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Reducing VRM repair downtime

by **Castolin Eutectic, Switzerland**

Castolin Eutectic has been a pioneer and leader in wear and specialist joining technologies for over a century. Welding, thermal spray coatings and wear plates are among its core solutions to increase performance and service life of vertical roller mills in cement plants as well as speed of repairs.

During the 1970s, Vertical Roller Mill (VRM) technology became increasingly dominant for grinding raw materials, mainly for the cement and power industries, due to their high energy efficiency and excellent drying capacity.

VRM components are subject to severe wear which can increase dramatically when high silica content is found in raw materials or where mills are grinding slag. It is well known that the largest consumer of energy in the cement manufacturing process is finish milling. Consequently, such wear problems can significantly influence the profitability of a plant. A worn VRM roller profile also reduces grinding efficiency, further increasing energy demands.

Over recent decades, Castolin Eutectic, together with its partners, has proved that preventive VRM maintenance can extend the lifetime of critical components by as much as 100 per cent. Such maintenance operations have been performed on over 200 units in more than 24 countries, with the majority being on-site repairs but also many in the Castolin Eutectic workshops. Since the 1990s its specialists have repaired over 40 different VRM models for more than 30 cement companies throughout the world. From small VRMs ($\phi 1\text{m}$ rollers x $\phi 1.2\text{m}$ table) to massive units ($\phi 3.2\text{m}$ rollers x $\phi 5.5\text{m}$ table), Castolin Eutectic has successfully worked on VRM and roller press equipment from Polysius, Loesche, FLSmidth, Gebr Pfeiffer, PSP Engineering, Alstom and KHD in cooperation with well-known international cement companies including Holcim, Lafarge, Cemex, HeidelbergCement and Buzzi Unicem.

The company has continually strived to develop alloys and applications to



The Advanced High Speed VRM Repair Concept offers consistent quality as everything is video recorded, measured and controlled

reduce wear and has developed special alloys, coatings and wear plate solutions specifically for VRM applications. It has also established teams in many parts of the world specialising in on-site repairs of the complete VRM (eg rollers, tables, nozzle and dam rings, separator blades and disks, cones, chutes, scraper blades).

Within its CEMTEC international cement programme, Castolin Eutectic's VRM specialists can not only rely on the group's full range of manufacturing and R&D but also draw on the company's unique TeroLink® database, a source of more than 9000 fully-documented, approved case studies. Thanks to this unique case history, its VRM experts benefit from the know-how and experience of thousands of wear specialists the world over.

Advanced materials and wear solutions

Together with its R&D department, the VRM team has developed special anti-wear products that provide resistance to abrasion, impact and erosion. This includes the established TeroMatec® wire EO8338 (open arc wire), which enables an extra



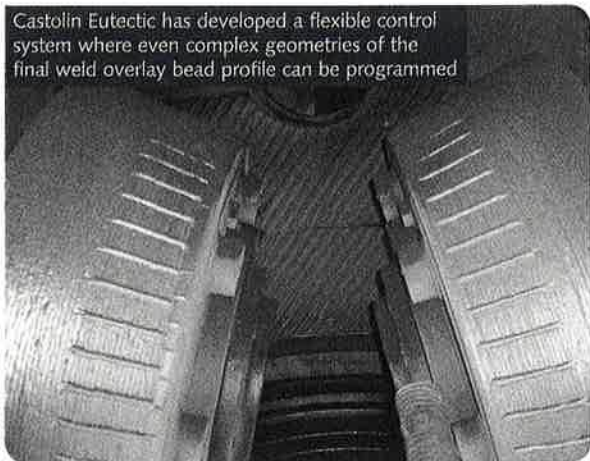
smooth surface as well as an extremely resistant coating. In one recent application in the Middle East, this new EO8338 wire was able to reduce wear-loss on Polysius QUADROPOL rollers from 9g/t crushed, to 4.5g when built up to a 40mm thickness on a four-roller system.

For the wear protection of large surface areas such as chutes, coal mill cones, separator discs, blades or housings, Castolin Eutectic has a wide wear plate range sold under the CastoDur Diamond Plates® (CDP) name. CDP plates consist of an easy-to-weld steel plate over-laid with abrasion-, impact- and erosion-resistant alloys by means of arc welding, metal fusion or plasma coating. Innovations have included the patented powder-fused plate, the first XuperWave® weld bead concept, PTA overlay plates with 60 per cent tungsten carbide, the first impact-resistant plates and first oriented crystal structure.

High-speed repair

Today, a key concern of any cement plant

Castolin Eutectic has developed a flexible control system where even complex geometries of the final weld overlay bead profile can be programmed



is the availability of critical processing equipment, particularly crushing and grinding machines. Downtime during refurbishment is a major cost and there is continual pressure to reduce the length of stoppages so the plant can resume full production as quickly as possible.

Castolin Eutectic has responded to this call from both local and international concerns, by initiating a development programme to address this point. The whole on-site welding operation has been studied and a new Advanced High Speed Repair Concept developed, based on a dedicated approach to VRMs. It includes advanced welding equipment technology, automation, logistics, multi-head control and data logging as well as a specific VRM package and designated team.

Launched in 2009, this Advanced High Speed VRM Repair Concept delivers high grinding performance with fast refurbishment: 36h for three rolls and a table. Occasionally, kiln stoppages can be completely avoided (if the customer is able to temporarily store the required amounts of product) and results deliver a higher grinding capacity as well as reduced mill energy consumption. Not having to weld thick wearfacing also lessens the risk during operations as thick coatings can spall.

Consistency

With this Concept, nothing is left to chance and everything is measured and controlled:

- a video system records the whole process
- different auxiliary drives for table and rolls for practically every type of mill are used
- an integrated frequency controller

and an incremental measurement tool for customer drives offer consistency throughout the process

- profiles welded onto the grinding rolls can be customised to provide optimum draw-in conditions and minimise relative movements between the comminuted material and the roll surface

- every 'print screen' of adjusted welding parameters is stored on a memory card and is available to control quality and provide a record of the repair, in addition to the standard documentation according to ISO9001.

For cement grinding significantly lower fineness levels are needed compared to raw material grinding, where coarser particles are stabilising the bed. The aerated fluidised bed on the rotating table has to be compressed and de-aerated before it can be ground efficiently. Therefore, Castolin Eutectic has developed a flexible control system where even complex geometries of the final weld overlay bead profile can be programmed.

On-site service

Fully-equipped VRM Mobile Service Units are delivered to the plant and offer an optimal on-site service with lightweight state-of-the-art inverter welding machines, Castolin Eutectic power distribution and wire transportation with a reach of up to 25m. Integrated computer-controlled X-Y-axis for torch movement

and semi-automatic welding mode complete this Advanced High-Speed VRM Mobile Service Unit Repair Concept.

Preliminary dye penetration tests are a feature of the VRM repair concept. Along with fume extraction to protect operators, security is paramount throughout with continuous verification of welding parameters and an automatic shutdown feature of the concept in case of errors. This level of automation and control allows up to four rolls and a table to be welded at the same time, offering a considerable time advantage.

Castolin Eutectic is certified according to ISO9001 and ISO14001 and all regulations stipulated by OHSAS 18001 are adhered to. Safety Certificate Contractors (SCC) accreditation is also underway.

Thinking global

The Advanced VRM and Roller Press Repair Concepts are only available through the Castolin Eutectic CastoLab Service Centres in Austria, Brazil, Egypt, Mexico, Russia, Spain and the United Arab Emirates, but the Advanced High Speed VRM Repair service is available throughout Europe. Moreover, the CastoLab Services' international network ensures consistent quality.

Since its development, Castolin Eutectic has successfully rolled out its Advanced High Speed VRM Repair Concept with over 70 jobs completed in 14 countries. In addition, the company also recently set a new record: completing a VRM repair involving three rollers and a table in just 36h with the application of up to 1350kg of welding material.

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