

The Flyingbelt has considerably fewer supporting structures than a standard conveyor belt. This reduces the visual impact of the system on its surroundings.

• Flexible route design

The system can be adapted to the most challenging terrains. The number of supports can be reduced and positioned where required with a variable distance of up to 1000m.

• Standard conveyor parts

Most components are standard conveyor belt parts with simple and rapid assembly thanks to a special installation vehicle running on the tracking ropes.

• Lower operating and maintenance costs

The system is equipped with a special vehicle which runs along the line for 'on-line' maintenance.

• Efficiency

Compared with standard trucks, the Flyingbelt requires far less power and in some cases, the belt generates its own power. When being transported downhill, the weight of the material drives the belt



Installation of the Holcim Barroso Flyingbelt using a specific vehicle that operates according to international guidelines for the safe transport of people (EN 12929-1)