

GOOD

TIMING

IN TEXAS

GIULIAMARIA MERIGGI,
BOLDROCCHI USA,
DETAILS A RECENT
TURNKEY PROJECT
COMPLETED AT
BUZZI UNICEM USA'S
MARYNEAL CEMENT
PLANT IN TEXAS.



Introduction

Analysts are convinced: the cement industry in the US is on an upswing, with positive multi-year growth forecasts further solidified following the election of Donald Trump as US President. If his campaign promises of major infrastructure spending come to fruition, the cement industry will reap significant rewards. The cement industry in the state of Texas is among those poised to profit.

Good timing, therefore, for Buzzi Unicem USA to have completed a major modernisation project at its Maryneal plant in the Lone Star state. Producing both portland cement and oil well cement, it foresaw the increase in demand from the construction and oil and gas industries. Buzzi Unicem USA's project turns Maryneal into a world-class plant, greatly reducing its environmental footprint. The plant has new state-of-the-art air pollution control (APC) systems that meet all US Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations.

The plant had three dry kiln lines with a production capacity of 550 000 short tpy. The modernisation replaced it with a fourth – much bigger – line with a capacity of 1.2 million short tpy. This new line began operating in July 2016, while the coal mill (with its environmentally-friendly APC system) went back online in March 2017, completing the project.

Although thyssenkrupp Industrial Solutions was the EPC contractor on the project, Boldrocchi was awarded a turnkey contract for several major components.

Boldrocchi is among the few companies in the world to offer a complete portfolio of products and solutions that manage the flow rate, temperature, and pollutants in process gases, and control the temperature and noise of heavy machinery. More specifically, the company is an expert in APC systems, fans, cooling systems and heat exchangers, noise protection, dampers, and other ancillaries.

Boldrocchi's contract at the Maryneal plant was multifaceted, as Buzzi Unicem USA took advantage of the company's expertise in APC, fans, and other ancillaries, as well as its engineering expertise. It was also turnkey, as the company has the ability to custom design, manufacture, test, install, and commission all of its solutions.

Kiln and raw mill solution

The first component of Boldrocchi's contract at the Maryneal plant changed partway through the project. Originally, the company was to provide a turnkey solution from the inlet flange of the baghouse to the outlet flange of the stack on the existing kiln and raw mill lines.

When the contract was awarded, Buzzi Unicem USA wanted the baghouse to be used on the existing three kiln lines. However, the company's decision to go ahead with a new line was moved-up, and Buzzi Unicem USA decided to use the new baghouse on the new line instead.

This presented a complication for Boldrocchi from an engineering perspective, as the baghouse design for the three existing lines needed an inlet on one side and an outlet on the other. To be used with the new kiln line, this



Four-storey coal mill structure.

same baghouse needed the inlet and outlet on the same side. A tricky order, as the baghouse had already been built. To solve this problem, the company's engineers found a way to design internal deflectors that could be repositioned to allow for the required flexibility of two different configurations.

Commissioned in July 2016, the emissions from this baghouse are well within NESHAP limits of 0.01 lbs/short t of clinker (2 mg/Nm³). Boldrocchi was also able to design it with very low compressed air consumption, while offering one full cleaning cycle per hour. This energy efficiency was important for Buzzi Unicem USA, as it helped earn ENERGY STAR® certification from the EPA for the ninth straight year.

Boldrocchi not only supplied the baghouse. The scope of supply for the kiln and raw mill included:

- Baghouse.
- Dust handling system (screw conveyor and chain conveyor).
- Fresh air/emergency damper.
- Kiln/raw mill fan (double-inlet with air-foil blades and a 700 kW motor).
- Ducts.
- Stack.
- Kiln ID fan.
- Raw mill fan.

Boldrocchi had already completed the stack by the time the project was modified. Adding the fourth line preheater tower beside the baghouse meant significantly increasing

the stack height. Therefore a new lower section of the stack was built and Boldrocchi's stack was installed on top. The new stack now has an 11 ft (3.6 m) dia. and is over 260 ft (80 m) high.

Boldrocchi is not only an expert in APC systems, but in a much wider solutions portfolio, including fans of all types. The company actually began in Italy as a fan expert over a hundred years ago. Both kiln ID fans and raw mill fans are crucial to the proper performance of the entire production line and, once again, the company believes every one must be tailor made to the specific process parameters to be genuinely effective and reliable for decades.

The kiln ID fan needed to be designed with a double inlet and for a continuous operating temperature of 536°F (280°C) with peaks of up to 842°F (450°C). Boldrocchi chose materials that stand up to high temperatures: the shaft was done in 16Mo3, a specified pressure vessel grade chrome molybdenum steel alloy, and the impeller in Dillimax 690, a high-strength quenched and tempered, fine grained structural steel. Since the dust load is only 10.93 grain/acf (25g/Nm³), no wear lining was required. A 2000 kW motor completed the fan.

A raw mill fan must stand-up to high pressure and abrasive, sticky dust. Boldrocchi designed this one with a double inlet and a fully wear-lined impeller. This fan has a double layer of lining (on the blades and the shaft) to cope with a dust load of 30.59 grain/acf (70g/Nm³). The wear liner on the casing scroll is made of Creusabro®, a high-performance wear and impact resistant steel. The motor installed on the raw mill fan is for 2000 kW – the same size as the kiln fan, specifically so that the two motors can use the same spare parts.

Coal mill solution

The second component of the turnkey contract was to provide systems – environmental and other – for the refurbished coal mill. This included organising and supervising the erection of the coal mill itself, as well as the separator, drive, and oil circuit. It also included engineering, building, and erecting the baghouse, ancillaries, and the entire mill steel structure – a four storey building housing the mill and its APC system. The EPC contractor usually does this structure, but as Buzzi Unicem USA was refurbishing its existing coal mill as a separate contract, this part of the project was awarded to Boldrocchi.

Boldrocchi designed the coal mill building to support the head of a drag chain conveyor (not in Boldrocchi's scope) and to house the coal mill, with silos on top, followed by the baghouse. The steel structure included all the necessary service platforms and access stairs. The company also designed and manufactured all internal components within the coal mill structure, then installed and commissioned them. This part of the project therefore included:

- Coal mill baghouse.
- Baghouse fan (exhaust, downstream of the baghouse).
- All duct work.
- All process dampers.



Kiln/raw mill filter: dustworks overview.



Kiln/raw mill filter: internal deflectors modifications.

Boldrocchi places a lot of importance on the high quality of its solutions and its team's product knowledge. Among the company's advantages is its wide product portfolio in APC. It not only custom makes baghouses, ESPs, nuisance filters, and cyclones, it offers everything required for flue gas treatment. That includes deNO_x solutions to remove NO_x, which contributes to erosion of the ozone layer, as well as select catalytic reduction (SCR) and select non-catalytic reduction (SNCR) solutions. The company also offers deSO_x solutions that remove gaseous pollutants that may cause acid condensation: sulfur dioxide (SO₂), sulfur trioxide (SO₃), hydrochloric acid (HCl), and hydrogen fluoride (HF). Solutions to reduce mercury, metals, and dioxins are also available.

- Pulverised coal silos.
- Pulverised coal dosing system.
- Pneumatic ash (coal) handling system (co-designed with Buzzi Unicem USA).
- Other small fans and blowers.
- Motors.
- Stack.
- Firefighting system.

Due to the inherent risks of explosion and the need to conform to ATEX requirements, coal mill baghouses are much more complex to design than other types. Boldrocchi is a specialist in coal mill baghouses with numerous references around the world, experience working with ATEX regulations, and the expert technical ability to custom-make solutions that ensure optimal performance, in accordance with all NESHAP (or other) regulations and safety. The coal mill baghouse at Maryneal includes the following:

- Special explosion-relief doors.
- Grounded bag cages in carbon steel with cataphoresis protection to avoid damage in an explosion.
- MPS acrylic antistatic filter bags with PTFE coating.
- Rupture membranes on one side of the filter casing, to protect it in case of explosion.
- Customised hoppers that Boldrocchi engineers designed with a particular angle to avoid coal deposits, therefore reducing the risk of an explosion.
- A reversible screw conveyor with manual cu-off gate and a motor, designed to ATEX norms, to evacuate the coal from the hopper.
- A rotary valve on both ends, feeding the two silos and a motor, all following ATEX regulations, to prevent an explosion from spreading to the filter bags and burning them.
- A simple-inlet coal mill baghouse fan, designed respecting the internal distances and tolerances for explosive environments, according to ATEX criteria, with all relative equipment (instruments, coupling, and motors) ATEX certified as well.

Onsite

Managing a construction site of this size meant developing, installing, and operating a work safety programme that would meet the stringent governmental regulations set by the Mine Safety and Health Administration (MSHA).

Boldrocchi ensured that a commissioning engineer was onsite for about a month for each project and that training was given. Boldrocchi's site manager – onsite full-time to fully follow the project – was so popular (his Italian cooking helped win fans) that Buzzi Unicem USA has requested he return to manage activities at Boldrocchi's next project with Buzzi Unicem USA at the Cape Girardeau plant in Missouri. This project will see Boldrocchi provide a turnkey APC solution on the kiln plant, which co-processes alternative fuels, to achieve NESHAP requirements. Start-up is expected in 2018. 🌐



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ESTABLISHED IN 1909



Solutions for the cement industry:

- Air pollution control
- Fans & blowers
- Cooling systems & heat exchangers
- Dampers & diverters



Boldrocchi is a worldwide engineering & manufacturing company that offers a wide-ranging portfolio of solutions tailored to your plant's process needs.

We pride ourselves on being forward-thinking experts, advising clients on how to optimize their production with quality, reliable solutions, whether in new or existing plants. One example is at a Maryneal, Texas plant. Our turnkey solutions included APC systems, fans, dampers, handling & storage equipment, stacks, multi-storey structures and ancillaries for their new kiln & raw mill and refurbished coal mill.



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