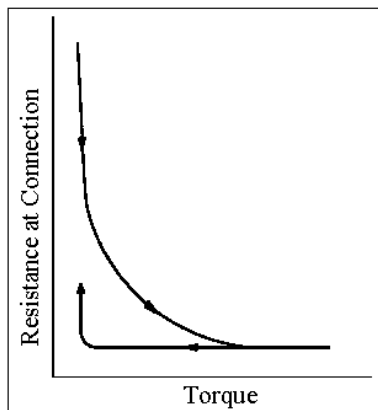


The hot one is not always the culprit

Fifteen years ago when a plant wanted to perform preventive maintenance on their electrical connections, there was only one choice - retorquing. This usually took place during a summer shutdown and required the utility to turn off the power to the plant. This was a good practice but it ate into the valuable summer shutdown when other projects, such as installation of new equipment, were scheduled. Although infrared imagers were available at that time, they were very bulky, costly and sometimes required liquid nitrogen to cool the infrared sensors. Now plants have a choice, they can retorque connections or they can perform an infrared inspection. We believe there is a strong case for infrared surveys and a strong case against retorquing.



1. **Retorquing causes distortion of the bolt and nut threads and may not improve the connections.** The graph at the right was taken from EC&M Magazine*. The graph shows that, as a connection is tightened, the resistance decreases until it reaches its minimum value. At the tightness or torque of the bolt relaxes over time the connection's resistance does not immediately increase. It actually stays at the original level until the torque has relaxed by quite a bit. This is because the metals in a properly tightened connection actually bond to each other on the molecular level. Retorquing a slightly loosened connection will not improve the connection. Furthermore, retorquing presents the danger of damaging the threads, especially if a torque wrench is not used to retighten the connections. This will increase problems in the future.

2. **Infrared will find more problems.** With retorquing you usually had time to only retorque the major connections. With an infrared inspection you can look at all the connections in the plant and in a much shorter time than it would take to retorque. In TechNote 5 we show a bad control connection, which was causing production problems, that was caught with infrared. Retorquing would never have caught this problem.
3. **Infrared is more convenient and less costly.** An infrared inspection does not require the equipment to be shut down. In fact, the equipment needs to be running at normal load. There is no interference with production. It finds the problem areas and then the maintenance personnel can address only those connections showing signs of high resistance and not all the connections. Infrared surveys are an ideal predictive/preventive maintenance practice.

*Norman Shackman, P.E., "Guide to proper busbar connections", EC&M, August, 1989.

