

Energized Motor Testing Reveals Improper VFD Settings

Authors: Ettore Di Pasquale, Field Engineer partner of EasyTool, and Richard Scott, General Manager, ALL-TEST Pro, LLC.

The Company

Easy Tool is an Italian Condition Monitoring Solutions Provider with service and support representatives in Italy. Easy Tool, located in the town of Fabriano, in the province of Ancona, represents ALL-TEST Pro condition monitoring instruments and performs regular condition monitoring services for a local business that gravure prints food packaging materials. This gravure printing is a type of 'intaglio' process that uses specialized printing presses to engrave designs into plastic food packaging materials.

This food packaging printing company has a condition monitoring professional from SPM Instrument Italy come on-site to their facility 3 times each year to test their equipment, trend data, and support their reliability program. In November 2015, Ettore Di Pasquale, *Field Engineer*, was performing a dynamic test on a 55-kilowatt, 400-volt motor at the food packaging printing facility when he discovered an abnormal current waveform.

The Application

This 55-kilowatt, 400-volt motor is controlled by a variable frequency drive (VFD). This motor drives the centrifugal fan that sends air into a natural gas combustion burner. The gas burner, which needs the fan for the proper combustion air dosage, is required by the steam generator to create heat for the drying section of the printing machine. The heat generated dries the ink on the plastic packaging.



The Discovery

Di Pasquale had connected the ALL-TEST PRO On-Line II™ energized motor testing instrument to the electrical panel in order to conduct the condition monitoring tests at a safe distance from the operating motor. He quickly discovered there was an abnormal current waveform (*see Figure 1*).

“While there was no visible cause for alarm, the motor testing showed evidence of strong load fluctuations,” explains Di Pasquale. “Load fluctuations can occur when a VFD asks a motor to

continuously change speed, even when a change in speed is not really required for the motor to perform its intended function.”

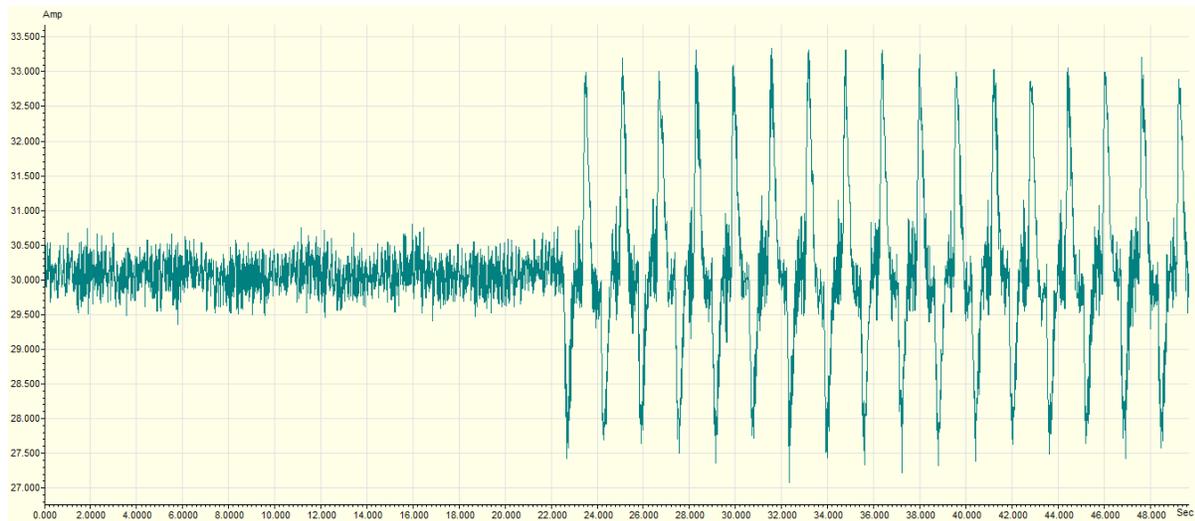


Figure 1. Results of initial test show the current waveform. There is evidence of strong load fluctuations (peak 6 amps at 20% of the total load). These fluctuations were determined to be caused by improper configuration of the VFD controller and it's PID.

Di Pasquale discussed the issue with the managers at the food packaging printing plant. He explained that when a VFD asks a motor to continuously change speed, that this activity can put a lot of stress on the motor mechanics and the motor windings. If the VFD continued to vary the motor speed in this way, over time the motor could have eventually exhibited rotor problems or winding failure.

The Solution

To prevent motor failure, Di Pasquale suggested the VFD be checked. Trusting Di Pasquale's recommendation, the maintenance managers at the food packaging printing plant contacted the VFD supplier. The VFD supplier went on-site to re-program the VFD, adjusting it to correctly drive the motor.

A Second Round of Energized Motor Testing

After the VFD supplier re-programmed the VFD, Di Pasquale went back to the food packaging printing facility to perform a follow-up energized motor test. He wanted to make sure there were no more load fluctuations or abnormal waveforms. He again brought the ATPOL II™ to confirm that the problem had been corrected.

The second round of energized motor testing with the ATPOL II™ showed the load performance had been greatly improved after the VFD reconfiguration / PID correction (see *Figure 2*). Testing proved the VFD supplier correctly re-programmed the VFD to drive the motor.

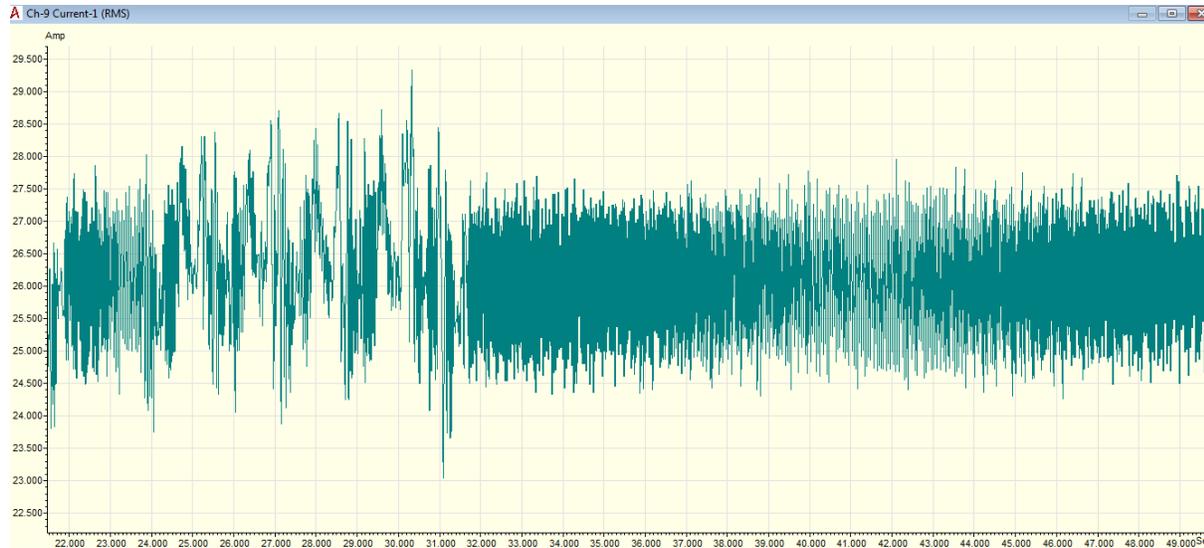
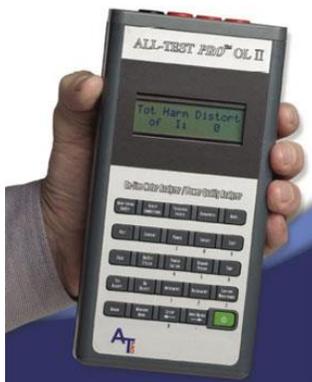


Figure 2. Energized motor testing with the ATPOL II™ shows the load performance is greatly improved after the VFD reconfiguration / PID correction.

Lessons Learned

1. Variable frequency drives need to be set correctly. Improper programming of VFDs can reduce motor life through incorrect operation over time.
2. Consistent condition monitoring is critical for preventing equipment failure. This food packaging printing facility essentially prevented motor failure by having their highly-skilled condition monitoring technicians perform regular tests and look for 'red flags' indicative of problems.



3. There are easy-to-use portable instruments, like the ALL-TEST PRO On-Line II™ energized motor testing instrument, that can help you check the health of your motors. The ATPOL II™ is an invaluable monitoring and diagnostic tool that can help you see what is really going on with your equipment. Make sure you have the proper tools to support your condition monitoring program.

[Watch this video](#) to learn how motor testing can save you time, money, and headaches, or visit www.alltestpro.com for more information.

About ALL-TEST Pro LLC

Since 1985, ALL-TEST Pro, LLC has provided industry with the most advanced predictive maintenance testing and troubleshooting tools for AC and DC motors, coils, windings, transformers, generators and more to a wide range of industries worldwide. With a full line of testing instruments, software, accessories and training programs, ALL-TEST Pro has the tools you need to perform advanced non-destructive motor testing and analysis for both de-energized motor circuit analysis and energized electrical signature and power analysis. The extensive capabilities of the instruments, coupled with dependable post-sale training and technical support, ensure improved productivity, reduced downtime and a rapid return on investment.

About Easy Tool

Easy Tool distributor of ALL-TEST Pro, LLC for the Italian territory provides technical service, support, and training in condition monitoring practices and offers a wide product range, from high-tech portable instruments to online systems and a comprehensive condition monitoring software. To learn more, contact info@easytool.it