

# Wear technology leadership

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The Newberry plant uses a Polysius system that includes a single vertical roller mill with a rated capacity of 192tph. The table's diameter is 135 in. dia with 75 in. rollers operating at 26.7rpm, 1750hp. The mill can easily provide more than enough raw material feed to operate the kiln at maximum efficiency.

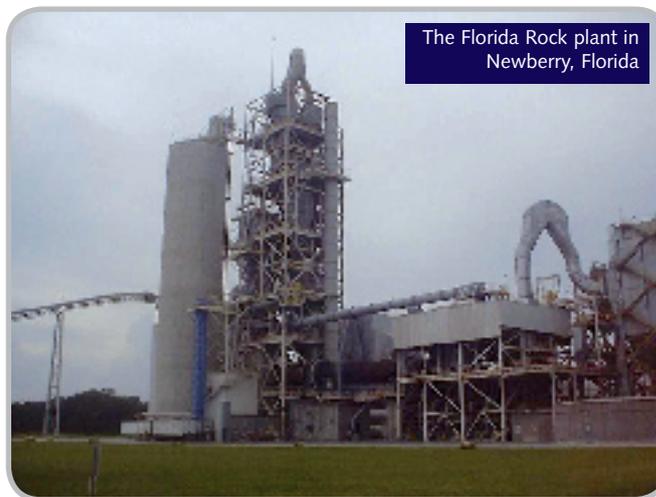
Before the first clinker was produced, Newberry's management team realised that the high moisture content of the raw materials would cause a processing flow problem.

Pre-production testing assured the plant's operation management that moisture levels would remain at approximately 11 per cent, an ideal level to maximise production. However, moisture levels actually ranged from 11 to over 13 per cent. These high levels coupled with the high clay and silica content of the raw feed mixture, presented some double-edged problems. When the moisture content was under control, the raw feed flowed well, however, the high silica content of the raw feed created a significant wear issue. Conversely, high moisture and clay content caused material to plug, stopping the process completely. This was the problem that the Florida Rock Industries management team faced after the first year in production.

## Design

Due to the original inlet feed chute design, material was plugging at a rate that caused the mill to be shut down every eight to 10 hours. The maintenance team was then forced to work round the clock entering the mill and clearing out

*Florida Rock Industries, Inc is a major construction materials company operating a cement plant located in Newberry, Florida with a permitted operating capacity of 750,000tpa. During 2001, the cement plant sold 682,000t or just over 90 per cent of the rated capacity. Operating since December 1999, the plant has been experiencing start-up challenges that only became evident during production. This article reports on a solution to eliminate the double-edged problem of sticking and abrasive wear at the Newberry plant.*



The Florida Rock plant in Newberry, Florida

promote flowability and handle the impact and high abrasion of the feed stock.

## Solution

The original equipment chute liners were not assisting flow or supplying the level of protection necessary to provide the expected service life. Stainless steel liners partially relieved the flow issue but offered relatively little protection from impact and abrasion.

AJ Weller designed WellerCLAD HYPOL® to

meet the demands of this application and customised it to fit Florida Rock's expectations.

WellerCLAD® and WellerCLAD HYPOL are a combination of chromium carbides, manganese and vanadium in an iron base that are metallurgically bonded to steel using a low temperature fusion process to maintain the integrity of the materials.

This unique chemistry, high chrome and other alloys lend excellent lubricity which encourages better flow. The carbide size, density and consistency provide a tough wear surface that stands up well to high abrasion. The fusion process makes the material tough enough to absorb heavy impact without degrading or spalling.

It was understood that in its natural state the material would not satisfy the flowability issue that the customer was facing. AJ Weller then applied its proprietary WellerCLAD HYPOL method to provide a surface finish that substantially increases particle flow by lowering the coefficient of friction, without effecting the toughness, or wear resistant properties of the material.

the plug. Kiln production was threatened daily and as the mill had to be frequently re-entered to clean the pluggage, safety concerns were raised.

The raw feed entering the mill was measured at -4ins. When flow was not restricted, the impact point on the chute was facing two kinds of wear problems; heavy impact from the size of the material, and severe abrasion from the silica content. The straight sided chute with 90° angles allowed material to pack and bridge.

The AJ Weller Corporation was asked to help solve this complicated issue. The 25 year old company located in Shreveport, Louisiana, has earned a reputation for solving difficult wear problems. The products and solutions offered include a complete line of premium wear resistant materials for various industries.

The company identified two major problems:

- redesign of the raw material inlet feed chute eliminating all the sharp corners and angles
- identification of a material that could

### Installation

Preparations were made to install WellerCLAD HYPOL during spring 2001. The liner system was supplied cut to fit and arrived ready to be installed. The maintenance team welded each liner in place and used narrow strips in the corners of the chute to open the angles. The steel backing on the material made for quick and easy installation with standard welding equipment and rods. Installation was completed without any problems and the mill was brought back on line with the rest of the plant.

### Results

Since the initial modification and installation of WellerCLAD HYPOL, the raw feed chute has operated with significant efficiency. Florida Rock's raw mill shutdown time went from eight hours per day to three hours per week.

A subsequent redesign and modification of the chute was made in November 2005. The 'Jet Slide' Feed chute incorporates WellerCLAD HYPOL into a

This photograph was taken moments after the shutdown for Florida Rock's May 2006 planned outage. No cleaning had taken place, this was the 'as is' condition of the chute. Subsequent inspection of the chute revealed no evidence of premature wear.



Figure 1: Florida Rock's 'Jet Slide' feed chute, looking up from the bottom

louvred chute design which allows high pressure and forces air to be focused directly into the centre of the material flow from the bottom of the chute (see Figure 1). Sticking and plugging have been eliminated. WellerCLAD HYPOL's excellent lubricity and super tough wear protection have substantially reduced maintenance costs and production slow downs. Related safety issues have also been drastically reduced.

### Conclusion

Multi-dimensional processing problems require solutions that supply answers to all the facets of an application. Forward thinking and dedication from the maintenance team at Florida Rock coupled with the technology resources and experience of the AJ Weller Corporation resulted in the sticking and abrasion problems in the raw feed chute being overcome.