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Portable instruments for checking electrical systems

With facilities dependent on a steady supply of electric power and continuous operation of electric motors, any disruptions in these processes could prove disastrous to a company's productivity and profitability. Monitoring and analysis can identify problems that could harm equipment performance, result in motor failure, and leave a company with extensive downtime and lost production.

As facilities and production processes have become more automated, they also have become more sensitive to voltage variations, such as momentary interruptions, sags, and transients. With electric motors, it is vital to assess their condition to plan repair or replacement before actual failure. Portable instruments make it easier to perform the monitoring and analysis techniques that help ensure efficient operation.

Today it is possible to gather, store, recall, and analyze the data needed to perform predictive maintenance because of the portable instruments that make motor monitoring easier. Resistance to ground testing, surge comparison testing, high potential testing, motor current balance testing, partial discharge monitoring, motor circuit analysis, motor current signature analysis, motor power or electrical signature analysis, motor flux analysis, and motor normalizing temperature analysis are some of the major techniques involved.

Reliability is reason for program

A recent motor diagnostic and motor health study found that the primary driver behind a company's developing a motor diagnostic program was reliability (cited by 70 percent of respondents) with production at 16 percent. Other drivers were troubleshooting (7 percent), energy (3 percent), and other reasons (4 percent).

The study was sponsored by ReliabilityWeb.com, BJM Corp., and SUCCESS by DESIGN Publishing.

It also found that users prefer instruments that are easy to use, handheld, accurate, and with a short learning curve.

Among the suggestions respondents offered to companies beginning a motor program were:
- Do pre-planning and equipment selection based on company needs.
- Get buy-in from upper management; it is essential.
- Stay with the program.
- Purchase equipment intelligent and simple enough to avoid the need for a dedicated operator.
- Start with a few critical motors, then expand the program.
- Know that initial training is required, but follow-up training 6-12 months later is advisable also.
- Do not rely on just one test method; use all available methods before making a call.

Using motor diagnostics technologies will save money for a company. Howard Penrose of BJM Corp. offered a hypothetical example of a plant with a motor management program that has 100 critical motors. Based on numerous studies, at least 14 of those motors will have mechanical/electrical problems and eight of those will have electrical issues. Assuming only three motors fail in one year, with the average cost of downtime $10,000/hr (and counting only an average 3 hours for coupling/uncoupling and no other costs for troubleshooting, moving, transportation, etc.), the minimum savings would be $90,000/yr by detecting a problem through motor diagnostics and correcting it during planned downtime. **MT**

Questions to Consider Prior to Making a Motor Diagnostic Equipment Purchase

- What are the training requirements? How much time will have to be invested in learning the equipment and software?

- What is the setup time per motor?

- What are the annual costs? Is there an annual maintenance fee associated with the equipment? What are calibration and repair costs associated with the equipment?

- Are there technical support fees? What is the technical/motor system background of the technical support staff (D&B ratings can be very helpful here)?

- Are there fees for software updates? What are the associated costs? Will the software maintain equipment history from previous versions?

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• How much information does the equipment require to perform an analysis? Motor nameplate? Number of rotor bars and stator slots? Load information? Operating speed? No information required? How easy is the information to obtain?

• How long does it take to complete a test? Is the data analysis automated? Are the diagnostic rules straightforward and applicable?

• Does the equipment require a constant load during testing? What load? How long must this level be maintained?

• Can the test be performed from a distance (i.e., motor control center or disconnect)? Will it detect cable and other circuit problems?

• If a suspicious unbalance is detected, does it require rotor testing or more extensive time testing to confirm if a fault exists?

• Will the equipment operate successfully in the plant electrical environment? Will it allow frequencies other than 50/60 Hz systems to be tested without compromising fault detection?