Lafarge Readymix's recently modernized Dunkirk plant next to the Nottingham canal

Modernization of Dunkirk

Lafarge Readymix upgrade their Nottingham facility

Responding to the technical challenges and demands of the fast-moving construction industry, in recent years Lafarge Readymix have invested heavily in the development of a range of innovative special products, such as their Artevia coloured decorative concretes and Agilia range of self-compacting concretes and screeds, all of which have been specifically designed to save time, provide greater ease of use, and reduce costs for the user.

But as well as investment in product research and development, the production of such advanced products alongside more traditional concrete mixes also calls for significant investment in modern, flexible manufacturing facilities capable of meeting changing and varied production requirements while at the same time satisfying the key issues of health and safety and the environment.

In the city of Nottingham, which is currently experiencing a sustained period of urban regeneration and infrastructure development, Lafarge Readymix have recently made just such an investment in the modernization of their busy Dunkirk plant. In an area where the company faces stiff competition from other major concrete producers as well as several independent operators, the plant upgrade is expected to give Lafarge a distinct competitive advantage.

The Dunkirk site's old ready-mix plant, which was struggling to cope with present-day production requirements, has been replaced with a modern, bespoke facility specifically designed to cater for the production of company's latest special products as well as conventional concrete mixes. As is the case with all new Lafarge facilities, the health and safety of staff and visitors to the site was a prime consideration in the design of the ➤

The new, fully clad, ISO 14001-accredited wet-batch plant

new plant, in keeping with the company's firm belief that no task is so important that anybody should get hurt doing it.

The tender competition for the new plant was won by Northern Ireland-based static quarry plant specialists McCrory Engineering, who have already supplied Lafarge Readymix with several other concrete plants nationally. Apart from stipulating product and output requirements, Lafarge left a large part of the plant design and specification work to McCrory, allowing them to bring their expertise and experience to bear to deliver an appropriate solution.

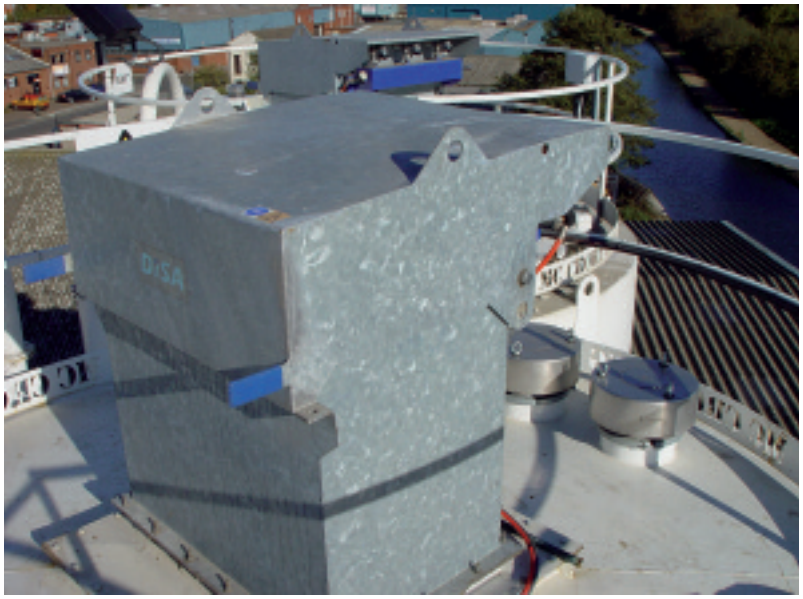
The new, fully clad, ISO 14001-accredited wet-batch plant was erected during June and July 2005 with the entire project, including civils, being completed in less than three months. The old plant remained in operation throughout the construction and commissioning phases to maintain production capacity.

The four cement/dust silos with the plant control room visible bottom left

Prior to the modernization aggregate raw material deliveries were tipped into a large above-ground feed hopper for distribution to the appropriate storage bins. Today, however, sand and aggregate materials, all of which arrive by road, are discharged directly, in a controlled manner, into an above-ground truck offloader, which the delivery vehicles reverse up to via a ramped access platform. This design provides quick offloading of the road vehicles while giving easier access to the reception hopper and feed mechanism for routine clean-up and maintenance purposes. The compact site also has a series of ground storage bays which provide adequate buffer stocks in the event of non-delivery or late arrival of feed stocks.

A short covered link conveyor delivers material from the reception hopper on to a fully encapsulated inclined conveyor, which levels out at its head end, whereupon a shuttle conveyor/discharge arrangement feeds the material into one of five large-capacity in-line aggregate/sand storage bins mounted within the first of two fully clad plant buildings. Each storage bin is monitored by CCTV and equipped with pneumatically operated discharge doors, which accurately regulate material feed on to a load-cell mounted weighing conveyor for delivery, via a fully encapsulated inclined conveyor, to an aggregate holding hopper mounted above the pan mixer in the second plant building.

The plant is equipped with four pneumatically filled vertical silos for the storage of Ordinary Portland Cement (OPC), pulverized fuel ash, dolomitic limestone dust and anhydrous cement. This increases the ➤



Each silo is fitted with an oversized pulse-jet filtration unit and two pressure-relief valves

powder storage capacity of the plant by nearly 100% compared with the old plant. Each of these materials is delivered by screw feeders to one of the plant's two cement weigh hoppers, each of which is equipped with a small dedicated reverse-jet filtration unit. The anhydrous cement is used in the production of Agilia Gyvlon, a pump-applied, free-flowing, self-compacting floor screed.

All four silos are equipped with an oversized, flange-mounted SiloSafe 24 pulse-jet filtration unit, each of which provides a total filter area of 24m^2 for clean, emission-free aspiration of the silo during filling. To maximize safety during filling and discharge, all four silos are fitted with two WAM VCP spring loaded pressure-relief valves to counteract any build up of positive/negative pressure within the silo and thereby minimize the risk of explosion/implosion.

In addition, all four silos are equipped with audible and visual high level alarms, which are preset to activate when the vessels' contents reach a level some two tonnes short of their full capacity, giving tanker drivers sufficient time to shutdown the delivery procedure. Each silo fill pipe is fitted with an automatic shut-off valve that closes within 30s of any high level alarm activation.

The silos are equipped with audible and visual high level alarms and automatic shut-off valves

To compensate for the slowness of mains water replenishment, two second-hand microsilica silos, in conjunction with two smaller surge tanks mounted above the pan mixer, ensure that adequate fresh water supplies are constantly available to meet production requirements. A ground sump with integral stirrer is used to capture any 'grey water' run-off for subsequent reuse in the production process, as the site maintains a low-waste policy and aims not to discharge any water off site.

Apart from aqueous pigments, which are pumped directly into the truckmixer via a mobile pump, all admixtures are stored ready for use in a cluster of plastic self-bunded tanks and pumped into the mixer water supply via inline meters.

The mixer unit at Dunkirk comprises a R3000 high-speed pan mixer from Rapid International, featuring hard-wearing chill-cast nickel chromium steel pan floor and wall tiles, spring-tensioned mixing arms for consistent homogeneous mixes, and two pneumatically operated discharge points. The mixer's capacity has been increased by 50% compared with the old plant and the unit is fitted with a fully automated high-pressure Rapid Jetwasher system for fast and effective cleaning of the mixer pan, particularly when changing between special products and traditional mixes, and at the end of each working day.

The plant is controlled by a Command Alkon COMMANDbatch system with graphical interface. The fully automated system, which provides full reporting and ticketing capabilities, is housed in the plant control room overlooking the truckmixer load-out bay.

With its newly acquired capacity to produce a broad range of special products alongside the more traditional concrete mixes, the Dunkirk plant will continue to service the busy construction and house-building markets in and around Nottingham and is also well placed to compete for a significant share of the city's major construction and infrastructure projects, including the next two phases of Nottingham's expanding tram network, the construction of a high-class apartment and marina development on the river Trent at Colwick, and the future redevelopment of the Broadmarsh Shopping Centre.

Acknowledgement

The editor wishes to thank Lafarge Readymix for permission to visit the site and, in particular, John Wright, sector manager (Leicester and South Notts), for help in preparing this article.