The grand light display of the Chicago World’s Fair was a wonder when first seen in 1893. Tesla’s vision to light the entire World’s Fair with more than 100,000 incandescent light bulbs came true at a time when electrical power was in its infancy. The spectacle was nothing less than amazing to the people of the late 19th century. As the public walked the halls of the exposition, they imagined the electrified world to come with optimism and concern.

We find that same trend of innovation today in the energy production market, as innovation continues to push the boundaries of traditional power production. Electrical equipment has become smarter and more autonomous, and is expected to perform advanced functions as distributed energy and alternate energies grow in popularity.

Think back to the first time you used the Internet and realized the vast amount of information available through this connection. The possibilities were great, but once you found out about the ability to access all kinds of information online - were you also somewhat concerned? As we look into the future, we see our homes and lives connected to the internet more than ever before – and while these connections create opportunity, they also create risk for potential damage. In much the same way, risks are introduced to electrical power systems as they become more connected. Hence, safety and reliability remain the concern for these new areas of power generation. Considering these examples from different decades and industries, we can see that the concern for the safety of property and human life persist through time and application.

As William Henry Merrill walked the Chicago World’s Fair in 1893, he contemplated the dangers of electricity and the need to ensure the safety of the public and their interests. He was aware of the hazards of electricity, as demonstrated by Edison and Tesla who battled over whether DC or AC power would dominate the power industry. Mr. Merrill was also aware of the rise in building fires, with many being attributed to the increase of electricity use. Having witnessed many deaths and injuries, he was determined to keep the public safe from the dangers of electricity. He began his work with the major cause for electrical fires: a breakdown of insulation, especially on Edison light bulbs. Soon after conducting his first official tests of insulating materials, Mr. Merrill founded Underwriters Electrical Bureau, which in 1901 became Underwriters Laboratories Inc. (UL).

In 1903, the first UL Standard - The Standard for Tin Clad Fire Doors - was released. This standard addressed the increasing need to keep workplaces safe during the increased use of electricity and fires in factories around the U.S. As the need for electrical and fire safety grew, UL along with organizations such as the National Fire Protection Association (NFPA), developed additional standards and codes.

UL continued the development of safety standards through innovative test method development and research. As a proactive step towards safe roofing systems, they conducted research into the travel of flame over roof covering systems. In 1916 many roof covering systems on residences & commercial buildings were made of wood. This was an obvious hazard, especially in a populous city like Chicago. UL found this was an issue and began by applying burning discs to the roof covering systems in order to determine their resistance to ignition from the flaming particles landing on the roof. It was soon found that this was not enough, as many fires began inside the building, and then traveled to the roof as the flames exited the windows. Out of this research, the Steiner Tunnel was developed in 1922, with the original Steiner Tunnel design still being used to this day. The invention of this test equipment has been credited with saving millions of lives today.
In Latin America there is an increase in UL Standards used in countries with 120 V, 60 Hz grids such as Colombia and Ecuador. Along with the increase in UL Standards use, some countries are requiring letters of compliance and inspection type. On the African continent, there is also a large demand for local inspections on power generation systems.

We’ve found that certification may reduce the need for inspection in some countries, but some still require onsite inspection. From the adoption of standards in areas of modernization to meeting the needs of a changing power generation landscape, standards must adapt to the trends and needs of the market.

In addition to the trends and changes in standards acceptance, there are situations where a gap exists in currently available standards. One example of this is generator assembly certification for units bound for Canada, which currently requires certification of the alternator and controller units in order for a unit to be considered acceptable for installation. The consideration of the alternator and controller only leaves a gap in certification, as no consideration is given to the prime mover, enclosure, fuel system and other critical components of the system. This gap causes an issue where the local inspectors in Canada may require additional inspections in the field by a third party. In some cases this applies to units that were previously inspected and moved a short distance. This not only adds costs but also jeopardizes a smooth commissioning of the site.

In response to the feedback from manufacturers, distributors, local inspectors and code participants in the industry, Underwriters Laboratories of Canada (ULC) determined that a harmonized standard with the current U.S. standard for generator assemblies, UL 2200, was the best path forward. Currently ULC is forming a group of industry experts to create a bi-national standard for generator assemblies for installation in Canada and the U.S., UL/ULC 2200. This is an opportunity for the standards development organizations to create greater opportunity for generator manufacturers and distributors in North America. The goal is to include all fuel train requirements from the Technical Standards & Safety Authority, TSSA, of Canada. The group is also looking to harmonize requirements for medium voltage applications, light towers and road going units. The vision of a single harmonized standard will streamline certification and field acceptance while reducing overall costs for manufacturers and distributors. Being a part of the development group is an advantage to all involved.

Another example of a gap in requirements is NFPA 37 fire testing for Residential units closer than 5 feet from a dwelling. The five foot distance was put into place based on the known heat release and hazards of generators. The NFPA 37 document was revised to include a provision for placing generators closer to dwellings than the prescribed five feet. This is a step in the right direction. One concern is that the NFPA document does not describe the method for testing. This has caused confusion and acceptance issues in the field. Understanding the cost and time associated with the acceptance of the units, UL will be conducting research in 2016 in order to create such a test method and will publish it in UL 2200. The vision is to bring us one step closer to a harmonized and science-backed method.

Filling gaps in the certification standards is one way UL helps ensure that standards meet the needs of the global industry and of the public. We also look for areas where a standard does not meet the needs of changing technology. A good example of this is advancing functionality of generator controllers. This applies across the board, from residential units up to large power plant controllers. In addition, regulators are asking for more concise certifications for safety and functionality. In the industrial, com-
In commercial and residential realms, controllers are gaining advanced functionality such as paralleling, grid interconnection, short-circuit protection and branch circuit protection. Some may argue that these functions have been a part of controllers for some time now, but we see a shift in the acceptance of these as distributed generation grows.

Additionally, the industry asked for a solution beyond the industrial control standard, UL 508, which did not fully address the functionality of a controller. In response, UL developed a draft standard UL Subject 6200. The group working on this standard is hoping to simplify requirements for controllers from residential controls to AVR controls for utility scale generator systems. In addition to simplifying requirements, the standard will bring all requirements for generator controls into a single standard. Another goal of the group is to create a tiered certification scheme to meet the needs of the application. For instance, it may be suitable for the functionality of simple controls to be evaluated in the end use application while large control systems may require functional safety evaluation for critical applications.

We encourage you join the discussion or at least be a part of the discussion with the development group. There are many means of participating, which do not require a participant to be a formal part of the standards development panel. Additional information can be found on the ANSI website at www.ansi.org.

As the market evolves and new products and players enter, standards will continue to evolve. As long as people like Nikola Tesla and Thomas Edison continue to innovate, UL will be here to help ensure the safety and functionality of these product innovations. As seen in the time of Tesla, the public is hesitant to adopt products without proven safety records. As the power generation market evolves and touches more consumers, standards can help provide the assurance that the products they use will not harm them, their families or their property.

With this, UL asks you to join the discussion and participate in standards development. Standards bring additional value to your product. In fact, one manufacturer touted that “Certification was the best thing to happen to my company.” Being a part of the standards development can ensure that standards continue to raise the bar for safety and performance of products, creating advantages for companies, and industry in general. Participation in standards development not only takes products and markets to the next level but can also positively impact a business’ brand. It’s a great place to network and gather market information. UL looks forward to seeing you at a standards development event in the near future. To learn more about how to participate in the standards development process with UL, please visit www.ansi.org, csds.ul.com, or contact Jason Knedlhans at Jason.Knedl-hans@ul.com.

About the author:

Jason Knedlhans is the Business Development Manager for Generator Equipment at UL LLC. He joined UL in 2006 as an engineer on the Energy team. His passion for responsible power generation led to Jason holding a number of increasingly responsible positions at UL, including management of the Energy and Power Technologies division engineering team at UL’s headquarters in Northbrook, IL. Jason obtained his Electrical Engineering degree from the University of Wisconsin – Milwaukee. He began his journey as an Electrical Engineer at Harley-Davidson Motor Company, designing and testing the charging systems, concept design, and EMC testing and analysis. After his work at Harley-Davidson he moved to Underwriters Laboratories, now known as UL LLC.

Jason is currently focused on service and customer relations development for generator products, including portable generator units, traditional generators, gas turbines and controls for hydro and nuclear applications. Jason has also been extensively involved in other power generation products such as photovoltaic products and accessories, inverters and battery systems. He has trained global engineering personnel and laboratory technicians on a number of topics, including generators and photovoltaic safety and performance testing.