

# RISING FROM THE ASHES

*What is claimed to be the world's largest cement kiln precipitator was rebuilt in record time following extensive damage caused by a fire at the plant*

**H**olnam Cement in Clarksville, Missouri, U.S.A., is thought to be the largest cement kiln in the world. Prior to the fire damage, it took four precipitators working at full capacity to keep the opacity readings within the desired range.

The original design of the precipitators was Joy-Western manufactured, delivered between 1965 and 1967, and

installed in a two-on-two, side-by-side configuration. In 1984-85, the bottom unit (numbers 3 and 4) were rebuilt by American Air Filter (AAF). Four years later, Cleveland Manufacturing Corp. (CMC) rebuilt the top two units.

#### **The cause**

The precipitator suffered fire damage during start-up after a four-week kiln

outage in January 1997. Operators at the plant were bringing the kiln on-line when a crack in the shell was discovered. The subsequent shutdown to allow the rewelding of the shell took approximately 24 hours, during which time a light preheat flame was kept in the kiln to maintain the temperature of 200° F (93° C) already obtained in the preheat. Unburned oil



New collecting plates are being installed in the lower precipitator at Holnam Cement's Clarksville, Missouri, U.S.A., plant.



**On-site fabrication assembly was carried out on the precipitator after an 18-week dismantling process revealed extra damage caused by the fire.**

vapor is thought to have condensed on the precipitator plates.

The fire apparently occurred when the kiln was restarted after the repair causing extensive damage to the collecting plates and the discharge electrodes. Before the incident, all the units had been performing well. However, electrical readings after the fire indicated internal damage in all four precipitator boxes serving the 7.62-meter-diam × 231-meter-long kiln.

At the end of January, Holnam contacted Neundorfer Engineered Systems, a precipitator service company, to provide emergency troubleshooting services. Within 24 hours, support staff and Holnam personnel were inside one of the four boxes, removing electrodes and assessing the damage. All this was carried out while the kiln operation continued under a malfunction variance granted by the Missouri Department of Natural Resources.

When the emergency support crew arrived at the plant, the opacity readings were about 97%. Inspection

showed the warped plates in all four units, with the most badly damaged areas being in the A and B fields. All the units were inspected and all close-clearance rigid discharge electrodes (RDEs) were removed, as a temporary measure to reduce opacity and keep the kiln on-line.

Opacity went down to about 60%, which, although a move in the right direction, was still unacceptable. Four electrical fields, one in each unit, had to be shut down due to irreparable damage.

During the time these temporary repairs were being made, Neundorfer, Holnam, and the Holnam insurers were working together toward a permanent solution at an acceptable cost.

The plan that was chosen had to take into account design, materials availability, and incorporate the installation schedules that would minimize business interruption and ultimately restore and improve the performance of the precipitators.

The eventual repair proposal put forward by Neundorfer was prepared in just two days. Eighteen days after the fire, work began on dismantling Unit 4 prior to the assembly of any new components. Unit 4 is a bottom precipitator and had to have both damaged and new components unloaded and loaded from the side of the casing and building.

The work was originally estimated to take 10 to 12 weeks, but it ended up taking 18 weeks because of extra damage discovered as the repairs progressed.

As Unit 1 (the first of the top two units) was being rebuilt, unexpected damage was discovered and certain special components had to be fabricated on short notice. The rebuild included replacing half of the precipitator internals, sectionalization of inlet fields for half of the precipitator in order to offset performance losses in the non-repaired sections, and the repair of the remaining sections. The contract also included asbestos abatement on the roofs of the two boxes.

**Workers remove damaged collecting plates in the lower precipitator.**

Throughout the job, the quality of work and of individual components was monitored by engineers hired by the insurance company assessing the fire damage.

### Results

A respectable 3% opacity and greatly improved maintenance flexibility resulted from changes made during the repairs and the rebuilding, which are said to include a better rapping system and better controls added to the lower two units (3 and 4). The changes were made at no additional cost to the project, and production continued throughout the rebuild process.

The silver lining of the cloud caused by the fire is that now Holnam is able to shut off any one of the precipitator units for maintenance while continuing production, which had previously not been possible.

*Information was provided by Holnam Inc. and Neundorfer Engineered Systems.*

