

## Pioneering cathodic protection system stops damage from rust.

Cathodic protection has a century-long track record but has seldom been used for historic buildings – until now.

When the time came to renovate this residential college, we noticed that mysterious cracks appeared all over the masonry. It turned out they were caused by accumulated rust scale on structural steel embedded in the masonry.

The cracks were mostly restricted to upper floors, but management rightly questioned whether they would spread to all floors eventually. The cost of uncovering and remediating all the steel on the building would have been quite high.



Cracks through the masonry originated at the flanges of steel beams

The solution was to uncover and remediate all steel that had rusted to the point where it cracked the masonry, and install a cathodic protection system on the upper two floors of the building. Cathodic protection has a century-long track record of experience in tunnels, bridges and water treatment facilities but has seldom been used in historic buildings, until now.

The system includes sensors that detect tiny corrosion currents if they occur. Follow-up studies conducted after five years show that corrosion has stopped.

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Severely rusted steel was uncovered, painted with a cementitious alkaline coating, and then cathodically protected from future corrosion.



Electrochemical measurements were used to estimate how fast the rust was spreading. They showed little or no risk of corrosion on lower floors.

Cathodic protection for the upper floors would be enough to stop all meaningful rust far into the future.



Titanium and ceramic anodes, drilled into the wall at pre-set locations, were connected to their power source by titanium wires embedded in mortar joints.

