

## The Cost of Poor Power Quality

The pulp and paper industry consist of companies that use wood as raw material and produce pulp, paper, paperboard, and other cellulose-based products. In 2014, the global production of paper and cardboard was approximately 407 million metric tons, with half of this production attributed to packaging paper, and approximately one-third attributed to graphic paper. Today, the paper industry is a billion-dollar industry that is an economic powerhouse for many nations.

***The top 10 producing pulp and paper countries in the world are: China, United States and Japan (that accounts for over half of the world's production), followed by Germany, Korea, Brazil, Finland, Canada, Sweden, Italy. The largest reported producers in the world include such companies as: International Paper (US), Georgia-Pacific (US), Weyerhaeuser (US), Stora Enso (Finland), Kimberly Clark (US), UPM (Finland), Svenska Cellulosa Aktiebolaget (SCA) (Sweden), Oji Paper (Japan), Nippin-Unipac Holding (Japan), and Proctor and Gamble (US).***

(Source: Pulpandpaper-technology.com)

Although the reported energy consumed from the production of paper has declined since 1965, producing one ton of paper still consumed nearly 3000 kilowatt hours of energy in 2015.

(Source: Statista). It is not uncommon to find that energy represents over 10 percent of the total cost of shipped products in the pulp and paper industry. According to PWC, the average return on capital employed by the top 100 companies in this sector averaged 3.5% in 2015.

(Source: pwc.com). So, efforts to assist those same companies reduce costs and improve efficiency in areas of highest impact such as energy and power quality are welcomed.

Companies in the pulp and paper industry report an average of 6-8 costly disruptions per year in each production facility, with an average Total Downtime Cost (TDC) of \$100K - \$500K per hour of production downtime. And industry experts estimate 30-70 percent of disruptions are caused by poor power quality. Many experts estimate downtime can be reduced by 20 percent for those companies that choose to focus comprehensively on power quality and put in place programs to address the complex issues in power quality. (Source: Rockwell Automation).

Yet, today, the majority of paper and pulp manufacturers do not measure, monitor and manage power quality in real-time affording these same operators' substantial opportunity for comparative advantage to improve maintenance and operational efficiency, much less predict and prevent costlier production failures from occurring in the first place. The economic costs of disruption - coupled with these statistics - further substantiate our proven case study results.

***Demonstrating that pulp and paper operators stand to benefit greatly by putting in place power quality programs and solutions across their enterprise.***

Poor power quality can result in product scrap, product rework, damage to machinery and tooling, quality concerns, bottlenecks, and production delays – all with substantial cost. Additionally, limited plant resources are often caught scrambling to react, analyze and remedy a host of very complex problems without often knowing the root cause driving the failure, or how to quickly resolve the production failure quickly, further exacerbating the problem. The pain can be rather high when unplanned and often complex downtime occurs.

Voltage sags can create tremendous harm to plant equipment, including drives, servo drives and PLCs to name a few. Causes of voltage events experienced in the facility can be attributed to faults experienced on the utility system itself (ex: lightning, animal/tree contact, cable failures, dig disruptions, fuse and breaker faults, or general equipment failures, to name a few). The most common external cause of power events is weather – lightning, ice storms and snow, for example. In fact, the highest average flash density rates of disturbance experienced have been reported across the south, southeast and Midwest, respectively. Based on data supplied by the Edison Electric Institute, the largest causes of power outages in the US are caused mostly by weather events, followed by equipment failures, that together, account for nearly 80 percent of events.

Voltage sags, typically only lasting approximately 4460 milliseconds in duration, can also be caused by events inside of the facility, such as by the starting and stopping of large motors and loads, poor connections and grounding, or by the equipment within the same facility. If repeated, these short duration sags and hits, often exceeding 20-30 times the rating for the power devices, can cause power supplies, drives, and PLCs to fail. In fact, damage to power supplies, drives, UV lights, and other equipment within the pulp and paper facility are very likely caused by repeated and continued voltage sags. And, because voltage sags typically average

less than 4500 milliseconds, it's crucial to monitor, measure, and analyze power quality in real time, in order to capture the readings in order to analyze the true root cause of the disruption.

Experts agree that for those operators who choose to focus on comprehensively addressing power quality within the production environment, it is not uncommon to realize a 20 percent reduction in disruptions. Expect to see more focus on real-time power and energy management and analytics solutions in this exciting, and impactful space.

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*Pulp & Paper Industry Perspective: The Cost of Poor Power Quality*

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