# Stack corrosion protection

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*Changes in fuel use and waste heat recovery have led to increased corrosion damage in the stacks of many cement plants worldwide. To safeguard against premature failure of carbon steel chimneys, producers increasingly recognise the benefits of corrosion protection. For example, a cement plant in southern California replaced the top of its stack with a new section that was treated with a corrosion-protective coating.*

The increased use of higher-sulphur coal and alternative fuels that contain sulphur and chlorides has raised the severity of corrosion damage in the carbon steel chimneys of many cement plants. Aggravating the situation further, many works improve their energy efficiency by recovering the heat of the hot acidic combustion gases leading to the lower temperatures, which generate more condensation inside the chimneys. This results in more aggressive corrosion, particularly in the more elevated sections.

The corrosion process caused by condensing acid gases can be very damaging and will produce a rapid deterioration of the wall thickness (see Figure 1). The coating material of a corrosion-protective coating such as 3L&T's CorrosionGard™-160S bonds strongly to the metal and provides a chemically-resistant barrier. In addition, this type of corrosion protection is also very resistant to undercut corrosion, which some coating materials fail to prevent. Figure 2 shows how severe corrosion can be in a cement plant. Above the flange, the steel wall is already perforated, which can also present safety issues.

Figure 1: condensing corrosion mechanism

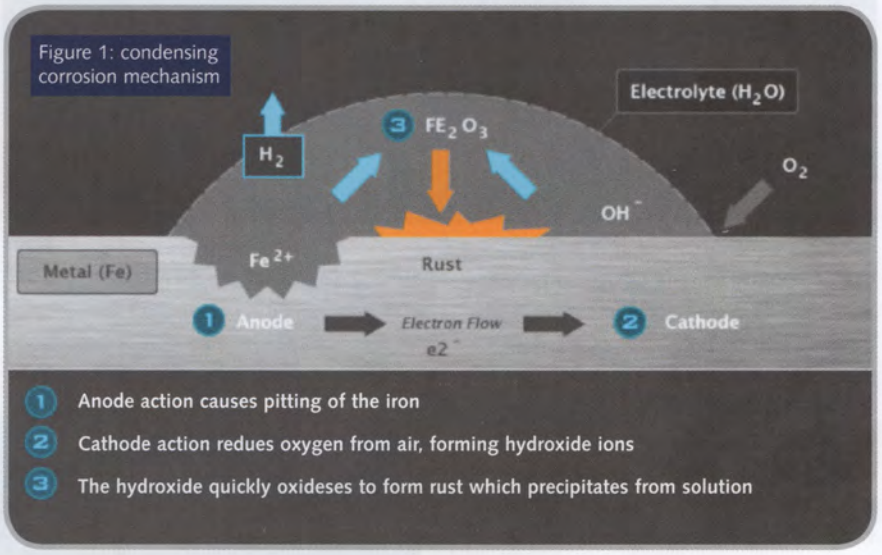


Figure 2: corroded cement plant chimney

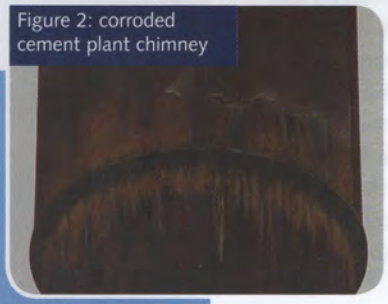

Figure 3: stack to be repaired and protected from corrosion

## Field application

PENTA Industrial Corp, 3L&T's North American partner, was contracted by a cement plant in southern California to install the CorrosionGard™-160S protection on the interior surface of the full height of the stack during the January 2015 shutdown. Figure 3 shows the full chimney.

The top section of the stack was newly fabricated and positioned on the ground next to the existing stack. Figure 4 shows one of the new sections already coated.

With the stack out of operation, PENTA Industrial installed a motorised work cage to access the full height of the remaining existing section of the stack. A tarp was installed over the top of the stack to keep out precipitation, and dehumidification

Figure 4: new chimney section coated with CorrosionGard™-160S

*Many different factors contribute to stack corrosion, including sulphur and chloride in exhaust gases as well as a higher degree of moisture. Different plants have different operating conditions in their chimneys caused by a range of climates, geographies, raw materials and fuel sources. Therefore, there is no single solution for all chimneys.*

and temporary heating equipment were also used. Overspray protection was installed also on both ends of the new stack section.

Working two shifts per day to meet the outage schedule, the interior surfaces of the new and existing stack sections were sandblasted to an SSPC SP-10 near-white metal profile and quality control measurements were taken to verify the required profile was achieved.

After blast profile quality measurements were taken and approval to proceed was given, CorrosionGard™-160S was spray applied with a 70-1 airless spray pump to the required wet and dry film thicknesses. Quality control measurements were taken of the dry film thickness to verify required thicknesses were met. Once the spray application was completed and approved, the CorrosionGard™-160S cured at ambient conditions.

After curing, the plant personnel erected and bolted the new section to the existing section. Now the full height of the stack is fully protected with CorrosionGard™-160S.

## No single solution

Many different factors contribute to stack corrosion, including sulphur and chloride in exhaust gases as well as a higher degree of moisture. Different plants have different operating conditions in their chimneys caused by a range of climates, geographies, raw materials and fuel sources. Therefore, there is no single solution for all chimneys. 3L&T initially developed the StackGard™-255SQW corrosion protection for higher-temperature stacks. This was followed by the launch of CorrosionGard™-160S, which was used at the Lebec works. More recently, a derivative was formulated, CorrosionGard™-160SH2, that can handle higher short-term temperature peaks. All coating technologies provide resistance to undercut corrosion, acid attack from $SO_2$, $SO_3$, $NO_x$, HCl and $CO_2$, fine particle abrasion and thermal shock.

Figure 5: Stack rigged with work cage and CorrosionGard™-160S application in progress