

4. APPENDIX A: INSULCORE™ SOLUTIONS REPAIR EXAMPLES

The InsulCore™ Solutions technique has been successfully used to repair more than 60 cores in the USA. Up November 2010, M&C has successfully repaired a 2.1 MW, 10 pole stator core and a 3.1 MW, 10 pole rotor core, using this technology. Below are some examples of the results achieved.

4.1. 13.7 MW Rotor Core Repair

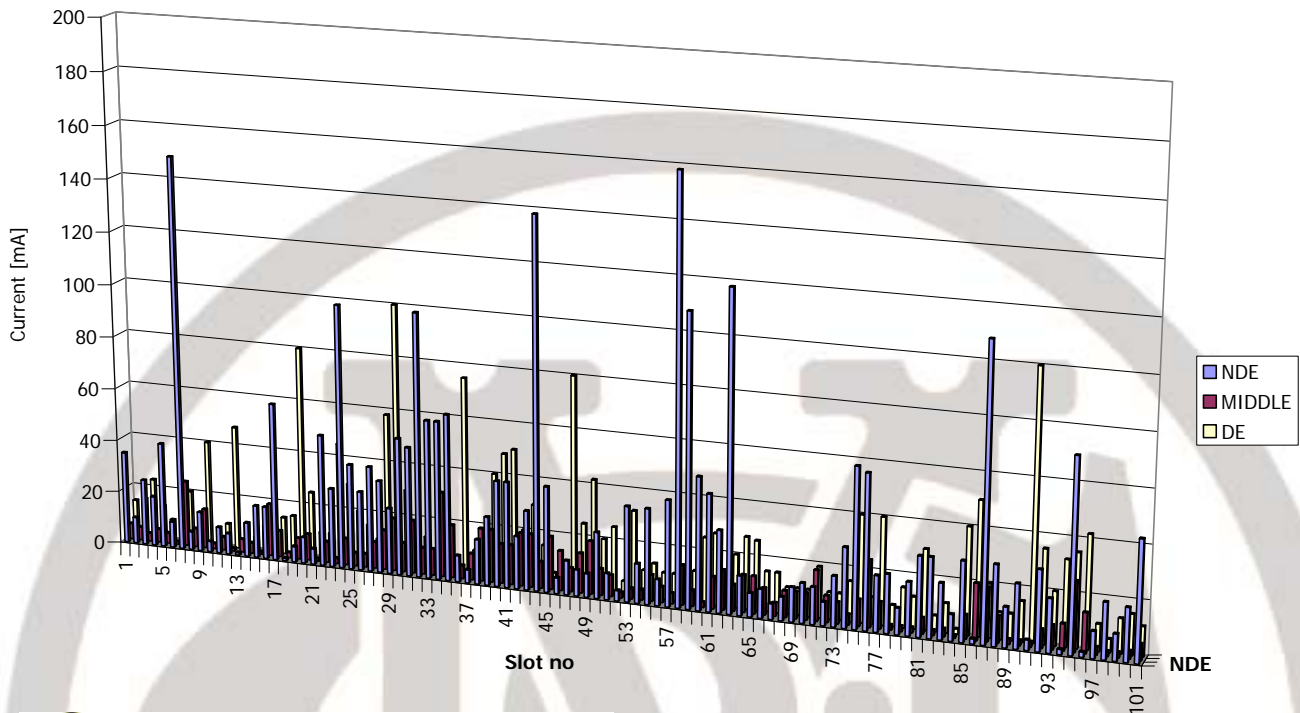
This 4 pole motor had a rotor core inter-laminar deterioration problem resulting in severe vibration problems.



Traditionally the core would have to be re-insulated and restacked (with the resulting damage to the laminations and lost active core material) or replaced. The cost and delay time implications were huge.

The original El Cid core test results are shown below.

Elcid Test: Original Rotor Core Test Results



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10 of the El Cid results were out of specification.

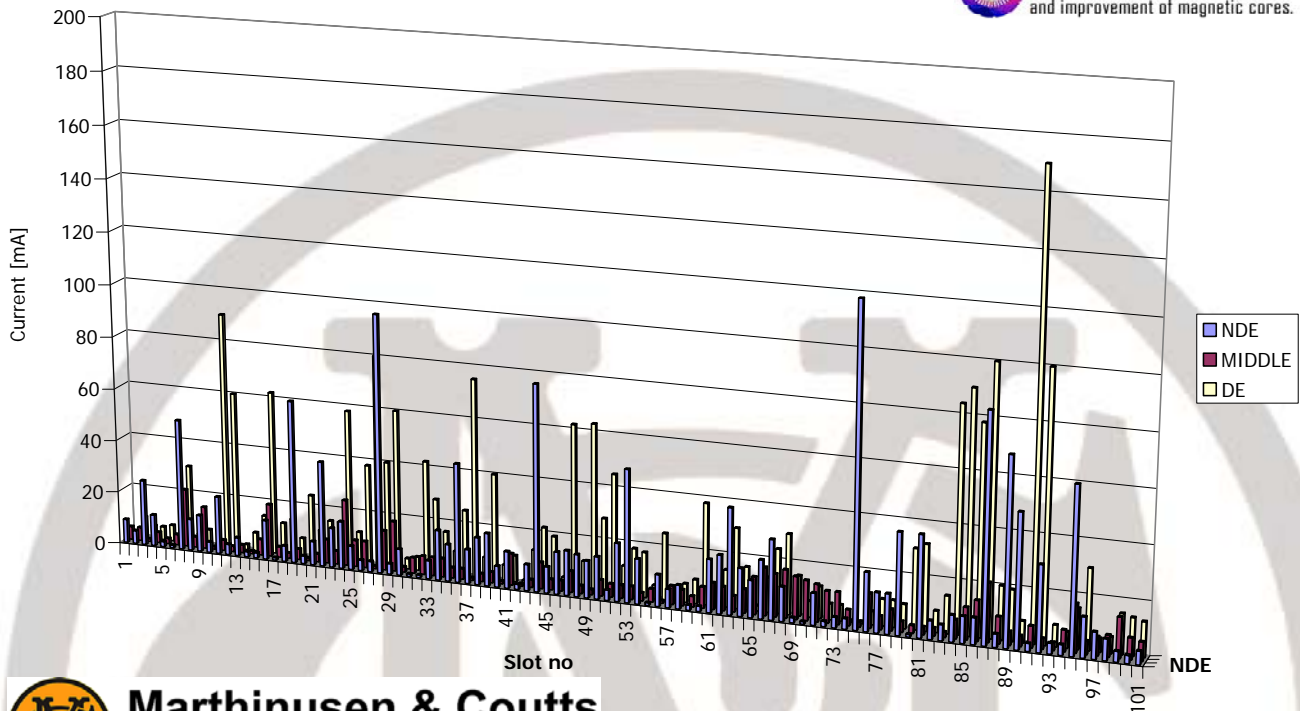
We recommended that the core could be treated using the InsulCore™ Solution treatment as a possible solution to the problem.

The rotor core was treated with the InsulCore™ Solutions treatment and the El Cid test results are shown below.

Elcid Test: After InsulCore treatment



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Result:

The average result **decreased by 22.2%**. Only 1.3 % of the results were still out of specification. The average value is **84% below** the specification value.

The customer gladly accepted these test results. The core repair took a total of 12 days as opposed to the 14 weeks it would have taken for a traditional core repair.

The use of the InsulCore™ Solution treatment resulted in a **80.6% cost saving**, compared to the traditional method.

4.2. 2.1 MW Stator Core Repair

This 10 pole motor had a bearing failure, which resulted in a rotor to stator core rub.

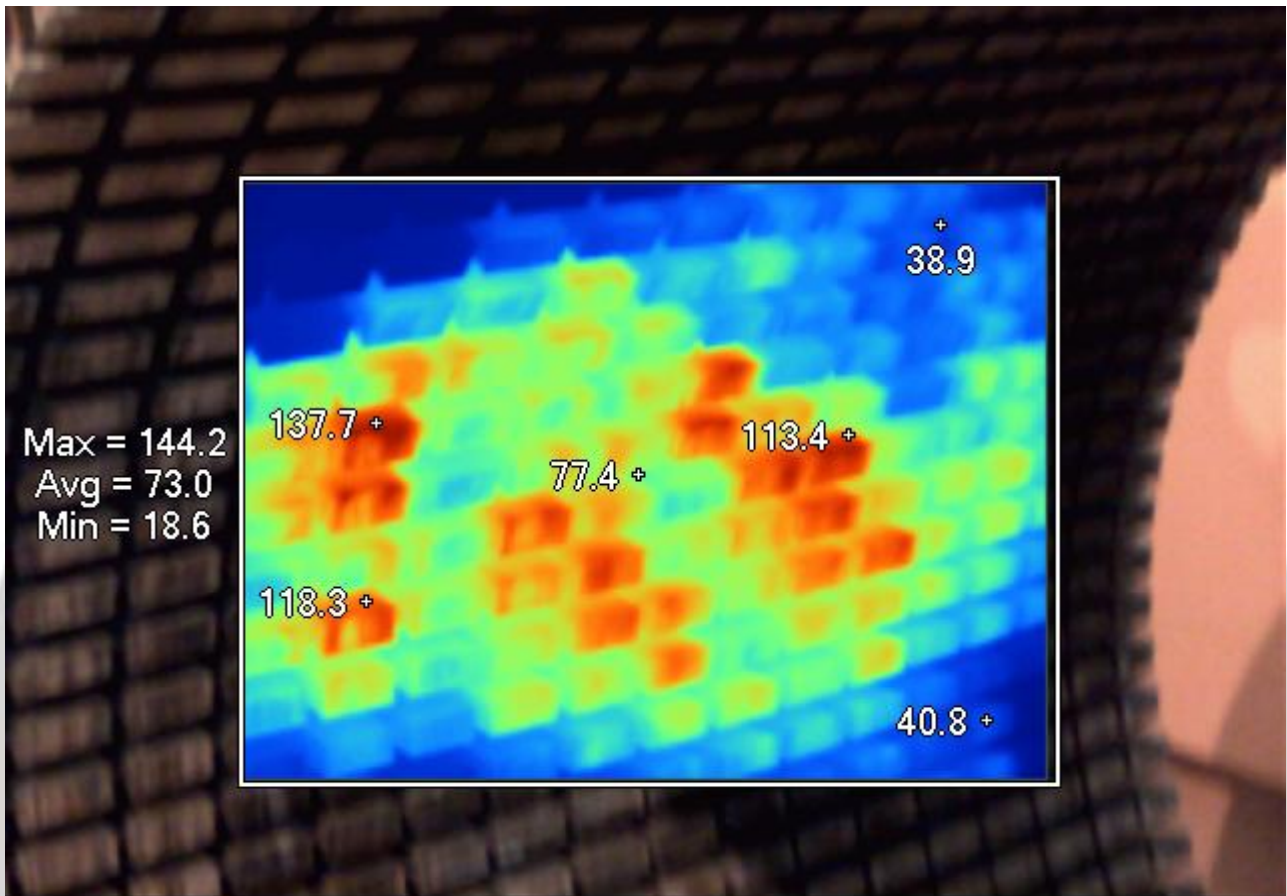


The stator winding failed and had to be rewound. The stator core test however revealed many areas of "hot spots".

This was due to the severe core rub, as can be seen in the photograph below.



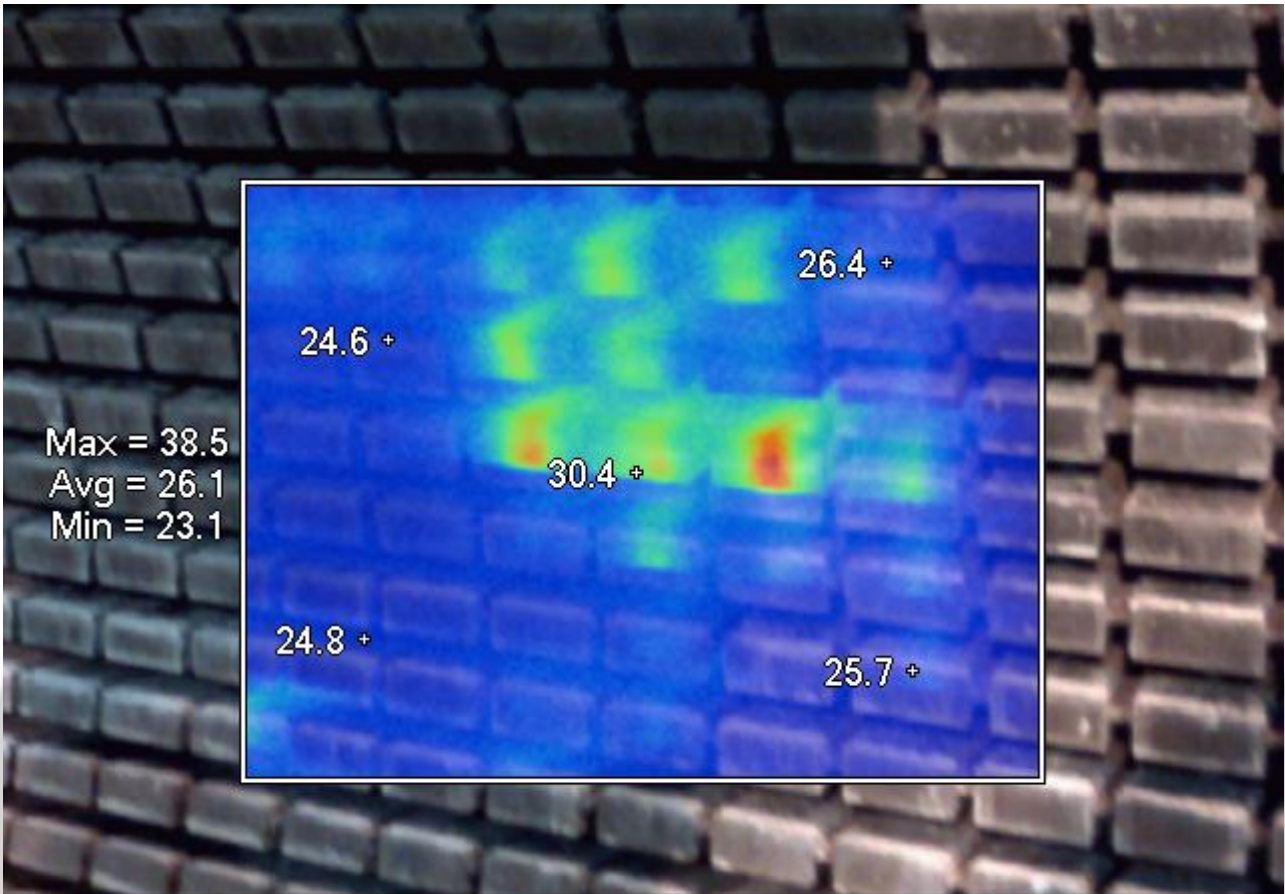
Extensive core “shocking”, “bumping” and “spreading” were unsuccessful in resolving these problem areas. The thermal scan of the stator core is shown below.



Because of the frame and core construction, a restack was not possible and the core would have to be replaced. This would have considerable cost and repair time implications.

The repair of the stator core using the InsulCore™ Solution was recommended to the customer.

The core treatment was successful, and the thermal image of the core test is after InsulCore™ Solutions treatment is shown below.



Result:

A **78.9%** drop in the hot spot temperature after the InsulCore™ Solutions treatment.

4.3. 3.1 MW Rotor Core Repair

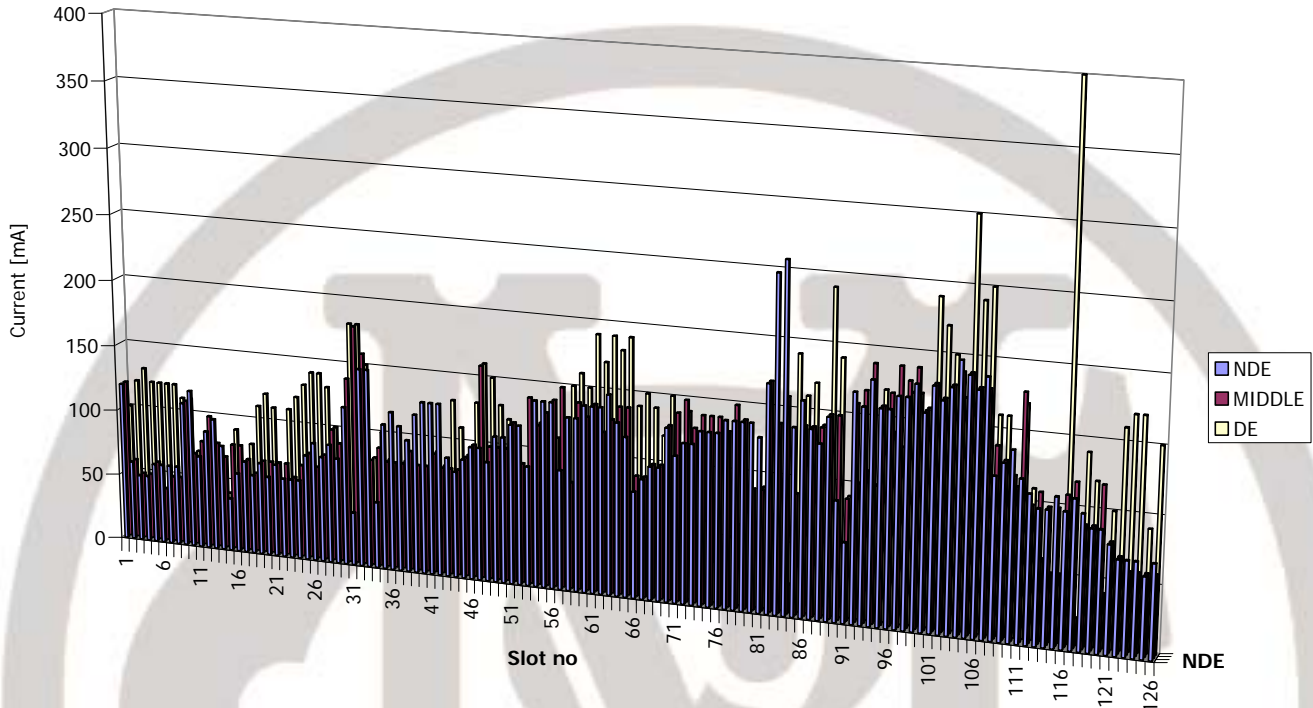
The standard M&C assessment found high core losses as indicated by the EICid test. Consultation with the customer revealed that the customer has an installed base of eight of these motors, with five of them having similar rotor core problems. These problems were identified more than twelve years ago.

Due to limited duration planned outages as well as the repair costs of a traditional core repair, the customer were forced to live with these problems. (A typical traditional core repair would take more than 8 weeks to complete.)

Several different core repair methods have been attempted, including the acid etching method. None of these produced meaningful improvements in the EICid core test results.

The original EICid core test results are shown below.

Elcid Test: Original Rotor Core Test Results



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55% of the El Cid results were out of specification, with the average value being 16% above the acceptable limits.

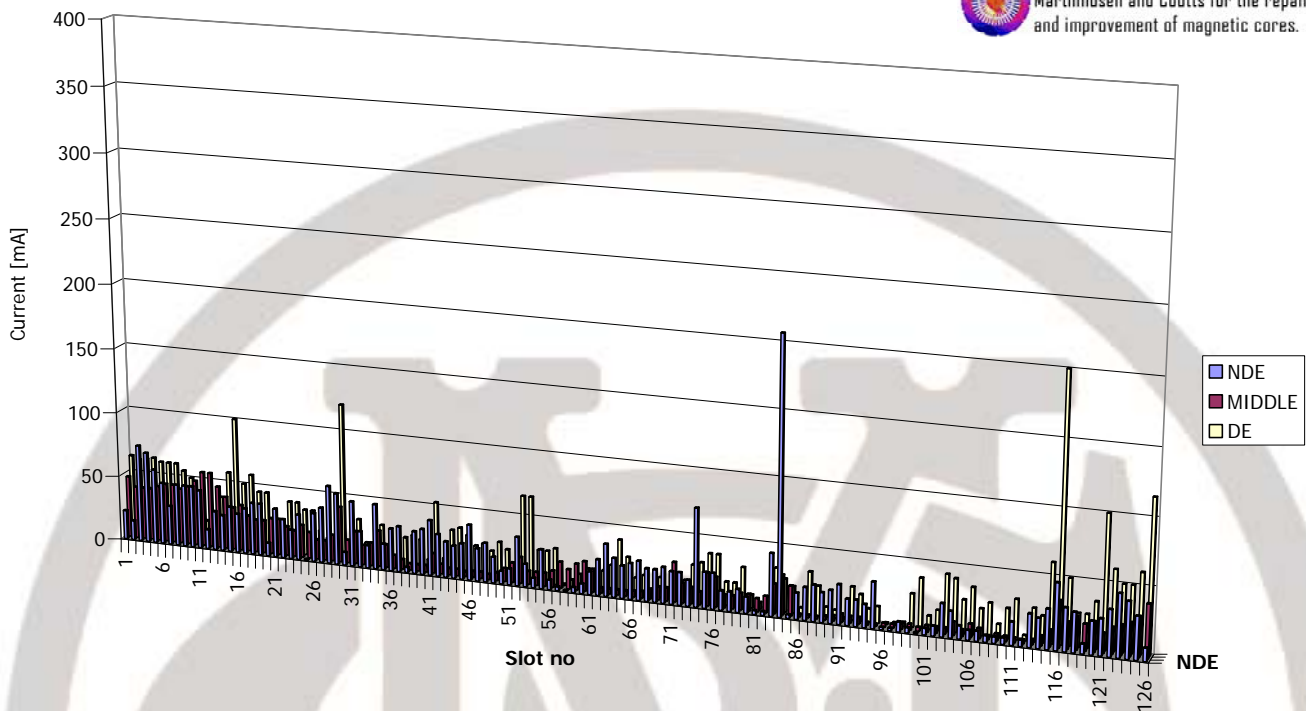
We recommended that the core could be treated using the InsulCore™ Solution treatment as a possible solution to the problem.

The rotor core was treated with the InsulCore™ Solutions treatment and the El Cid test results are shown below.

Elcid Test: After InsulCore treatment #2



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Result:

The average result **decreased by 78.4 %**. Only 1.1 % of the results were still out of specification. The average value is **75% below** the specification value.

The customer gladly accepted these test results. The core repair took a total of 7 days as opposed to the 8 weeks it would have taken for a traditional core repair.