

FCB Horomill® turns 25

This year marks the 25th anniversary of the FCB Horomill®, a breakthrough technology for raw meal, cement, slag and minerals grinding. Having actively participated in the development of the mill, Buzzi Unicem reflects on the evolution of the technology in terms of mechanical, wear protection, process and layout developments.

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Buzzi Unicem's Mexican associate Cementos Moctezuma employs the FCB Horomill to grind raw meal and cement at its plants in Tepetzingo, Apazapan and Cerritos (pictured)



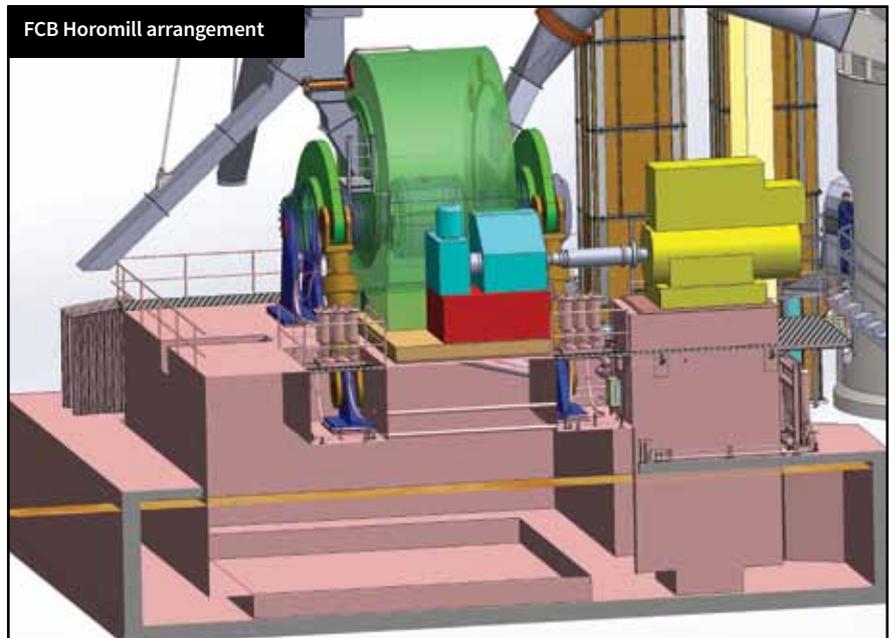
The FCB Horomill was presented to the cement world for the first time at the International VDZ Congress in 1993. The technology was designed, realised and developed through the cooperation of Fives FCB (directed by G Taberlet and later A Cordonnier), and Sandro Buzzi, chairman and technical head of Fratelli Buzzi. Their forward-thinking approach and continuous problem-solving efforts have proven to be the driving factors behind the success of the technology today. As the FCB Horomill turns 25, this milestone occasion presents the perfect opportunity to reflect on those years of learning through experience and how the equipment has evolved over time.

For Cementos Moctezuma (jointly owned by Buzzi Unicem and Cementos Molins of Spain), more than 80 per cent of cement and raw materials is milled at its Tepetzingo, Cerritos and Apazapan plants in Mexico using the FCB Horomill. Of the 19 units referred to in this article, 14 were installed at Cementos Moctezuma's plants

in Mexico. In Italy Buzzi Unicem employs the technology for raw material milling at its Barletta works, and for finish grinding at

the Trino and Augusta facilities. Meanwhile at Buzzi Unicem's Maryneal plant, USA, the FCB Horomill is used to grind raw materials

FCB Horomill arrangement



Drive unit for the FCB Horomill



Grinding roller surface



as well as 50 per cent of the plant's cement output.

It should be noted that where raw material and finish grinding is not 100 per cent carried out by FCB Horomills in the cement plants mentioned, this is a reflection of opportunities taken over the years to save capex and utilise existing idle machines within the group (with the exception of Apazapan where a different solution was opted for). However, the successful use of the FCB Horomill at these facilities is testament to the early trust and support shown by Buzzi Unicem and Cementos Moctezuma in the technology.

During implementation of these units, output has never been compromised and the plants have never had to stop cement flow to the market. When the decision was made to adopt this technology to grind all materials at the Tepetzingo works, this proved to be more of a challenge. Much is owed to Cementos Molins, namely company president Juan Molins, who put his trust in this technological leap that made all the developments listed below possible.

Key features

The FCB Horomill uses a compression grinding process, equipped with one idle roller hydraulically pressed against the cylindrical mill shell, which under high pressure is able to grind raw materials, clinker, slag and other materials with a very low specific energy consumption and zero water consumption.

Mechanical

In terms of reliability, the only material change in the original configuration of this machine was the need to redesign

first year of operation. Operations were not compromised because of the ongoing expansion project at Tepetzingo, with the installation of Line 2 immediately following Line 1. It was a busy period, but the Moctezuma team turned the task into a bold success. Following the installation, no significant mechanical issues arose.

Special maintenance had to be undertaken to the steel supports in the two first FCB Horomills at the Tepetzingo plant after about 20 years of operation, but no similar intervention was necessary in subsequent machines. A defective shell was replaced at Cerritos, but this was not a design issue, rather a quality assurance issue related to a supplier to Fives FCB.

From the very beginning Fratelli Buzzi and Fachini Gears SpA, located in Italy, developed a very compact reducer directly installed on the mill, with a built-in pinion, that has been working well ever since. Over the years, either steel or cast iron girth gears have been installed, with no side effects reported with either solution.

and replace the shells of the two first Tepetzingo mills (raw materials and cement) in the

In terms of future developments, we aim to strengthen the filtering devices for the lubricating oil to ensure a cleaner lubricant, particularly that being applied to the big and expensive roller bearings.

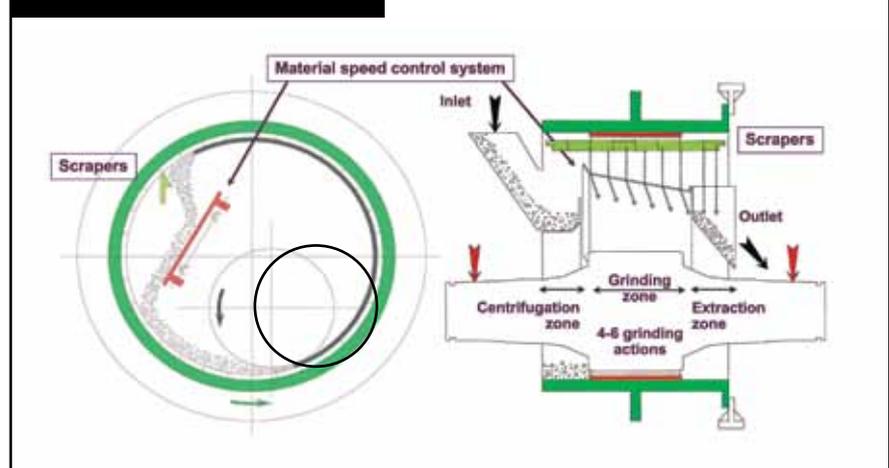
Wear protection

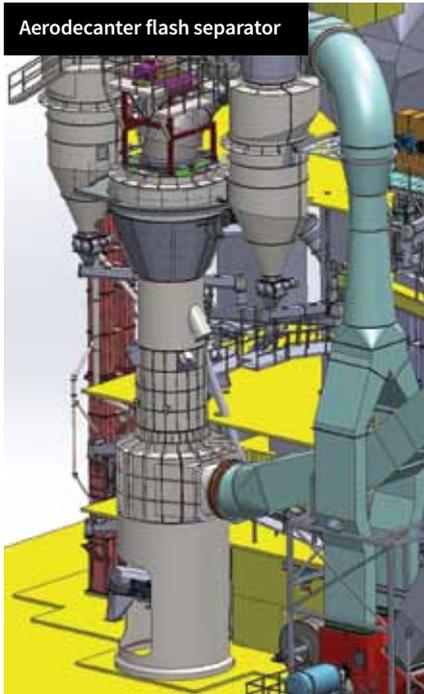
Efforts to improve the life of wear protection linings is continuous. The roller is fitted with a thermal interference mounted sleeve, whose lifespan is currently more than three times that of the original. The welding procedure for wear protection of the shell has been established over the years and no replacement has been necessary of the original cast steel linings, which are currently re-welded routinely. Innovative materials are presently being used and the results in terms of lifespan are monitored continuously. The main area of development is the grinding surface of the roller. Non-standard solutions imply welding different layers of materials to provide a good resistance to wear and shock.

Process

The FCB Horomill process was improved by altering the original, purely-mechanical

FCB Horomill comminution process





conveying of material from the mill to the separator and switching it to semi-pneumatic conveying. This was achieved with the installation of the 'Aerodecateur', a flash separator installed underneath the separator, thus carrying out a pre-separation that improves separator efficiency, as well as easier operation of the mill when it receives a coarser material. At the same time the separator is fed by the process air and no longer via the upper splash plate, thus improving the life of the seals and the relevant bypass when severely worn. Seals themselves are easier to manufacture and cheaper to maintain.

The FCB Horomill has successfully achieved the initial objective of being suitable for both cement and raw mix grinding with no alterations to machine configuration. It offers the possibility of installing one single type of mill in a complete plant with raw materials and cement being ground in identical mills, leading to minimised capital expenditure for spares. As no gas flow contributes to the grinding technology inside the equipment, the differences between raw material and finish grinding lie outside the mill. A typical configuration for a greenfield cement plant is one raw mill and two cement mills, which also meets the general guidelines for new Buzzi Unicem plants as the company believes it is better to rely on two cement mills to take into consideration a certain degree of redundancy.

Buzzi Unicem and Moctezuma have standardised the use of the Horomill 3800, which is able to feed a 3200tpd clinker line

with raw meal, and to grind the relevant cement with two units. In recent years Fives FCB has developed a wider range of machines and larger-capacity units are now available.

Specific electrical consumption is better across the board when compared with other technologies Buzzi has installed for grinding the same types of cement, namely ball mills coupled with high-pressure grinding rolls and a vertical roller mill.

Over the years Buzzi has developed trials to understand if a certain amount of water could contribute towards optimising power consumption. The answer has been positive, in a range of 5kg H₂O/t of cement.

Operators of the FCB Horomills installed at Buzzi plants are highly-skilled specialists. They are convinced that process-wise the FCB Horomill is easy to completely understand, therefore making it an easy machine to operate. Issues have arisen at times due to geometrical deviation from the optimal profiles, but this has always been due to wear. Also in this case, the stability of the machine is particularly noteworthy. If the FCB Horomill complains, it always does so for a very good reason. To ensure safe operation, it is sufficient to treat it right, and the results do not fail, repetitively and consistently.

Layout

In the most recent development, Buzzi Unicem has avoided the need to construct a specific mill building by taking advantage of the Aerodecateur, which can be considered a good column to support the separator. Thus the separator does not

need to rely on a building and becomes a self-supporting unit, as is the recirculation elevator, and the whole installation sees a material reduction of structures.

Therefore, the upkeep of the building is limited to maintenance and inspection, while all the loads of the installed machines are directly supported by the ground. The mill is supported by a 1300t block of reinforced concrete, which is a part of the machine as the grinding forces are borne by it. It is a massive high-tech concrete component: during pouring, the temperature must be continuously monitored and controlled, and the geometry of the fixing points must be precisely realised.

Since the very beginning, the former engineering head of Buzzi Unicem, Vanni Brunelli, developed and realised a system for supporting the FCB Horomill and vibration damping to limit the transmission of vibration to the nearby buildings. In the following years some mills have been fitted with these devices while others have not. It is a decision to be made every time a new mill is designed and is driven by the characteristics of the soil. Buzzi Unicem have mills that are fitted with this system located in close proximity to towns, and the company has never faced issues with transmitted vibrations.

Number one choice

Within the Buzzi Unicem group, the FCB Horomill is today the first choice for new installations – with experience gained over the years of development and successful operations being a key factor driving future decisions. ■

FCB Horomill on vibration dampers

