400 Hz Monitoring – Aviation Applications

INTRODUCTION

Most of the world distributes power at 50 Hz or 60 Hz. However, there are certain specialized applications that distribute power at other frequencies.
Applications such as aviation, naval, and others distribute power at 400 Hz to improve system efficiencies. 400 Hz applications can be a challenge for the end user since most products only measure at 50 and 60 Hz. Many users think that all AC applications are the same and do not consider the fundamental frequency of the power system, assuming their instrument can handle this application, but few actually can. A misapplication of a 50/60 Hz instrument in a 400 Hz application will most likely result in inaccurate measurements, inconsistent instrument behavior, and loss of time and money as a result of surveys that do not collect useful data.
400 Hz measurements require some enhancements to hardware and instrument firmware to accommodate the 400 Hz fundamental frequency and its associated measurement and synchronization requirements.

INSTRUMENTATION

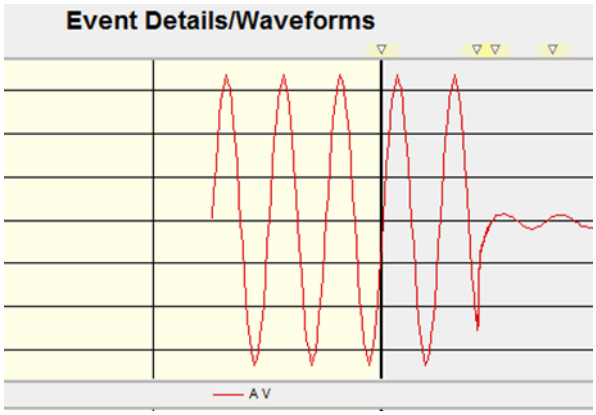
GOSSEN METRAWATT is one of the few Power Quality instrumentation manufacturers that offers products for 400 Hz applications. The MAVOWATT 270-400, and its predecessor, the MAVOWATT 70-400 fully function at 400 Hz, as well as the traditional 50 Hz and 60 Hz ranges.

The 400 Hz versions of these advanced power quality, demand, and energy instruments offer the same powerful feature set as the traditional versions, but add 400 Hz capabilities. They can meet virtually every application by accurately measuring traditional 50/60 Hz, 400 Hz circuits and DC systems. All of the MAVOWATT 270 and the MAVOWATT 70 capabilities are available in their respective 400 Hz versions, including high speed transient measurements.

AVIATION APPLICATION

400 Hz power systems have the same concerns as traditional 50/60 Hz systems, yet many users don't know that an advanced tool is available to help them. Power quality, demand, and energy are important in any application, regardless of the power frequency. With the GOSSEN METRAWATT 400 Hz capable products, users can apply industry leading GOSSEN METRAWATT monitoring technology to these more specialized applications. As an example, aviation power distribution reliability can involve three main components: the aircraft, jetway, and ground equipment/power. Any link in this chain that doesn't perform to expectations can cause failures that may result in delays, lost productivity, and lost revenues. Therefore, it is important to have the tools available to quickly resolve any problems to reduce the economic impact of interruptions in service. The MAVOWATT 270-400 is an indispensable tool for not only troubleshooting problems, but when applied proactively, problems can be avoided altogether by understanding the dynamics of the power distribution system.

As an example, the figure below shows a voltage sag displayed in our Dran-View 7 software that was recorded measuring the 400 Hz aircraft supply from a jetway at a major east coast airport.



Aviation power distribution can also go beyond 400 Hz as aircraft power systems can distribute power at 50/60 Hz, 28 V DC, and other levels. Whether the application is troubleshooting onboard the aircraft or ground based equipment, it's important to have the ability to measure the entire electrical environment without compromises. The MAVOWATT 270-400 has such capabilities, all in one easy-to-use instrument.

GATE POWER DEMAND AND ENERGY APPLICATION

An interesting new application is aircraft support energy surveys. In many cases, airport gates are rented or leased to airlines. The cost of the energy consumed by an airplane while parked at the gate is intended to be included in the fees charged to the airlines. However, in many cases, owners estimate energy usage and do not measure actual aircraft consumption for the purposes of adjusting fees accordingly. A Boeing 777 consumes more electricity than a regional jet, and owners need to make sure contracts and pricing are based upon actual usage and not estimates. The MAVOWATT 270-400 demand and energy monitoring capabilities can be used by airport authorities, ground maintenance teams, and airlines to easily conduct power consumption surveys to measure actual usage, making the information readily available to adjust billing/contracts accordingly. Such surveys can range from short term spot checks to long duration monitoring surveys.

BAGGAGE CONVEYOR ENERGY EFFICIENCY APPLICATION

A major US airline planned to retrofit a portion of their baggage handling system at their Texas hub to include energy efficient 60 Hz drives. The airline wanted to prove the effectiveness of this upgrade and to verify that the actual energy savings met those advertised by the supplier. They wanted a power monitoring tool to measure energy consumption before and after the upgrade that could also be their 'go to' tool for many other applications, including 400 Hz aircraft power applications, facility and terminal power quality, demand, and energy monitoring applications.

The airline chose GOSSEN METRAWATT, with the first application being to benchmark the energy consumption before the retrofit of the baggage handling system. After the retrofit, they did a comparable survey that positively verified that energy savings were as expected and met the supplier's claims.

CONCLUSION

Aviation power systems have the same power quality, demand, and energy concerns as traditional 50/60 Hz systems. However, due to the various power distribution methods (400 Hz, 50/60 Hz, DC), specialized instrumentation is required to accurately measure in this environment. The MAVOWATT 270-400 was specifically designed for such applications, yet retains traditional 50/60 Hz capabilities, making it an indispensable tool for use in any power system in any airport or aircraft environment.

MAVOWATT 270-400 Aviation Applications

- **Power quality troubleshooting**
- **Real-time 50/60 or 400 Hz monitoring**
- **Power system performance testing**
- **Preventive or just-in-time maintenance**
- **Testing of AC/DC systems**
- **Power consumption, billing and allocation**
- **Compliance with Mil std 1399 testing**

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