

New Equipment Commissioning Utilizing MCA Equipment

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Since the development of MCA equipment back in the 1980's, it has evolved to encompass multiple uses beyond the intended purpose. It was designed to assess motors and their associated circuitry, for anomalies, through periodic monitoring and trending.

If MCA equipment was a tool in your tool box, it would be analogous to a crescent wrench. It can be utilized for multiple tasks. It may not be the optimum tool for that task, but – it is more than capable of completing it with the desired success. MCA can be used for the following, and many more, applications:

1. **Trending of periodic data.**
2. **Acceptance testing of new or refurbished motors.**
3. **Troubleshooting anomalies within the motor or motor circuit.**
4. **Troubleshooting anomalies within the distribution system.**
5. **Commissioning of new construction or new installation of equipment.**

The purpose of this paper is to discuss the utilization of MCA equipment for commissioning of new installations.

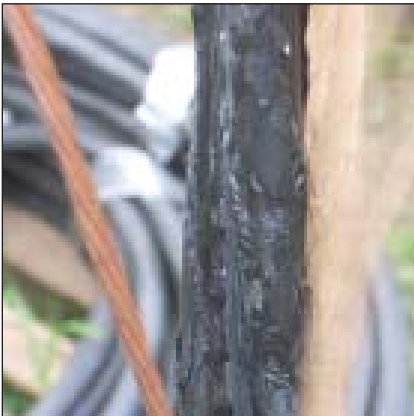
Equipment commissioning falls into three basic categories:

1. **New Construction:** During the process of constructing a new facility, MCA Equipment can be used in various stages of the construction to provide a means of identifying improper installation and/or defective equipment and materials which can delay startup, result in spurious shutdowns, and extensive troubleshooting due to unfamiliarity with the new equipment
2. **Facility Additions:** Adding a new process or expanding the present process also provides the opportunity for MCA testing. Facility additions may result in the same problems faced with new construction.
3. **New Cable or Motor Installations:** MCA testing provides a means of quality control and ensuring full longevity, after repair or replacement, in an existing facility.

Used in any of the above situations, commissioning testing can greatly enhance reliability. Although new equipment is generally covered by a warranty, rarely will warranty coverage provide for reimbursements of lost production costs and the costs of the associated maintenance expenditures. Warranty usually covers the repair or replacement of the defective equipment.

Commissioning Testing Process

Upon receipt of new motors, Acceptance Testing should be performed. Acceptance Testing ensures that you are starting with a motor in optimal condition. Any anomalies



identified in the process of “Commissioning” can then be related to poor maintenance practices and/or improper installation.

Baker Advanced Winding Analyzer

Commissioning of cabling should start with the cable while it is still on the reel. If it is defective, it can be rejected before installation.

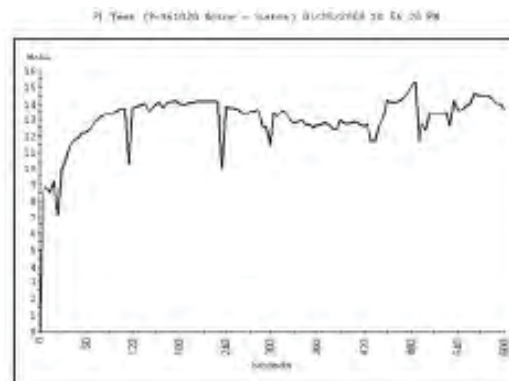
The picture on the left shows cabling that was pulled from multiple new installations. Because the problem was identified after installation, the project fell well behind its expected completion date. The plant management was posed with allowing the defective cable to remain installed and run the risk of premature failure of multiple equipment, or to fall behind schedule and ensure that the installation met their specifications.

The cable stacked on the pallets was pulled from the installation locations. Close examination of the cabling revealed that the cable was improperly cured.

Switch gear can also be tested prior to installation using MCA equipment that has the capability of measuring precision low resistance. The starter can be read from the input through breakers, fuses, contactors, and overloads. It is necessary to provide a temporary control voltage to energize contactors.

In the case of medium and high voltage starters, the input terminals through the output terminals can be tested.

During a recent Commissioning, near the end of construction, a fully connected 4160 V motor circuit was tested. The insulation resistance to ground was below the facility acceptance standards of 100 MegOhms. The motor was disconnected and the individual cables were each tested to ground. All three phases read approximately 13 MegOhms. This is highly unusual so one of the previously tested leads was removed from the output insulator terminal and the ground resistance reading jumped to over 21,000 MegOhms, and within 5 seconds increased to over 22,000 MegOhms. This isolated the problem to the insulator terminal strip. Had the switch gear been tested prior to installation this fault would have been readily identified. The replacement required removal of the entire enclosure, as the bolts mounting the insulator were behind the enclosure and up against the rear wall.



Polarization index on the connected circuit



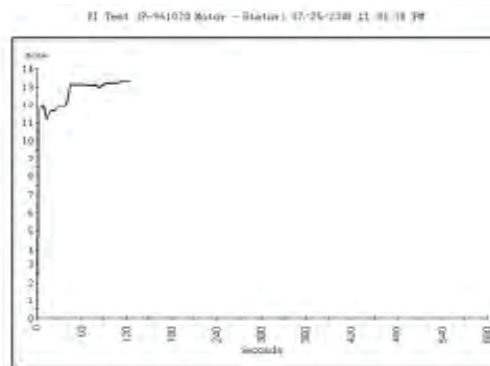
The guilty culprit: defective insulator



PdMA Corporation MCE



AllTest Pro 31



Partial PI on one phase cable

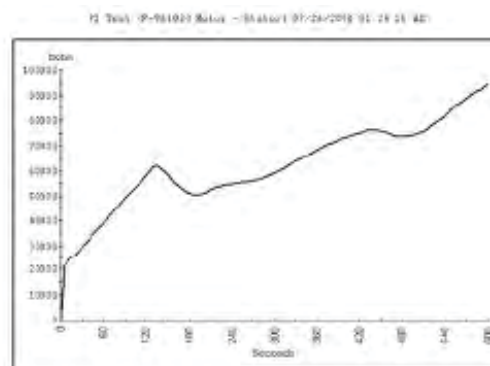
Motor Testing

Motors should be tested upon acceptance, after mounting but prior to coupling and alignment, after coupling and alignment, and once again when the circuit is connected for normal operation. This enables identification of possible damage to the motor during rigging and mounting, Softfoot or misalignment after coupling, and a final verification of the connected and installed system.

MCA equipment, depending upon manufacturer, provide a number of invaluable tests for commissioning:

- Phase to Phase Resistance Test
- Impedance / Inductance / I/F
- Rotor Influence Check
- Insulation Testing
- Hi Pot
- Megohmmeter
- Surge Testing

Dynamic Testing Utilizing MCA equipment and some or all of the tests they provide, may require additional man-hours and maintenance funding, however short term savings during start-up and the long term potential reliability, more than pays for any commissioning testing expense.



The resultant PI on a load removed from the insulator