

Focus on Power Quality – Reducing the Environmental and Health Cost of Scrap

Tire and rubber manufacturing combines both chemical and mechanical process that combine layers of compounds into rotational or belted products. The chemical compounding process must be maintained to ensure product delivery and reliability and the consistent, reliable and efficient source and use of high-quality power is critical in the production process.

When power quality is compromised, core processes can also be compromised leading to higher degrees of scrap, lower quality products and costly production disruptions. In fact, the average Total Downtime Cost (TDC) of production downtime in the rubber industry is estimated at \$150K-\$500K per hour of downtime, and it is not uncommon for companies in this sector to report an average of 6-8 events per year. Scrap creates an added cost in the tire and rubber manufacturing industry, due to the potential environmental and health-related impact of rubber disposal. Fortunately, the world market leaders in this space such as Bridgestone (Japan), Michelin (France), Goodyear (US), Continental (Germany), and Sumitomo Rubber Industries (Japan), as well as many others in the industry continue to focus on both the environmental and health-related costs of scrap.

So, we must ask ourselves a key question. What can we do to impact the reduction of the root causes of production disruptions that create scrap that then creates the potential negative impact to our environment and health? In other words, how can we delve deeper into the problem to create great impact?

Jidoka, one of the two pillars of the Toyota Production System, along with just-in-time (JIT), highlights the causes of problems because work stops immediately when a problem first occurs. Focusing to identify the root cause of problems leads to improvements in the processes that build in quality and reduce defects. Jidoka then teaches us to identify the sources of poor power quality that cause 30-70 percent of production disruptions (Source: Rockwell Automation). Jidoka is built on the premise that once the root cause of poor power quality is identified, we can then take remedial actions that will result in greater efficiencies, prolonged asset life, and reductions in production downtime.

This approach sounds very logical. Yet, only approximately 15 percent of manufacturers today are monitoring power quality (PQ) in real-time – wasting then opportunity for improvement in a very critical area, but if addressed holistically can result in substantial impact. Many experts estimate costly production downtime can be reduced by 20 percent for those companies who choose to comprehensively focus on power quality. So, tremendous opportunity exists for those manufacturers who choose to focus on PQ, with added advantage for continuous improvement, or kaizen.

Production disruptions in tire and rubber manufacturing can be caused by any number of factors. For example, if during the tensioning, layering or wrapping process the compound is compromised, production may need to stop completely – possibly putting in jeopardy the integrity of the product. Scrapped productions must then be discarded leading to other regulatory and environmental costs and concerns added to other financial, operational and perhaps reputation risks and costs.

Voltage sags have a tremendous impact to almost all manufacturing facilities. Tire and rubber plants typically use a large number of mid-horsepower drives, and many plants use a growing number of variable frequency drives (VFDs) on the plant floor. These drives create non-linear loads that often create higher degrees of harmonics, and degradations in power quality. These drives are also impacted by voltage sags and current surges. Mechanical bearing systems used throughout the winding process can also be severely impacted by voltage sags. Of course, other machines and processes used throughout the industry are impacted by poor power quality, in addition to the examples cited above.

Manufacturing is faced with reductions in technical staff and a shortage of people who are able to solve complex power quality, production and advanced automation problems. Most manufacturing companies agree that a collaborative approach is necessary – and involvement with customers, OEM partners, and nimble focused systems and solutions providers is critical – as together these groups offer the expertise, knowledge of operations, cultures and technologies crucial to delivering solutions.

One of the most exciting, and impactful areas we can add large value to manufacturing is in the area of focusing on efficiency of the most basic, and critical, raw materials in the production process. Tire and rubber manufacturing consume a large amount of energy, and in order to deliver quality products competitively must have a reliable, consistent, low cost source of energy. Assessing, monitoring, analyzing, managing and modifying power quality in real time is

a clear example of Jidoku. Case studies have proven, and will continue to prove, that a comprehensive approach to power quality makes sense economically. Additionally, in the case of the case of tire and rubber. A focus on power quality has proven to reduce production downtime which will lead to a reduction in scrap – with a resulting positive impact to our environment.

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Tire & Rubber Manufacturing Perspective:

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