



MULTIMEDIA & APPLIANCES

INDUSTRY SPOTLIGHT

Smart toys

Traditional and new-generation toys go electronic

TECHNOLOGY FOCUS

Fuel cells

New power source for portable devices

Robotics

High demand for domestic and industrial robots

TECHNICAL COMMITTEE AFFAIRS

Systems approach

IEC to develop systems standards

IEC TC 105

Fuel cells

IEC FAMILY

The way ahead

Interview with IEC General Secretary and CEO





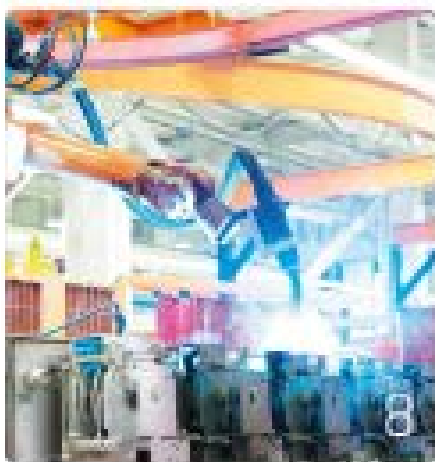
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Focus of the month Multimedia & appliances

This issue of *e-tech* focuses on technological evolution in multimedia and appliances from robots to portable fuel cell systems to charge mobile devices to QR codes. Smart devices, getting smarter and smarter, are bound to change the way we deal with our day-to-day environment. As technologies evolve, we will rely more and more on electronic assistance to perform even the most mundane tasks.

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Editorial

Smart getting smarter



Claire Marchand,
Managing Editor e-tech.

Electronic assistance at our service

The 2013 International CES (Consumer Electronics Show), held on 8-11 January 2013 in Las Vegas, Nevada, United States, lived up to its reputation, showcasing not only products that have just reached the marketplace, but also a wide range of technological innovations that may bring fundamental changes in our lives in the not so distant future.

Smart devices are getting smarter and smarter and are bound to change the way we deal with our day-to-day environment. As technologies evolve, we will rely more and more on electronic assistance to perform even the most mundane tasks. The driverless car, the sensor that helps you take care of your plants, the mobile application that monitors your heart beat and stress level, the ultra HD and OLED (Organic Light-Emitting Diode) TV are just a few examples of products that are expected to hit the stores pretty soon.

This issue of *e-tech* focuses on recent developments in FCs (fuel cells), including portable FCs used as an alternative to lithium-ion batteries to charge mobile devices. It looks at the new generation of electronic toys and provides an update on the technologies that are behind today's very sophisticated domestic and industrial robots.

The IEC, through several of its Technical Committees, has worked to prepare International Standards that lay out safety and performance requirements for those technologies.



Plant sensors...
(Photo: Parrot)



...and ultra HD TVs should hit the stores very soon (Photo: LG)

Fuel cells poised to power mobile devices

IEC work crucial to product development and safety

Rebecca Pool

While the ever-growing demand for more powerful mobile electronic devices is pushing the conventional Li-ion (lithium-ion) battery to its limits, the latest portable fuel cell systems promise to deliver a longer-lasting alternative. IEC International Standards have helped developers bring their products safely to the marketplace.

Operates much like a battery...

A fuel cell operates in much the same way as a battery: each technology contains an anode and a cathode separated by an electrolyte. However, a key difference exists.

While a battery contains all the requisite electrochemical reactants within a sealed unit, and needs recharging, the fuel cell is supplied externally with reactants. This means it will produce electricity as long as there is a constant fuel supply.

Fuel cells for consumer electronics

Fuel cells have long operated as standby electrical power supply units in remote locations, providing primary or backup power to systems such as telecommunications networks or any others that demand on-site DC (direct current) power supply. More recently, the technology has broken into the automotive market, generating electricity to power motors in a range of vehicles.

Fuel cell systems are now also making inroads into consumer electronics markets, most notably as external battery chargers. Several companies have recently unveiled portable charging systems that contain a micro-fuel cell and are set to rival Li-ion chargers.

They include myFC in Sweden, with its hydrogen-fuelled "PowerTrek" charger, and US-based Lilliputian Systems, which produces the butane-powered "Nectar" charger and power supply. Singapore-based Horizon Fuel Cells has developed the "MiniPak" charger and power extender and Aquafairy from Japan has launched the AF-M3000 power supply; both of these run on hydrogen.

These pocket-sized systems typically comprise a fuel cell stack, a fuel cell cartridge and control circuitry. When connected to a mobile device via a USB port, they provide 1W to 2W to either re-charge or power your mobile device. For example, Lilliputian's Nectar System promises to power any USB 2.0 compatible consumer electronics device for up to a month, providing around 10 charges.

Timing it right

So why are micro-fuel cell based mobile device chargers taking off now? The mobile consumer need for power is high on the list.

Some 10 years ago, the typical mobile phone could operate for around a week between charges. Today, your smartphone with its increased functionality, greater antenna power requirements and larger, power-hungry display may only operate for hours. Factor in the move to more advanced mobile networks rolling out at higher and higher frequencies and it's clear why conventional batteries are struggling to meet the growing energy demand.

Crucially, however, and following decades of development, many of the technologies necessary to enable the fuel cell power supply and charger have come to maturity. For example, materials developments have boosted electrode performance, resulting in fuel cells that can pack more power, while breakthroughs in systems integration have provided more compact products.

IEC International Standards – crucial for safety

As the technology has progressed, the implementation of IEC International



Tablet computer (Photo: Samsung)

Standards for micro-fuel cell power systems has also proven critical to product development. Alan Ludwiszewski, vice president of product development at Lilliputian Systems has been involved with establishing the safety standard IEC 62282-6-100, *Fuel cell technologies – Part 6-100: Micro fuel cell power systems – Safety*, from the outset, some 9 years ago.

He points out that the biggest challenge in developing micro fuel cell systems has been in ensuring the user can use them anywhere, including on aircraft. This has made the establishment of an independent standard, recognized by industry, safety experts and airline regulators alike, imperative.

IEC 62282-6-100 covers micro-fuel cell power systems, power units and fuel cartridges that are wearable or easily carried by hand, provide up to 60 V DC and do not exceed a power output of 240 VA. It establishes requirements for such products to provide a reasonable degree of safety for normal use, given reasonable likely misuse, as well as safety during transportation. Ludwiszewski adds: "This standard made sure we had a solid platform to design to".

Come fly with me!

Crucially, the standard outlines numerous key tests that any compliant product must satisfy. Vibration tests ensure a product is robust when handled by a consumer while pressure differential tests make sure a device is safe to fly in an aircraft.

There are also numerous environmental tests including high temperature exposure, temperature cycling and even long-term storage tests. "If you put these systems in a drawer for a period of time, you need to know they will be safe," says Ludwiszewski.

The tests' overriding concern is to ensure the fuel cell system will not leak fuel and harmful emissions are not released. For example, compressive loading or crush



Lilliputian Nectar Power FC mobile charger (Photo: nectarpower)

tests are included to ensure the device remains safe if dropped or stepped on.

Ludwiszewski comments that input from industry regulators led to amendments of draft standards. "For example the drop test was increased from 1m – as used for most electronics products – to 1,8m, to satisfy the aviation regulators that if, say, a charger fell from an overhead bin, it wouldn't create an unsafe situation."

He adds, "It has taken a number of years for the fuel cell industry to establish this IEC safety standard, get it published as an International Standard as well as work with the aviation regulators to prove the standard is robust enough to allow these products on aircraft. This took a lot of support from the IEC, without which I don't think the industry would have fuel cell approval on aircraft today."

But the safety standard hasn't just ensured the consumer can take his or her battery charger anywhere. According to Ludwiszewski, it has also reassured investors. "Everybody wanted to know that the new technology was safe, and this provided an independent assessment," he says. "The standard was heavily scrutinized by regulators and they did not accept it lightly."

Future possibilities

What is next in line for the micro-fuel cell? Industry analyst, Jonathan Wing, from



PowerTrek mobile phone FC charger (Photo: myFC)

UK-based Fuel Cell Today, now expects the portable fuel cell charger sector to flourish. "This is a lucrative market with quick profits to be made," he says.

Pointing out that myFC has valued the mobile phone travel charger segment at more than EUR 11 billion, he predicts unit shipments of portable fuel cell chargers in tens of thousands in 2012 alone.

The next step will be to integrate the micro-fuel cell directly into the mobile device, but this could take some time. While Toshiba unveiled a fuel cell powered laptop as early as 2006 and Fluid Computer Systems showcased its fuel cell tablet in 2011, neither met with commercial success.

As Wing surmises: "The consumer isn't ready for a bigger, heavier tablet with its own fuel system as opposed to the today's thinner lighter versions that you can still charge anywhere. [Integrated] fuel cells don't make a lot of sense right now."

Mass-market product by 2017

Just over a year ago, market intelligence business Pike Research predicted some 4,5 million micro- and small portable fuel cells would ship in 2017, representing a compound annual growth rate of 237% from 2011. And many in the industry, including

Ludwiszewski, believe the micro-fuel cell charger and power supply will kick-start the fuel cell's success in consumer electronics.

"This is a high volume application and will allow [manufacturers] to drive costs down", he says. "This will allow fuel cells to be a mass market product

for the first time, while the global IEC [safety] standard will allow us to set up international distribution. We're very excited."

Chores made easy

IEC International Standards help robots tidy up inside and outside the house

Following the introduction of the first electric vacuum cleaners in the early 20th century, a range of different appliances have helped deal with many household chores. However, all required a certain degree of direct human control until the first autonomous domestic vacuum cleaners were introduced at the turn of this century. Since then robotic appliances have improved and expanded the range of their activities significantly, both indoors and outdoors, thanks in great part to IEC International Standards.

From science fiction to actual applications

For decades science fiction literature and films helped shape the general perception of robots. Until fairly recently, for most people a robot in the domestic environment meant a machine with some human features that could stand upright, move around, communicate and carry out a variety of tasks. However, the complexity of designing and manufacturing such multipurpose android robots, not to mention their cost, meant they have remained confined to the domains of science fiction or research.

Some robotics designers and engineers saw the potential for developing cost-effective robots that could carry out a single set of tasks in the home environment. This led them to build small automated vacuum cleaners, the first of which, the Trilobite, was

launched by Electrolux in 2001, with other manufacturers following shortly after. These machines, along with robotic lawn mowers, were the first to usher in robots to the home environment.

Professional service robots, used mainly in the defence, farming, medical, retail and logistics sectors, are sold in much smaller numbers than their domestic service counterparts. However, these high-tech, much more expensive, systems make up the lion's share of turnover in the service robot industry.

IEC International Standards for robots

As there is more to cleaning floors than sweeping up dust, domestic robot manufacturers started developing other appliances based on similar design and principles to wash and polish various types of flooring.

Automated vacuum cleaners and their washing peers, like their traditional counterparts, must be able to clean in tight places and on different surfaces such as hard floors and carpets. In addition the former must be able to navigate their way independently in rooms cluttered with furniture and other obstacles. They must do so safely and without damaging their environment.

To ensure this is what happens, several IEC TCs (Technical Committees) and SCs (Subcommittees) prepare International Standards for systems and components used in robotic vacuum cleaners and cleaning appliances.

The safety of cleaning robots, like that of all household appliances, is essential. IEC TC 61: Safety of household and similar electrical appliances, has prepared an International Standard which covers the safety aspects of vacuum cleaning



Hybrid battery/solar-powered robotic lawn mower (Copyright: Husqvarna Group)

robots. IEC 60335-2-2, *Household and similar electrical appliances – Safety – Part 2-2: Particular requirements for vacuum cleaners and water-suction cleaning appliances*, stresses that it “also applies to (...) automatic battery-powered cleaners”.

Measuring the performance of cleaning appliances is important for manufacturers and consumers alike. SC 59F: Surface cleaning appliances, prepared the IEC 60312-1 and 60312-2 International Standards that define the methods for measuring the performance of dry vacuum cleaners and wet cleaning appliances.

SC 59F established WG (Work Group) 5: Methods of measuring the performance of household cleaning robots, to prepare specific standards for this type of appliance. It even went to the lengths of designing a standard room for testing cleaning robot mobility.

Hard labour outside too

Domestic tasks are not limited to indoor environments. While mowing the lawn, scrubbing swimming pools or cleaning gutters may be seasonal occupations, they are nonetheless time-consuming, tedious activities, with the potential to be unsafe. Several manufacturers have developed automated machines that can work outdoors to carry out these chores.

With reports that a quarter of lawn owners dislike cutting their lawns, the sale of robotic lawn mowers is booming. Spotting an opportunity, a number of garden appliance manufacturers began launching electric robotic mowers from the mid-1990s. The latest models incorporate a number of sensors that allow them to avoid obstacles such as trees and garden furniture, to recognize boundaries and even to stop operating and return to their charging dock if it starts to rain.

Robotic domestic mowers are niche products but their sale has literally exploded in Europe, in spite of their rather

hefty price. Sales were up 30% in 2012 on the previous year and are forecast to grow by as much as 20% a year over the next 5 years.

Robotic mowers are mature products that have evolved into professional areas such as golf course care or the weeding and edging of commercial sites.

Fewer outdoor jobs for you!

Another demanding outdoor chore on which robots are making an impact is pool cleaning. Robots that can scrub and remove dirt from pool surfaces, allowing owners to save on chemical and energy costs, have been introduced by several manufacturers and are proving increasingly popular. The use of electrical appliances near swimming pools requires special measures. IEC 60364-7-702, prepared by TC 64: Electrical installations and protection against electric shock, sets out the distances at which permitted gear, such as pool cleaning robots, may be installed safely, as well as the characteristics of wiring and current-based equipment used in swimming pools.

A battery-operated gutter cleaning robot is the latest addition to the ranks of outdoor robots. It is designed to take over a potentially hazardous task as it allows users to position the ladder in one spot and let the remote-controlled robot remove leaves, dirt and sludge.

From domestic to social and health worker

An ageing population in industrialized countries is stretching the resources of medical and social services. Robots are seen as offering some useful solutions to a number of problems. In addition to domestic robots that are already helping deal with household chores, some manufacturers have started introducing multipurpose robots that can switch on and off lights remotely and control air conditioning units and other connected appliances via mobile phone apps. When equipped with intruder and smoke sensors they can warn owners of break-ins or fires at home, or act as an air purifier appliance when fitted with a filtration system.

The range of applications for personal service robots is unlimited and a growing number of appliance manufacturers sensing a huge commercial potential are entering the fray.

Robots for the elderly and for handicap assistance are sophisticated and costly products. The market is very different from that of household robots and is just starting up (a mere 156 units were sold in 2011), but the IFR (International Federation of Robotics) forecasts that sales of such robots will reach about 4 600 units for 2012-2015. An example of this type of robot is Toyota’s HSR (Human Support Robot). It is intended for



Robotic vacuum cleaner (Photo: Samsung)



iRobot Looj gutter cleaner (Photo: iRobot)

home use, to help out those with limited mobility by fetching things, opening curtains, and picking up objects that have fallen to the floor.

Managing large families

As an all-purpose domestic robot is unlikely to appear in the foreseeable future, households may face the emerging challenge of managing a number of different types of robotic appliances.

Colin Angle, the CEO and co-founder of iRobot, a pioneering manufacturer of service robots for the home, defence and public safety environments, envisages an environment in which 'human interface

robots' with voice recognition and a touch screen and able to navigate around the home will ultimately control smaller devices. "Having a robot for this and a robot for that is confusing," Angle says, adding that users would prefer to say, "I'd like my kitchen vacuumed, or my bathroom scrubbed today. Can you handle that?". And the human interface robot would reply, "Of course!" and ensure the appropriate robot would take care of the chores.

A growing market

The domestic service robot industry is a highly significant and fast-expanding economic sector. The IFR estimates that

1,7 million domestic robots of all types (vacuum cleaning, lawn-mowing, window cleaning and other types), were sold in 2011 (up nearly 19% on 2010) at a total cost of about USD 454 million. The IFR projects sales of almost 11 million units for the period 2012-2015, with an estimated value of USD 4,8 billion.

The expansion of this market, which is very important to the future of the world economy, is underpinned by countless International Standards prepared by many IEC TCs and SCs and covering many components and systems central to the proper and safe operation of service robots.

Robots: reshaping manufacturing

Industrial robots are redefining industry, products and working practices

Industrial robots have been around for over 50 years. The first one, an automated die-casting machine that took over hazardous tasks from workers, was installed at a General Motors plant in the US in 1961. Industrial robots have since become much more complex and are used in a variety of other industries throughout the world. A number of IEC TCs (Technical Committees) and SCs (Subcommittees) prepare International Standards for countless components and systems that are used in robots and are fundamental to their safe operation.

"Anything that is manufactured is manipulated"

Robots were initially met with scepticism by managers and distrust by workers when they were first introduced to US car plants in the early 1960s, but then were gradually adopted by a

number of industrialized countries to replace workers for repetitive and often hazardous tasks.

George C. Devol, the man credited with inventing the first industrial robot, gave an obvious reason for the introduction of robots in the industry: "Anything that is manufactured is manipulated. Every part is manipulated while it is made. Every part is manipulated while it is assembled. A part is manipulated when it is delivered from a plant. Everything is manipulated," he said in a 1983 interview.

In a logical move, robots graduated from their original assignments in die-casting and welding to lifting and moving car parts for assembly. Initially the US and Japanese car industries were the main outlets for industrial robots, accounting for around 40% of the total number used in the early 1980s. The potential of robots to carry out relatively simple tasks accurately, without interruption and

at a quick pace, led to their adoption in many other industrial sectors such as electronics, the food industry and handling some products.

Relentless march

Industrial robots gained in popularity rapidly as they allowed high productivity as well as accuracy and quality. According to the IFR (International Federation of Robotics), "total accumulated sales, measured since the introduction of industrial robots at the end of the 1960s, amounted to more than 2 310 000 units by the end of 2011". Including early robots which are no longer in service, the IFR estimates "that the total worldwide stock of operational industrial robots was at the end of 2011 in the range of 1 153 000 and 1 400 000 units".

In 2011, the sales of industrial robots increased by 38% to 166 028 units and the worldwide market value for robot systems (including the cost of software,

peripherals and system engineering) for that year was estimated at USD 25,5 billion. The systems therefore represent a major industrial sector, which has the added benefit of increasing industrial productivity.

Contrary to widely-held assumptions robots do not destroy but create many jobs both directly and indirectly, according to a Metra Martech report for the IFR. Examining the correlation between increased robotization and declining unemployment rates in 6 countries, the report states that robots carry out work in areas that would be unsafe for humans, that would not be economically viable in a high wage economy and that would be impossible for humans. Robotization should create between 700 000 and 1 million jobs in the countries concerned between 2011 and 2016, Metra Martech says.

More than a fixed one-armed machine

The first generation of industrial robots could best be described as one-armed manipulators that were installed in a permanent position and carried out simple tasks and routines. Safety represents a major issue; it is best to exclude human workers from the vicinity and to place robots into protected enclosures that cannot be entered by workers until the machines have been disabled, either actively or automatically (see *e-tech* article from Issue 02/2012).

However, advances in robotics have enabled new characteristics to be introduced to industrial robots. They include so-called "cooperative working": the skills of human workers are combined with the precision and force that robots can provide, allowing both to work side by side without compromising workers' safety. This, and the small-batch assembly that is characteristic of many small- and medium-sized enterprises, is now possible using the mechanism of "guiding and teaching by example" (rather than by inflexible and uneconomic programming) and major



Industrial robot at work (Photo: ABB)



Baxter, "the robot with common sense" (Photo: rethink robotics)

advances in various kinds of tactile (e.g. pressure), optical or proximity sensors.

IEC SC 47E: Discrete semiconductor devices, prepares the IEC 60747 series of International Standards for semiconductor devices, which cover many sensors and improve safety. Other TCs involved in the safe operation of industrial robots include TC 44: Safety of machinery – Electrotechnical aspects, TC 17: Switchgear and controlgear, working on safety and emergency stops and switches, and TC 79: Alarm and electronic security systems.

The powers that drive

Industrial robots may be powered by electric, pneumatic and hydraulic systems, according to the intended purpose. For instance, hydraulic machines are able to perform some heavier duty tasks. Electric robots are efficient and present benefits including easy and direct access to an energy source, using uniform and simple components and presenting no delay in transferring signals. Furthermore, they can move around when powered by batteries.

Pneumatic and hydraulic robots require another source of energy (electricity or hydrocarbons) to provide compressed air or move fluids through their components. Hydraulic fluids must be recycled and may pollute if they leak.

IEC TC 2: Rotating machinery, prepares International Standards for rotating electrical machines such as drives and motors used in industrial robots. International Standards prepared by TC 22: Power electronic systems and equipment, and its SCs, are also central to components used in robot drives and other systems.

Changing industrial landscape

As noted by the IFR, businesses are investing heavily in industrial robots. The benefits are obvious and the impact on the global industrial landscape and international trade will be significant.

Ever since their introduction, industrial robots have carried out difficult and hazardous tasks. While they will continue to be irreplaceable in this role, they are also able to:

- carry out work that would otherwise not be economically viable
- enhance manufacturing jobs by increasing productivity, flexibility and competitiveness
- improve process quality
- reduce operation costs and material waste
- improve quality of work for workers by carrying out repetitive tasks
- improve health and safety for workers
- reduce labour turnover and recruitment difficulties

In countries where labour costs are traditionally high, a benefit of introducing more industrial robots is inshoring: the repatriation to the local country of activities – and jobs – previously outsourced to low-wage countries.

The latter countries are also introducing industrial robots to improve product quality and move workers to other tasks. For example, in June 2011, Foxconn, a China-based company manufacturing computers and consumer electronics goods, decided to eliminate “monotonous, repetitive tasks” by replacing thousands of its workers with robots, each costing USD 20 000-25 000. Foxconn had installed 30 000 such robots by the end of 2012 and plans to have fully automated plants in 5-10 years.

All signs from the industry point to a healthy growth in years to come as traditional markets in North America, Europe and Asia increase or renew their assets and emerging industrialized countries equip their factories. IEC International Standards will contribute significantly to this global growth of the robotics industry.



Robotic cell-based solutions for spot welding (Photo: KUKA Systems)

Watt? No. Think lumen!

Finding the right light is not so clear

Domestic consumers, faced with the gradual phasing out of the incandescent light bulb that has lit their environment for well over a century, have some difficulty finding new energy-efficient bulbs that reproduce the same light and feeling. Their confusion is compounded by the wealth of information now given on lamp packaging. These days, finding the right bulb means looking at many different parameters.

Watt is it all about?

For decades, choosing a new or replacement light bulb has been easy: consumers would look at the wattage (the amount of energy required to light the bulb), and decide on the product that best met their need. Everyone knew what light would be given by a 60 or 100 watt bulb.

The mandatory replacement of incandescent bulbs by energy-efficient products, initially CFLs (compact fluorescent lamps), introduced confusion for consumers as, to begin with, producers often only gave the watt equivalent of the new bulbs. Furthermore, other factors such as colour temperature and colour rendering (which relates to the way objects appear under a given light source), added to the complexity involved in selecting the right bulb.

The situation is no clearer now that LED-based lamps are becoming more popular and increasing in efficiency all the time.

Shedding light on watts and lumens

Watts and lumens are different units of measurement: watts indicate the power needed to light the bulb and lumens the amount of visible light emitted by a source.

The value of the bulbs required may differ according to the lighting effect desired. The



To add to the confusion, equivalent values are different for LED bulbs (Photo: Philips)

Typical product	Lumens	Efficacy (lumens per watt)
3 watt CFL	125	41
3,5 watt LED	150	43
15 watt krypton	185	12
25 watt incandescent	210	8
Ambient lighting		
9 watt CFL	400	44
8 watt LED	450	56
40 watt incandescent	460	12
10 watt CFL	500	50
General room lighting		
12,5 watt LED	800	64
60 watt incandescent	890	15
15 watt CFL	900	60
12,5 watt LED downlight	1 000	80
75 watt incandescent	1 180	16
20 watt CFL	1 200	60
Suitable for reading		
100 watt incandescent	1 750	17
29 watt CFL	1 750	60

Source: EFI (Energy Federation Incorporated), USA

table on page 11 gives average ratings for incandescent, CFL and LED bulbs. Consumers should compare the different values and types of bulbs and their intended use before making a choice.

Perception matters

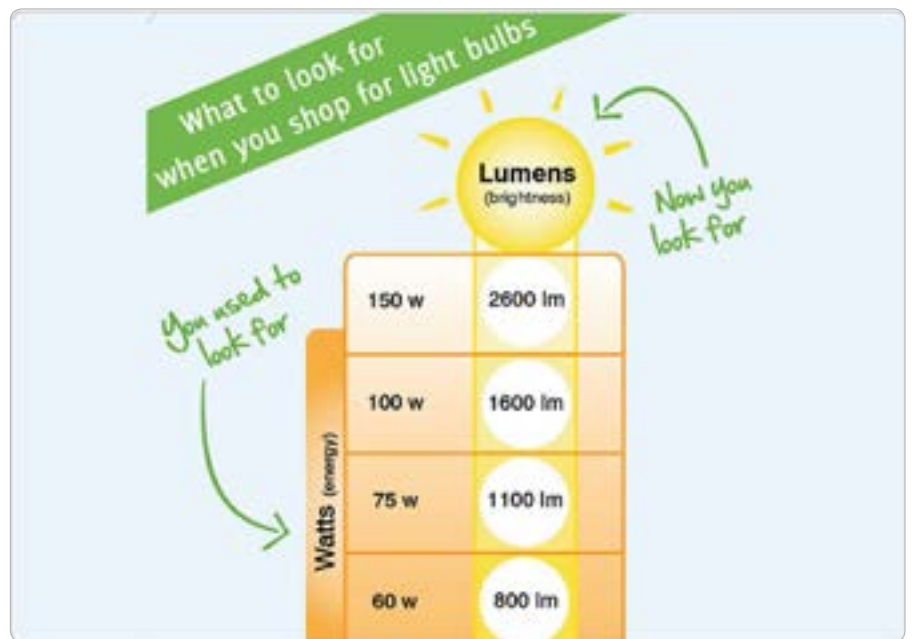
Consumers frequently complain that the new energy-efficient bulbs do not give the same “amount” of light as their incandescent equivalent. Actually it is not so much the amount of light emitted that differs, but that other factors affect users’ perception of light. People are accustomed to the light supplied by incandescent bulbs in homes and a switch to the new bulbs requires some adjustment. One important element is the colour temperature. Lamps radiate colours of different “temperature”. This is given in terms of the Kelvin (K), a unit of measurement for temperature defined by first IEC President Lord Kelvin, and named after him. In the colour temperature scale, the higher the temperature, the whiter the light. Light colours are divided into three or four groups that cover the following ranges:

- warm/soft white is usually perceived as homely and comfortable; it corresponds to colour temperatures under 3 300 K, and appears yellowish to reddish
- bright white, over 3 300 to 4 000 K
- cool white, 4 000 to 5 000 K. Bright and cool white are more suitable for working environments
- daylight white light corresponds to temperatures over 5 000 K and appears bluish

Incandescent bulbs fall into the first category; fluorescent tubes, CFLs, and LED lamps can be found in different colour temperatures ranging from warm to cool white. Another important factor in evaluating lamps is colour rendering, the ability of a light source to reproduce faithfully the colours of various objects under a reference light. The CRI (colour rendering index), also often described as colour “accuracy” on packaging, is the quantitative measure of that ability, with 100 representing the best possible



Manufacturers give the watt / lumen equivalents on packaging (Photo: GE)



Consumer and official websites provide charts to help consumers find the right product

accuracy. Incandescent bulbs have a CRI of 95-100, that of CFL and LED lights is lower: 80-85 and 80-90 respectively.

All these characteristics are important as they determine the kind of lamps suitable for a set environment. For instance, the wrong kind of light in a shop may make food look unappetizing.

Many factors other than lumens, colour temperature and CRI influence our perception of light in different

environments and make comparisons between different types of lamp difficult.

Consumers will need time and some research to find the bulbs that correspond to their environment, needs and taste. Proper labelling should help ease the task. That being said, the efficacy (lumens per watt) of LED modules keep improving and is expected to reach 160 lm/W in the next two years and forecasts to increase gradually to reach 180-220 lm/W eventually, requiring adjustments to the equivalence table in the future.

Toys in smart clothing

Smart moves boost sales of electronic toys

Peter Feuilherade

Electric and electronic toys form a small but growing part of the toys and games industry. They are defined as products designed specifically for children for the purpose of entertainment or education, and that require a power source (e.g. batteries or power cord) or to be connected to another powered product (e.g. TV or computer) to work. Several IEC TCs (Technical Committees) and their SCs (Subcommittees) prepare International Standards on the safety aspects of toys that use electricity in any form and on the transformers and batteries used with them.

Intelligent toys on the march

As well as electrically-powered and motorized toys, the sector also includes tablets and other 'educational' toys aimed at children as well as ones that work with mobile apps and devices such as iPhones. It excludes computer games and gaming consoles.

Many categories of toys, particularly traditional ones, are in decline because of the global recession. But interactive and 'intelligent' toys, accompanied by game applications for tablets and smartphones, are taking an increasing share of the market. Surging sales in these categories are helping maintain the whole industry's presence. Adults seeking games and toys to relieve increasing stress levels caused by modern life are adding to market growth. And companies such as global software developers are also investing in the lucrative market of intelligent toys, which are popular with computer-savvy youngsters and adults alike.

Reinventing traditional toys

As people of all ages adopt new types of media and virtual behaviour, traditional

toys such as puzzles and building blocks are being reinvented with integrated high-tech and/or digital components. Children go online at an earlier age, causing the boundaries between toys and electronic devices to become blurred. The main drivers of growth are toys featuring a high degree of innovation and superior technological features. Game applications for smart phones and tablets are increasing in popularity, especially in the "tween" (age 9-12) market. In the UK, one third of all children are online by the age of seven, and 97% by the age of 13. This trend can be observed in other countries too.

A typical seven-inch touch-screen tablet aimed at children is likely to be Wi-Fi enabled, with a built-in camera and microphone, USB connection and an SD card slot. Preloaded with music tracks, e-books, creative activities and dozens of apps including popular digital games, it will usually also include an MP3 player and video and photo viewers. Parents can synchronize tablets with a PC via a

USB cable, customize different levels of internet access and monitor which games and activities a child has been using from an activity log. Children's tablets cost from USD 100 upwards. Typically they use rechargeable LiPo (lithium polymer) or Li-ion (lithium ion) batteries.

International Standards for electronic displays, such as those used in touch-screen tablets are prepared by IEC TC 110: Electronic display devices. The MP3 audio-specific data compression format was designed by MPEG (Moving Picture Experts Group), which was founded by IEC and ISO (International Organization for Standardization) as part of ISO/IEC JTC1 (Joint Technical Committee): Information technology.

IEC TC 21: Secondary cells and batteries, prepares product standards for rechargeable batteries.

Learn as you play

Manufacturers are keen to stress the educational benefits of their toys and



Baja Beast remote-controlled toy car (Photo: Maisto)



Logitech® Extreme Action™ Controller for PlayStation®2

devices. They say that combining the latest technology with an offering of dozens of learning games, book apps and videos designed to enhance the curriculum helps children to personalize their learning experience while extending their skills across a range of vital subjects including spelling, maths, science, music and languages.

John Baulch, publisher of *Toy World* magazine in the UK, told *e-tech*: “Parents seem more than happy to invest in these items due to their high-play value and educational content. Kids love them too, because they are cool, fun and now they can have their own version of what their parents have, tailored to their tastes.”

Advanced multifunction handheld devices for children often include built-in auto picture rotation and gravity sensor controls to support motion-based games.

Applications can connect products that look and feel like traditional ‘stand-alone’ toys to digital devices like smart phones and tablets to enable children to interact between the digital and the real world. According to US market research company The NPD Group, in May 2012, mobile devices to which children had access contained an average of 12 apps; 88% of those apps were acquired for

free. Manufacturers use a combination of interactive programming (usually through free apps) and robotic engineering to allow customization and enable toys to develop a distinct ‘personality’ depending on the way they are played with. Toys interact with one another using infrared and Bluetooth technologies.

Sound and light show

Musical toys are just one category of toy that is highly focused on electronic products. They include not only enhanced sounds and flashing lights but other extras such as pre-recorded tunes, mixer functions and touchscreen technology.

As well as electronic versions of traditional board games and memory skill games, longer-established electric toys include model train and car racing sets, cars, boats and aircraft controlled by infrared remote control handsets, while the latest ‘flying toys’ can be flown indoors or outside, controlled by an iPhone, Android handset or tablet computer. There are also electric toys incorporating glow-in-the-dark elements, LED light-up effects and infra-red sensors and controllers. Kits that include light and touch sensors allow children to create various kinds of electronic circuit and build toy intruder alarms, water sensors or metal detectors.

Several IEC TCs prepare International Standards for the components such as LEDs and infrared, light or touch sensors that are integrated in these toys.

Market forecasts

The toy market is forever recreating itself as populations expand. Every generation of children demands new toys, whether these are traditional favourites in electronic ‘clothing’ or entirely new products.

Child-targeted electronic versions of adult technology are showing growth in more or less every major market, says UK analyst Steven Reece, who runs a toy and games industry blog.

In 2010, global toy sales of all kinds totalled USD 83,3 billion, up 4,7% year on year, with the Asian toy market notching up strong growth of 9,2% on average. In 2011 the United States remained the leading market for toys and games in general. Asia edged into second place, overtaking Europe.

The emerging economies of Asia-Pacific and Latin America are forecast to account for the bulk of growth of the global toy industry in the short term, fuelled by growing GDPs and an increasing shift towards a more Westernized lifestyle. China is the largest manufacturer of toy products, producing over 70% of the world’s total, while Japan remains the global leader in the video games market.

In 2011, toys for pre-school children (three to four-year-olds) and infants and featuring electronic components took impressive percentage shares by value in several markets: 40% in the UK, 45% in the US (pre-school), 52% in Russia (pre-school) and 43% in Japan.

IEC International Standards central to safety

The IEC’s involvement in the toy industry is not limited to the preparation of International Standards for components and systems that are used in toys and games, but also covers conformity and certification as well as safety issues.

IECEE (IEC System for Conformity testing and Certification of Electrotechnical Equipment and Components) plays an important role in the certification of electric toys – one of the 19 categories of electrical equipment covered by the system.

ISO/IEC Guide 50, published jointly by the IEC and ISO (International Organization for Standardization), sets out safety guidelines covering a wide range of equipment intended for use by children, including toys.

IEC 62115, *Electric toys – safety*, prepared by TC 61: Safety of household and similar electrical appliances, deals with the safety of toys intended for use by children under 14 years of age and with at least one function that is dependent on electricity. Products covered include construction and experimental sets, toys which replicate the functions of appliances used by adults (such as tablet computers), video toys and toys using electricity for

secondary functions, e.g. containing lasers or light-emitting diodes.

IEC 61558: *Safety of power transformers, power supplies, reactors and similar products*, prepared by TC 96: Transformers, reactors, power supply units, and combinations thereof, covers – among other things – the electrical, thermal and mechanical safety aspects of transformers for toys and power supplies incorporating transformers for toys. Protection against electric shock, overloads and short-circuits is a major consideration.

While one of the primary aims of these International Standards is to reduce risks to children, there are unavoidable risks that attach to the use of some toys. Batteries, for instance, can pose a serious health hazard if swallowed, and safety standards require that batteries in toys must be made inaccessible to young children. The IEC notes the vital role of



InnoTab@2S WiFi learning tablet (Photo: VTech)

parental responsibility in the selection of appropriate toys.

Through its International Standards and IECEE, its conformity testing and certification system, the IEC helps toy manufacturers produce toys and games that are safe for children and ensures the growth of an industry worth billions across the world.

Placing the barcodes higher

Late inventor's enduring invention started in the sand

Joseph Woodland, the inventor of the barcode, passed away aged 91 last December. Although Woodland and his associate Bernard Silver received a US patent for "Classifying Apparatus and Method" in 1952, it took until the mid-1970s for barcodes to start to be used in retail – and then only on a very small scale. A subcommittee of ISO/IEC JTC (Joint Technical Committee) 1, Information technology, prepares International Standards for the ubiquitous marking and all devices that use it.

Lines in the sand

In a 1999 interview with Smithsonian magazine Woodland recalled how he came across the idea of visually encoding



Joseph Woodland (1921-2012) co-inventor of the original barcode



Squaring the circle: today's 2D QR code is the direct descendant...

and representing product data whilst on a beach in the winter of 1948-49. "I poked my four fingers into the sand and for whatever reason – I didn't know – I pulled my hand toward me and drew four lines. I said: 'Golly! Now I have four lines, and they could be wide lines and narrow lines instead of [Morse code] dots and dashes'". Woodland added, "Only seconds later I took my four fingers — they were still in the sand — and I swept them around into a full circle." The pattern formed the basis of the 1952 design that received a US patent.

The initial code resembled a bull's eye and required a very large scanner. It remained unused for nearly two decades before being modified into a black and white rectangle by IBM engineers in the early

1970s. It was subsequently adopted as the industry standard in 1973.

No barcodes without International Standards

International Standards for bar coding are prepared by ISO/IEC JTC (Joint Technical Committee) 1, Information technology, SC (Subcommittee) 31, Automatic identification and data capture techniques, which was created in 1996.

The technology of bar coding is based on the recognition of patterns encoded in bars and spaces of defined dimensions. There are numerous methods of encoding information in bar code form, known as symbologies. The rules defining the translation of characters into bar and space patterns, and other essential features of each symbology, are known as the symbology specification.

As of February 2013, ISO/IEC JTC 1 SC 31 had published 103 International Standards. These cover the coding and also specifications for all equipment used to mark, identify or interpret the various types of barcodes, as well as the more recent QR (Quick Response) code and optical recognition characters.

Slow take-up leading to widespread use

Rectangular barcodes first appeared on grocery products in 1974 but the lack of

scanners meant a slow initial take-up. Once these were introduced on a large scale the benefits of barcodes became evident, translating into lower operating costs and increased sales. Barcodes sped up operations at the cash register and allowed sales and stocks to be monitored and managed.

Initially limited to retail, barcodes were rapidly adopted in many other sectors, such as logistics, air travel or healthcare.

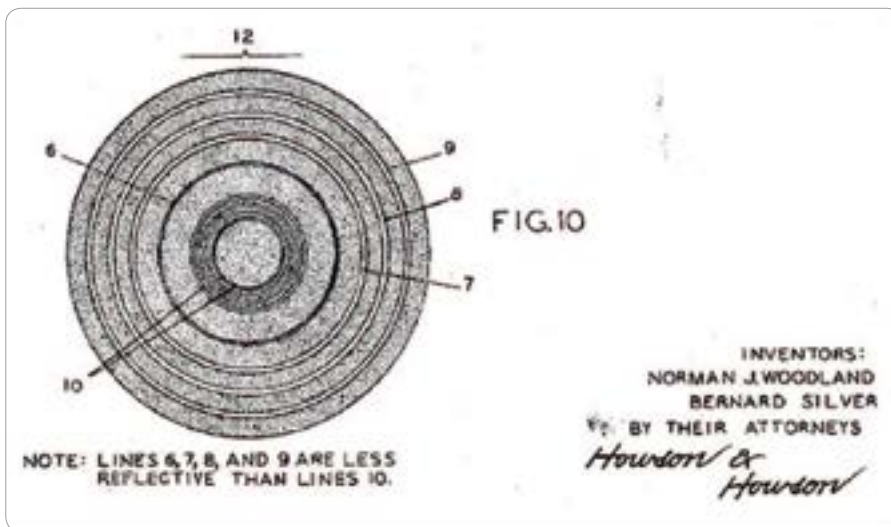
Barcodes are widely used in hospitals and maternity units. In the latter, babies get a personal bar code strapped onto their wrist or ankle. This can be scanned to read the newborn's details and name of the mother in a matter of seconds. Barcodes for babies or patients in hospitals also eliminate the chance of misreading poorly hand-written facts or figures in health notes, so reducing the risk of conditions and diseases going unnoticed.

In air travel, barcodes are used to match luggage and traveller and give precise and crucial indications regarding the overall weight of luggage on aircraft. In logistics and transport they ease identification and allow items to be dispatched rapidly to the right place.

Squaring the circle

What started as a circular pattern, and seemed for a long time to offer few interesting prospects, has found its way into many domains certainly not foreseen by Woodland. It also led to the creation, more than 50 years later, of the square QR code which can now be found on countless products and labels. QR codes can be scanned and read by mobile devices that convert them into information or open Internet links in browsers to direct users to articles, company websites or additional information.

Woodland's name will remain closely associated with the barcode, whatever shape it may take in the future, and ISO/IEC JTC 1 SC 31 will ensure the preparation of the relevant International Standards for barcodes and related equipment.



...of Woodland's circular design (drawing from his 1952 patent file)

System: more than the sum of its parts

Why system standards and conformity assessment need a different approach

A system by definition combines a number of different elements. Each of these elements by itself has a limited and defined function. However, when they are brought together in a system they are able to produce results that are more than the sum of each part and that could not be achieved outside the system. A systems perspective helps us understand how different elements influence each other or the system as a whole. With it, it is possible to determine whether an improvement in one area may adversely affect another area of a system.



The systems approach is increasingly used in IEC standardization and conformity assessment work

Not new, but increasingly applied

Systems thinking in itself is not new to the IEC. In select areas, both in standards development and conformity assessment, this methodology is regularly applied. What's new is that this approach is now increasingly being used to tackle a growing number of subjects in fields such as computing, engineering, information science, health, manufacturing, sustainable development and the environment, where it requires contribution from diverse technical disciplines. By providing a holistic view of the development effort, a systems approach helps "mould" all technical contributors into a unified team approach, forming a structured process, which can include design, production, operation, and possibly termination and disposal.

Converging technologies

In the past, most products and applications were developed as stand-alone devices. A fridge just cooled your veggies, a television allowed you to watch your favourite programme and your washing machine helped keep your clothes clean. Today, the refrigerator is connected to the Internet allowing you

to check its content remotely; it contains an integrated screen on which you can tweet or watch TV. You also may have a special agreement with your electricity provider that lets them remotely stop your washer/dryer during peak hours, when extra power is needed.

Increased efficiency...and complexity

Another good example of this whole-systems approach is the smart building. Here the use of intelligent software, sensors, energy generation and storage allows for controlled heating, lighting and cooling of a building, depending on its occupancy and use. Looking at the whole system is much more efficient in terms of energy use and conservation than the lighting, heating or cooling of a single room or apartment. It is the combination of all of these technologies that transforms a building into a safer, more reliable, more efficient and greener place. But an intelligent building may only be a tiny part of a smart city and the smart grid, which are infinitely more

intricate. Furthermore, some factors may not be foreseeable and require a risk management approach.

There are different ways of looking at systems and this in turn impacts on standardization work and conformity assessment.

What is a system, where does it start or end?

For an engineer a system may be the sum and interaction of many different elements, combining top-down and bottom-up points of view.

In this case, the question is where to draw the line, because often a component that is part of one system can also be viewed as a system made up of multiple components, and this can sometimes continue across several layers.

Following this logic a system would have to reach across several TCs (Technical Committees) to "deserve"

a system standard. For example an electricity transmission and distribution system would require a system standard because it comprises many different parts that are standardized in different TCs. However, a transformer, which is itself built from thousands of components, but also a part of the electricity transmission and distribution system, doesn't require a system standard. Here the work is done in a single TC that has liaisons with others, if needed.

In this scenario, conformity assessment and certification follows after standardization has been completed.

A systems approach guided by the need to manage risk

There are cases, where a technology requires a systems approach, for example in conformity assessment because investors, regulators or insurers need this to manage their risks. In this context standards will be useful and essential for certain aspects of the system but would not be able to cover everything in the life-cycle of the technology and its installation.

Such systems combine known elements, which can be standardized and unknown factors that need to be risk managed. Different projects and installations may not be sufficiently similar to be able to write a complete system standard to cover every aspect; in this case available technical and system standards would be just one element in the risk mitigation effort. It may therefore not be necessary to wait for all technical standards to be finalized before drafting the systems approach; technical standardization would not be the main driver.

Technical standardization: understanding the system and its components

In standardization, growing technological complexity and the merging of individual devices into increasingly complex systems means that it is no longer possible to solely focus on the individual parts of the system. There is a need to also take into account interactions and interdependence, and this requires an overarching understanding of the top-level structure as well as the many individual system elements. The development of systems standards

entails the coordinated and early participation of many experts from different technical areas. Over the past months the IEC has put in place many of the processes and structures that will allow it to develop these new types of International Standards.

Defining scope and boundaries for standardization

The IEC is creating SSGs (Systems Strategy Groups) that are tasked with pinpointing all stakeholders who are impacted by a given system. The aim is to define the scope and extent of a given activity, map and identify participants, and establish an overview of the timeframe and type of work that needs to be accomplished.

The SSG will define the overarching systems architecture, build road maps and trace the boundaries of the system. In this context it will need to define the breadth of the system, which normally will reach across several technologies and require the involvement of multiple TCs. The Group is also tasked with identifying standardization gaps and missing processes. Participation in an SSG is not limited to the normal IEC community; other interested parties may also be called upon to actively contribute.

Determining relevance and needs

In the process of setting up an SSG, the IEC community will clarify amongst other things:

- market relevance/need
- scope, activities and technology areas
- regulatory demands or other restrictions in different countries/regions
- required expertise and potential participants
- related work and information from other organizations/industries
- gaps in standards or other deliverables

The following areas have been identified as candidates for system



The IEC is studying ways of implementing a systems approach to certification in the field of wind...

standards in the near future:

- Smart Grid
- Renewable Energy integration into the grid
- Ambient Assisted Living
- Electrical installation systems
- Electro-mobility
- Electrical Energy Storage systems

Coordinating technical standardization work

Specialized STCs (Systems Technical Committees), sometimes born out of the SSG will build reference architectures, identify use cases, functionality, interfaces and system interactions. The STC will be very similar to a *normal* TC in structure and operation. Additionally, it will set high-level interfaces and functional requirements and collaborate with the product TCs to coordinate technical work. The aim is to achieve consensus on a work plan that is then followed by the STC and the relevant product TCs as active participants.

Finally, specialized system experts will guide the development of tools and software applications for systems standardization.

Conformity assessment of systems

Standardization work is just one side of the coin; the IEC is also heavily involved in putting in place the structures that will allow it to deliver conformity assessment services across systems. In addition to the systems approach that is applied in IECEx (as defined in the IECEx Rules of Procedure), active work is on-going in Energy Efficiency as well as for Wind and Marine energy generation.

Simplifying life for manufacturers

Today products and components need to be verified several times to enable manufacturers to declare that they can fit into a given system. Going forward, the aim is to find ways to allow manufacturers to use a single, modular approach to conformity assessment to accomplish the same result. To do so the IEC builds and expands on the

systems approach that is already in use, for example in IEC TC 31: Equipment for explosive atmospheres, which develops “intrinsically safe systems” that are deployed in instrumentation and communications.

Supporting the development of new technologies

System certification can however represent a particular set of challenges. For example, in CAB (Conformity Assessment Board) WG (Working Group) 15: Marine energy conformity assessment, only a few standards have been completed. Nevertheless, the deployment of marine energy can have potential environmental consequences that need to be understood, regulated and assured before marine energy technology is ready to be put in place. The WG is now studying ways of implementing a systems approach to certification and is viewing the issue from a risk management perspective.

Reassuring investors, insurers and regulators

Accessing the funding to support the development and commercialization of

marine energy systems can be complex; private investment is needed in parallel with government funding. A systems approach to standardization and certification helps reduce the technology and performance risks for private investors and provides reassurance to insurers and regulators.

WG 15 believes that technical standards will be useful and essential for certain areas of the system but they will never be able to cover all aspects of the life cycle of a project/ installation. By evaluating system interactions and risks early on, they feel they can develop a system certification that identifies technical standardization needs while incorporating best practice risk mitigation.

Satisfying many requirements

The IEC is looking at these different needs from all angles, to define the best way forward both in standardization and conformity assessment. We have an important role to play to ensure interoperability and safety in increasingly complex systems.



...and marine energy generation (Photo: Siemens)

Balancing power needs using fuel cells

Emerging sector will play major role in meeting tomorrow's energy challenges

FCs (fuel cells) convert the chemical energy of fuels such as hydrogen, methane or methanol into electricity through a chemical reaction. They are found in various power units and are used in portable, stationary and transport applications and in EES (electrical energy storage) systems. IEC TC (Technical Committee) 105: Fuel cell technologies, prepares International Standards for all FC systems and technologies.

Multiple applications

FCs started moving from the R&D (research and development) phase to commercial deployment for a number of applications in 2007.

FCs are currently used in three main areas:

- portable applications such as battery and mobile device chargers, APUs (auxiliary power units) and some military systems; in each case, the FCs are designed for mobile use

- stationary applications in which the FCs supply electricity for UPS (uninterruptible power supplies) and/or provide power and heat in large and small CHP (combined heat power) systems. Stationary applications include use as EES systems
- in transport, FCs provide propulsive power or range extension to road vehicles. They are being tested in some automobile prototypes, but are not yet widely deployed in that capacity. However, FCs are now found in urban buses as well as in material handling vehicles such as pallet trucks, reach trucks, counterbalance stand ups and counterbalance forklifts. They provide an ideal power solution, for this category of vehicles in replacement of lead acid batteries, which must be unloaded and recharged for 8 hours when empty. By contrast FC systems can be recharged in about 2 minutes, and weight is not a drawback

as batteries act as counterweights in forklifts.

Misleading statistics

The type of application determines the power range of FCs as well as the numbers shipped.

Portable FCs have a typical power range of 5 W to 20 kW, those for stationary operations can deliver between 0,5 and 400 kW and FCs for transport applications can provide 1-100 kW.

Assessing the actual size of the FC market can be a difficult exercise as data is reported using two completely different sets of figures. One concerns shipments of units (systems) whilst the other relates to the total megawatts (power output measurement) shipped.

Annual FC shipments in 2012 were forecast to exceed 78 000 units, more than three times the number shipped in 2011 (24 600); 50 500 of these were expected to be portable FC systems, representing nearly a 10-fold increase over the 2010 total.

These figures can be misleading: while the shipment of small portable units represents a sizeable and lucrative market, this relatively large number still contributes little to the total power output shipped (less than 0,3%) owing to the devices' small capacity. On the other hand, even a relatively small increase in the numbers of stationary or transport FC units can result in a significant surge in power output as the power they provide is higher.

The number of stationary FC units shipped in 2011, boosted by demand for residential CHP systems, was nearly double that of 2010. The total power output of the sector also doubled in



Hydrogen filling stations are needed to refuel FCs used in road transport vehicles (Photo: BP p.l.c.)

2011. Clean technology consulting company Pike Research has forecast that the stationary FC sector, driven by UPS and CHP applications as well as concern about power grid stability in the wake of natural disasters, will surpass 3 GW in 2013 and increase to 50 GW by 2020.

FC systems for transport applications still lag behind, but the sales of automotive FCs are expected to take a growing share of the FC industry when FCEVs (FC electric vehicles) and the necessary refuelling infrastructure become widely available. In January 2013 three global car manufacturers announced they were pooling resources to bring FCEV to the market as early as 2017.

Supporting the industry's expansion

IEC TC 105 stresses that the scope of its activities has been regularly reassessed and amended to reflect and meet the demands of the industry and the changing technological environment.

Besides following up new developments of FC and related technologies for an early detection of standardization needs for batteries, especially flow batteries, the TC's main tasks are to prepare International Standards for:

- stationary FC systems, especially for distributed small power generators and CHP systems
- FC components and modules
- portable and transportable FC systems
- FC systems for APUs and for propulsion applications other than road vehicles, including ships, aircraft and material handling equipment such as forklifts
- FC systems and their integration into local infrastructures, devices and hybrid systems, especially batteries and, longer term, heat engines

TC 105 encompasses 12 WGs (Working Groups) covering various aspects and



EFOY Pro 2200 FC, for professional users of off-grid industrial applications (Photo: EFOY)



FC systems can easily be retrofitted to replace lead-acid batteries into forklifts, like in these Yale machines

applications of FCs, and a JWG (Joint Working Group) on cogeneration CHP with IEC TC 5: Steam turbines. As of February 2013 it had published 12 International Standards covering various performance and safety aspects for stationary and micro FC power system. It is also preparing more International Standards to include other applications such as FC power systems for forklift trucks.

The FC industry is still at an early stage and has to overcome challenges such as high costs and large size for certain applications. However, it is expected to grow strongly in coming years, to exceed USD 15 billion by 2017, according to Pike Research. With its work programme designed to further the widest possible adoption of International Standards, IEC TC 105 will go a long way in helping the industry achieve this result.

IEC, IAF and ILAC increase cooperation

New tripartite Memorandum of Understanding is signed



From left: Peter Unger, ILAC Chairman, Pierre de Ruvo, IECEE Executive Secretary and COO, and Randy Dougherty, IAF Chairman

Cooperation agreements with other standardization and conformity assessment bodies have been on the IEC agenda for many years. One such agreement, made between the Commission's three CA (Conformity Assessment) Systems, IAF (International Accreditation Forum) and ILAC (International Laboratory Accreditation Cooperation) has proved highly rewarding, with levels of collaboration increasing constantly.

Long-standing cooperation

From day one, cooperation between the three organizations has evolved extremely positively on a number of technical and administrative fronts. These collaborative efforts culminated in the three organizations signing a MoU (Memorandum of Understanding) in October 2010. In 2012, the high level of confidence established between them led the IEC CA Systems and the members of ILAC and IAF to expand the scope of the first tripartite MoU.

The new MoU was signed in Rio de Janeiro, on 25 October 2012, by ILAC Chairman Peter Unger, IAF Chairman Randy Dougherty and IECEE Executive Secretary and COO Pierre de Ruvo, on behalf of IEC General Secretary and CEO Frans Vreeswijk.

Maximizing efficiency

The aim of the initial agreement was to maximize efficiency when dealing with common CB (Certification Body) and TL (Testing Laboratory) clients. One means of achieving this was by re-assessing these CBs and TLs jointly to avoid duplication of processes. Under the new agreement, collaboration will not be limited to joint re-assessments, but will also cover initial assessments and surveillance as appropriate.

Pooling resources

To ensure that collaboration is as full as possible, the three organizations have agreed to coordinate the application of standards and guidance documents for the assessment of the CBs and TLs accredited by IAF and ILAC and operating in the IEC CA Systems.



Under the IECEE CB Scheme, test laboratories can perform all types of electrical testing...



...for example circuit-breaker testing

The MoU also stipulates that joint training and workshops should be organized for the pool of technical assessors that are entitled to perform unified assessments of CBs and TLs.

High-level Steering Committee

In the wake of the 2010 MoU, the IEC-IAF-ILAC Steering Committee was formed to explore the possibilities for further harmonization of the three

organizations' assessments and related activities. The Steering Committee is chaired by IECEE Executive Secretary and COO Pierre de Ruvo.

The Steering Committee is responsible for developing the cooperation strategy; establishing working parties to deal with specific issues pertaining to the three organizations; monitoring, reviewing and providing assistance for agreed

projects; approving changes to these projects; resolving conflicts and making decisions on formal acceptance of project deliverables.

A dedicated website has been developed to provide information on the tripartite agreement, the Steering Committee and its task forces, relevant documentation and a list of the re-assessments performed since the first MoU came into force.

Promoting safety in the Ex sector

IECEX and UNECE present joint paper at PCIC Middle East

IECEX, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, and UNECE, the United Nations Economic Commission for Europe, presented a joint paper at the 2012 PCIC (Petroleum and Chemical Industry Committee) Middle East Conference in Abu Dhabi, UAE (United Arab Emirates), on 12-13 November 2012.

Co-authored by Chris Agius, IECEX Executive Secretary, and Lorenza Jachia, Head of Unit, Regulatory Cooperation, UNECE, the paper, entitled *IECEX System – Evolution and role of the United Nations, UNECE*, provides an in-depth analysis of the IECEX System and the rationale behind its endorsement by the United Nations, via UNECE, as the internationally recognized certification system for promoting the safety of equipment, services and personnel associated with devices, systems and installations used in explosive areas.

High-risk environment

The Ex sector encompasses more than just the most obvious oil and gas or petrochemical industries. The risk of fire or explosion exists in a variety of sectors, such as transportation – including aerospace – furniture manufacturing,



From left: IECEX Chairman Kerry McManama, Lorenza Jachia, IEC Vice-President and CAB (Conformity Assessment Board) Chairman Hiromichi Fujisawa and Chris Agius...

automotive manufacturing and repair, pharmaceuticals, food processing, grain handling and storage, sugar refineries and coal mining. They all utilize flammable substances in quantities capable of resulting in concentrations that are potentially explosive, whether on a constant basis, as a bye-product of normal operation or due to the occurrence of an abnormal situation.

A common goal

Since its creation in 1996, IECEX has set out to prove that the goal of realizing



...at the official launch of the UNECE's Common Regulatory Framework publication in 2011



The PCIC Middle East conference took place in Abu Dhabi, United Arab Emirates

a single international standardized way of conducting testing and certification is attainable and will underpin safety in these high-risk areas, providing that this priority is shared by all stakeholders involved. This requires industry to allocate adequate resources and policymakers to act cohesively and decisively at local, regional, national and global levels.

One of the most important roles of the United Nations is to protect workers and consumers – as well as all human beings and forms of life – from hazards. It also exists to promote development that is in keeping with the needs of present and future generations.

Joining forces

In joining forces with the United Nations, through UNECE, the IEC and IECEx aim to act as catalysts in the drive to arrive at a broad and global coalition that will provide and ensure safety for all industries worldwide where flammable or combustible materials are used, stored or transported, and where the risk of fire and explosion always lurks.

The joint paper describes the respective roles of the two organizations and the mechanisms that have brought them

together in their endeavour to make the world a safer place for all.

A joint approach

The approach jointly proposed by IECEx and UNECE, in partnership with industry and policymakers, embraces the work of the standardization community and of the IECEx System. The adoption of a shared regulatory framework at a global level in this sector aims to provide:

- increased safety for workers, communities living in the vicinity of plants and the natural environment
- lower costs for international trade
- more opportunities for producers from countries with economies in transition and developing countries
- greater confidence for end users and the community

To attain these objectives, the shared regulatory framework needs to include the following elements:

- a detailed description of essential requirements for producers of equipment used in environments with an explosive atmosphere, as well as for owners and operators of plants in which it is used

- a precise reference to the International Standards in which these requirements are set out
- details of how compliance with these International Standards should be assessed, if relevant, prior to the launch of the equipment on the market
- ways of maintaining vital surveillance of the equipment, as well as of the plants and facilities in which it is used

Common regulatory framework

These elements form the cornerstone of regulatory cooperation within the framework of the United Nations. IECEx and UNECE have worked in close cooperation for several years to develop a model for legislation in the Ex sector. Originally a German initiative, the model was adopted in November 2010, and in early 2011, the United Nations issued a UNECE publication, *A Common Regulatory Framework for Equipment Used in Environments with an Explosive Atmosphere*, in which this model is outlined.

Any Member State that has no regulatory framework in the explosive equipment sector can use the model as a blueprint for legislation. If countries already have such a framework, they can consider

gradually converging it with this international model. Once the model has been adopted as national legislation, it will enable the sector to operate under a single common regulatory framework in all participating countries.

Raising awareness in developing countries

The current focus of cooperation between IECEx and UNECE is the promotion of the common regulatory framework and objectives, primarily among developing countries, but also, at a later stage, among developed countries.

The first promotional event was the 2012 IECEx International Conference

in Dubai, jointly organized by IECEx, UNECE and ESMA (Emirates Authority for Standardization and Metrology).

The IECEx-UNECE joint paper was first presented in June 2012 at the PCIC

Europe conference in Prague, Czech Republic.

A copy of the joint IECEx-UNECE paper is available on the IEC website.

About PCIC Middle East

PCIC Middle East is the regional representation of PCIC Europe and organizes the region's leading conference for the oil and gas, chemical and pharmaceutical

industries, at which experiences in electricity and instrumentation in those areas can be exchanged and all aspects of upstream and downstream activities may be covered.

New IECQ website launches

Faster and more accurate information lies just a click away

Those of you who are frequent visitors to the IECQ website will undoubtedly be pleased to discover the new and totally revamped website that launched in mid-January. And for first-time visitors who want to learn about IECQ, finding their way around the different sections will be child's play.

Streamlined and restructured

From the home page, all information lies just one click away. Whether you want to find out about IECQ services, publications and documents, online certificates, working groups, events and meetings or just want to gain an overview of what the System offers, it's all there.

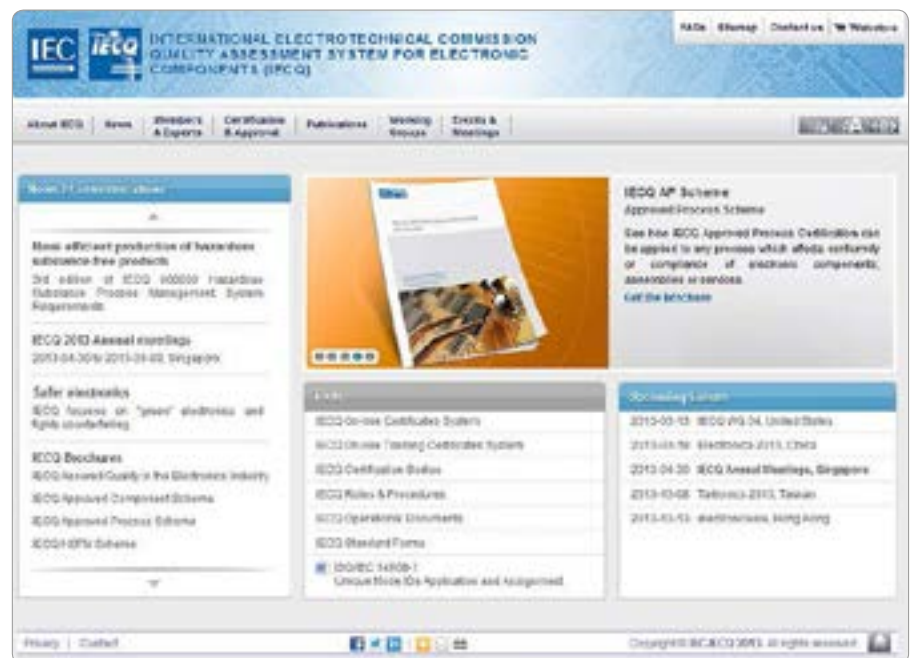
Easy navigation

The top menu provides seven main navigation tabs, each of which leads to a specific section of the website. Clicking on a tab brings up an overview of that section and links to specific items that pertain to it.

The seven tabs are:

- **About IECQ**, giving general information on the System and its five Schemes: HSPM (Hazardous

Substances Process Management), ECMP (Electronic Component Management Plan), AP (Approved Process), AC (Approved Component) and ITL (Independent Testing Laboratory).





The 'About IECQ' section provides general information on the System and its Schemes



Overview of the HSPM (Hazardous Substances Process Management) Scheme



The list of Member Bodies in the 'Members and experts' section

- **News**, listing all recent *e-tech* articles and news releases dealing with IECQ issues
- **Members and experts**, offering easy access to information on – and lists of – MBs (Member Bodies), CBs (Certification Bodies) and TBs (Training Bodies). It also provides information on IECQ Officers, global partners and subject matter experts
- **Certification and approval**, allowing direct access to all IECQ certificates
- **Publications**, enabling all IECQ publications and documents to be downloaded, from Rules and Procedures to Specifications and Operational Documents. MC (Management Committee) and CABC (Conformity Assessment Bodies Committee) documents are also available but password restricted
- **Working Groups**, listing members of each WG and their documents (some are password restricted)
- **Events and meetings**, providing information on forthcoming IECQ meetings or events at which the System is represented

Quick access

The homepage provides quick access to the most popular features, including latest news items, most-frequently used tools – e.g. On-Line Certificate System database, list of CBs (Certification Bodies) or operational documents – and forthcoming events.

Positive feedback

The website is a powerful tool that allows all levels of users to find the information they are looking for. Its enhanced speed, easy access to information and documentation and intuitive structure impressed those who were tasked with testing the beta version. Feedback received so far has been extremely positive.

Visit the IECQ website at: www.iecq.org

For more information or to send your feedback on the new website: info@iecq.org

The way ahead

Interview with IEC General Secretary and CEO Frans Vreeswijk

Frans Vreeswijk became IEC General Secretary and CEO on 1 October 2012. He shared his views on key issues and challenges the IEC is facing now and in the future.

The first 100 days

Q: You joined the IEC last March. What have been your impressions?

A: It has been a good experience. In the first months, as Deputy General Secretary, I had the opportunity to observe and learn much more about the IEC and its CO (Central Office). Those months were extremely informative. I realized that the IEC CO is full of dedicated and loyal staff. I also got to know the Regional Offices and appreciate their contribution to the IEC.

I have been able to meet with several National Committees and discuss our common issues and our approach to the Masterplan. Building the relationship with our NCs (National Committees) is an important personal objective for me.

As my management style is one of openness and teambuilding, I would like to encourage a strong team spirit and proactive cooperation. To that end, I organized a first teambuilding workshop with key staff at IEC CO last November. It was a great opportunity for CO management to get to know me better, and for me to get better acquainted with them. These workshops will take place on a regular basis – the next one is planned for early February – and I would also like to have one during the next GM (General Meeting), when all regional managers can attend.

Comprehensive representation

Q: In your presentation to Council in Oslo, you mentioned the need to



Frans Vreeswijk, IEC General Secretary and CEO

ensure that all interested parties in each member country are represented and the need to develop closer relations with the IEC market. How do you plan to go about that?

A: The Masterplan calls for the IEC to position itself as the home of industry. To do this, we need all NCs to fully represent the interests of all stakeholders in their country, both at the technical and management levels. This is a guiding principle that I always emphasize in my presentations to NCs. As part of this I generally suggest that they consider reviewing their structure.

I have already met with several NCs in 2012. In May, I visited Brazil and Argentina and met many more Latin American NCs at the COPANT (Pan American Standards Commission) annual meeting. I also went to the USA and several European countries. In the first semester of 2013 I will travel to Japan, India and China.

One way of developing close relations with the market is to visit companies. Another is to organize and/or participate in major international conferences and

events. For example, in the Smart Grid arena we are planning the World Smart Grid Forum in Berlin next September. Through this event we are hoping to bring together high-level executive decision makers to discuss policies and actions. We will look at what has been done in the past, what worked and what didn't. This will allow us to identify some of the next steps that need to be undertaken to progress in the implementation of Smart Grids.

Emerging economies

Q: How will the IEC increase its visibility among countries that are emerging as new players in electrotechnology?

A: Well, if I focus on the BRIC (Brazil, Russian Federation, India and China) countries, I am pleased to report some important developments:

China recently became a Group A member and the election of Dr Shu, of State Grid Corporation of China, as the 3rd Vice-President of the IEC gives us the opportunity to enhance the visibility of the IEC in China.

This year, the GM will take place in New Delhi, India. This occasion will allow the Indian NC to present the IEC and its activities to its local stakeholders. It will also permit the IEC to meet with key players in the Indian electrotechnical sector.

There are many opportunities for us to raise the level of awareness about IEC work in these countries and we are actively taking advantage of them.

Taking the systems approach

Q: What developments would you like to see in IEC standardization work?

A: My main priority is ensuring that the

IEC continues to develop standards that respond to market needs. More specifically, we need to give significant attention to the development of systems standards, which are often complex. To this end, the SMB decided at the Oslo GM to create Systems Strategic Groups, (SSGs) and Systems Technical Committees (STCs). Their success will be measured by how well they are able to develop the systems standards industry needs.

SSGs may well go beyond traditional IEC membership. The keywords here are system and strategic and SSGs need to take care of those IEC-relevant interfaces that are outside the pure electrotechnical field.

STCs will have the same structure as IEC TCs (Technical Committees) and they will have to liaise with product TCs. Coherent interaction and communication will be essential.

We must develop the processes for and the awareness about complex systems standards and evaluate how the first results are accepted by the market. This is the challenge we are facing in the coming years.

The systems approach is not limited to standardization but also reaches our conformity assessment activities. Many different approaches from top-down to risk management are currently being explored.

A wind of change

Q: *The Masterplan makes it clear that conformity assessment is complementary to standardization and is an equally important activity within the IEC. For many years the IEC has managed three Systems. With the rapid development of new technologies, there seems to be a need for more specific CA (Conformity Assessment) Systems. Now CAB (Conformity Assessment Board) Working Groups are developing schemes for wind and marine energy. Do you see this as a trend that could be extended to other*

technology sectors?

A: Yes, I do see that the market needs new CA schemes and that the IEC can create them. I also think that we need to review the governance of the IEC CA activities, as already called for in the Masterplan. We must look into ways of adding new activities efficiently, so we use existing processes and procedures. I expect that we will see quite a lot of growth and changes in this area.

Involving the younger generation

Q: *Why is it important to get professionals involved in standardization earlier in their career? What do you hope for the YP (Young Professionals) programme to achieve?*

A: The world demographics demonstrate that the relative working population is going to decline so we will need to work harder to get people involved in our work. This means that we develop special actions for YPs. We need to incorporate them in our work early on so they are enthusiastic about the IEC and aware of the role that standards and conformity assessment play in the marketplace. We can also learn a lot from the IEC YPs

as they will be the future leaders of the IEC. They can help rejuvenate and speed up our processes and methods, they can help us be more flexible in, for example, the way we approach meetings: giving priority to virtual meetings whenever possible to save time and costs.

The YP programme is very successful. Several NCs – Denmark, Mexico and the UK– already have very good programmes in place that were built on what the IEC does. Several others, including Brazil, Germany, Italy the Republic of Korea and the USA are in the process of developing a national programme, with many more NCs looking into it.

My dream is that every NC has a successful programme at the national level, based on the template that CO is currently developing.

I therefore encourage every NC to follow suit by developing special actions for their YPs. Approaching academia may be another way of attracting younger experts and future managers. But there I think our approach needs to focus on raising awareness so we need a special programme for that purpose. Plans have



The Masterplan calls for the IEC to position itself as the home of industry



IEC CAB (Conformity Assessment Board) Working Groups are developing schemes for wind and marine energy

not yet been developed in that respect. At the same time, we continue to work together and reach out to academia together with ISO and ITU under the auspices of the WSC (World Standards Cooperation).

Supporting developing countries

Q: How do you see the future of the Affiliate Country Programme?

A: The Affiliate Country Programme has become very successful and important for the IEC since it was founded 10 years ago. The main goal of

programme was to support developing countries by encouraging them to adopt IEC International Standards at the national level, so they can better access equipment for national electrification and improve their participation in the global market.

We shouldn't forget that electrification is at different stages of development in developing countries. There is a UN (United Nations) initiative, the Sustainable Energy for All programme, that aims to increase rural electrification. We are in discussion with them on how to promote IEC International Standards in developing countries and on how we can support each other to reach these goals.

We also have the Affiliate Plus status, which aims to support the countries that are further ahead in adoption and offer them, among other benefits, up to 400 IEC International Standards free of charge for adoption.

Meet the IEC 2012 Young Professional Leaders

Profiling the three representatives elected by their peers in Oslo

The IEC Young Professionals programme brings together upcoming expert engineers, technicians and managers from throughout the world, who aspire to become more involved in the IEC and help shape the future of international standardization and conformity assessment in the field of electrotechnology. For this month's magazine, e-tech interviewed the three 2012 Leaders of the IEC Young Professionals programme who were elected by their peers in Oslo.



Marie-Caroline Ehrhard has a background in energy, electronics and engineering.

Standardization in a nuclear facility

Introducing Marie-Caroline Ehrhard, of France

Marie-Caroline Ehrhard is an Instrumentation and Control engineer, at EDF Generation and Engineering, in France. Specialized in energy, electronics and information technology, Marie-Caroline also has a Masters in Environmental Systems Engineering. She is responsible for the I&C (Instrumentation and Control) system of the FA3 (Flamanville 3) EPR™ (Evolutionary Power Reactor)

compliance with IEC SC (Subcommittee) 45A: Instrumentation and control of nuclear facilities standards for both hardware and software.

Her responsibilities also include EPR FA3 I&C systems and architecture licensing with IRSN (the French Institute for Radiological Protection and Nuclear Safety) and ASN (the French Nuclear Safety Authority), again for both hardware and software.

International Standards are a pre-requisite

"I use standards every day. When I started this job I was very quickly introduced to the world of standardization. In fact one of my very first assignments was to read and learn two IEC standards – this was a pre-requisite for everything else," explains Ehrhard.

"As a nuclear instrumentation and control engineer, my job is to present an acceptable safety demonstration to national safety authorities. IEC International Standards, more specifically SC 45A standards, are widely regarded as an international consensus of applicable requirements and state-of-the-art techniques. Consequently, the safety demonstration provided to both French and British nuclear safety authorities depends upon a demonstration of compliance to IEC SC 45A standards."

Ehrhard is involved in the development of International Standards through reading and analyzing them during their review by National Committees. She also participates in the preparation of comments and technical input during the review stage.

Highlights from the General Meeting and the Young Professionals workshop

On the subject of the General Meeting in Oslo and the IEC Young Professionals workshop, Ehrhard said, "At the IEC General Meeting what I enjoyed most was the fact that everyone came



During the IEC Young Professionals workshop, Oslo, October 2012

from a different country. The cultural differences were enormous – it was an unexpected aspect which I really enjoyed. I also appreciated the attention that people paid to us, such as taking the time to explain everything and letting us sit in on important IEC meetings. Coming into contact with people with a lot more experience than I have was also helpful."

Since Oslo, Ehrhard is working with other IEC Young Professionals on a project which covers providing pre-workshop and post-workshop support for future IEC Young Professionals. "This helps create a sense of community

amongst us. It provides people you can turn to if you have questions about the IEC and its work," she said.

A message to future participants

To potential participants of the IEC Young Professionals programme, Ehrhard said, "I would just like to highlight for future participants and their bosses that the question should not be: How much does it cost to be involved in standardization? The question should be: How much does it cost not to be involved and therefore to have no say on what standards prescribe, especially in areas where compliance to IEC Standards is mandatory?"



Ehrhard works with International Standards on a daily basis.

IEC Young Professionals: Go ahead, get ahead

Jose Thomas

IEC 2010 YP from India: now participating in IEC TC 57/WG 13 and WG 16

Mandar Sinnarkar

IEC 2011 YP from India: now involved in IEC TC 40, TC 49 and TC 91

Juan Rosales

IEC 2010 YP Leader from Mexico: now involved in IEC TC 61 and participating in TC59/WG 15

Esther Ondiviela

IEC 2011 YP from Spain: now participating in IEC TC 61/MT 23

2013 YP workshop New Delhi

2013 YP workshop New Delhi

The IEC Young Professionals 2013 workshop will be held in New Delhi, India, from 21 to 23 October, in parallel with

the IEC 2013 General Meeting. Please contact your NC for further information.

Standardization for Smart Grids and Electric Mobility

Introducing Frens Jan Rumph of the Netherlands

This second 2012 IEC Young Professional Leader profile introduces Frens Jan Rumph, who brings a research perspective to international standardization. He works specifically in the fields of Smart Grid and Electronic Mobility.



Frens Jan Rumph

A research perspective on International Standards

With a background in computer science, Frens Jan Rumph started his professional career at TNO, the largest independent Dutch research organization, in 2006. He began in the telecommunications sector, supporting the development of new concepts in business support systems for Internet-scale services.

In 2009, Rumph started to work with Smart Grids, focusing on demand and supply management systems, new energy services, their operation and management. In this area he performs research into the use of ICT in energy management/power system management. His main expertise is in information modelling, algorithms and protocols for ICT intensive service delivery architectures and service-enabling technologies which can be used in Smart Grids. The research he does helps

governments, energy suppliers, energy services providers and grid operators in the development of products, services and related regulation.

“My main involvement in standardization is by bridging the technology development and research performed in my organization, TNO. This works in two directions. First, there is pull into my organization of what the state of the art and best practice is, on which we try to build. Also, involvement in standardization provides us with insights into what topics are considered important by the industry. This helps us direct our research and development. Second, there is the push – we try to disseminate the lessons we learn in our research projects to industry. The standardization community can play an important role in this,” said Rumph.

Career evolution

“During the first years of my professional career I used international

telecommunication standards as I was involved in technology development around IP-based multimedia systems.”

Now Rumph participates in national and international standardization of communication and information specifications for Smart Grids and Electric Mobility.

“When I started my first projects in the Smart Grid domain a few years ago I began to learn about standardization at IEC and CENELEC (European Committee for Electrotechnical Standardization). In 2011 I became involved in the Smart Grid Coordination Group of CENELEC, CEN (European Committee for Standardization), and ETSI (European Telecommunications Standards Institute). In 2012, at the national level, I also became involved in TC (Technical Committee) 57: Power systems management and associated information exchange and TC 69: Electric road vehicles and electric industrial trucks, mirroring the committees at the IEC and CENELEC,” he explained.

With a background in information and communication technology, interoperability is always an important aspect of the technology development



During the IEC Young Professionals workshop in Oslo

that Rumph has been involved in. His experience with standardization started during his studies when Rumph began working with various International Standards, both technological in nature (e.g. internet communication protocols) as well as methodological (e.g. quality and requirements engineering in software intensive systems).

An opportunity to develop horizons

When asked how he became involved in the IEC Young Professionals Programme, Rumph replied, “I was invited to apply for the IEC Young Professionals programme by the NEC (IEC National Committee of the Netherlands). After going through



The research Rumph does helps governments, energy suppliers, energy services providers and grid operators in the development of products, services and related regulation (Photo: Siemens)

the material provided and having a discussion with NEC’s direction, I realized that participating could help me be more successful in standardization, expand my professional network and boost my career in general.”

As a message to other engineers, technicians and managers who would like to become more involved in the work of the IEC, Rumph said, “The IEC Young Professional programme is a great opportunity to learn more about the IEC, to build your professional network, and a good step into becoming more involved in a very interesting area of work which is standardization.”

Smart Grid software and solutions

Introducing Manyphay Souvannarath of the United States

The third IEC Young Professional Leader for 2012, Manyphay Souvannarath, from the United States, is a senior systems analyst at General Electric Energy. She has undergraduate degrees in computer science and biochemistry, an MBA and is completing a Masters in Applied Systems Engineering. Manyphay first learned about International Standards early in

her career when she was responsible for analyzing and developing software at a utility.

Working with IEC International Standards for Smart Grid

However it was when she joined General Electric Energy three years ago as a Senior Systems Engineer working on Smart Grid solutions that she started to

directly work with International Standards. As the system engineer responsible for new product solutions, she developed interoperable solutions which required a knowledge of international software standards such as IEC 61968 CIM (Common Information Model) / Distribution Management.

Her current role with her company is to develop and analyze technical



Manyphay Souvannarath is a senior systems analyst at General Electric Energy



During the IEC YP workshop, Oslo, October 2012

Getting ahead with the IEC Young Professionals Programme

It was Ken Caird, a member of the IEC Smart Grid Strategic Group, who first introduced Manyphay to the IEC Young Professionals Programme and recommended for her to apply. Her involvement with the IEC Smart Grid Strategic Group had also sparked Manyphay's interest to learn more and become further involved in the IEC.

"In my current role as a Senior System Analyst for the Smart Grid software as a service solution, I continue to work on building Smart Grid software solutions that are integrated with multiple systems. Such interoperability relies on standards and their compliance by everyone. Therefore, my involvement with the IEC as a recipient and active participant becomes valuable to both GE and my own personal career growth," said Souvannarath.

Expand horizons through IEC involvement

When asked if she has some advice for future participants of the IEC Young Professionals Programme, Souvannarath had this to say, "To those Young Professionals who are, at any level, IEC standard stakeholders, I strongly urge you to expand your mind and learn about IEC and how you can contribute. There are so many different benefits to contributing to the IEC both at a personal career and an industry level."

"From a personal career perspective you are increasing your proficiency and knowledge base around IEC International Standards within the area of your industry interest. You expand your network with other members outside of your organization. This allows you to share best practices, general knowledge, and career opportunities both at a local and global level."

"From an industry perspective, you are influencing the direction, development and acceptance of standards and technology," she said.

requirements for Smart Grid software as a service for customers, and to architect solutions based on technical requirements and stakeholder needs.

"Our primary standard for building integrated solutions is IEC 61968 CIM so we need to make sure we comply with this. It's also important that our third party system vendors comply with the CIM standard," Souvannarath said.

Collaborative project for best practice

Over the past two years Souvannarath has been working directly with the IEC SG (Strategic Group) 3 on Smart Grid, designing and developing a Smart

Grid interactive mapping tool. (This tool is currently in development and not available yet for general use). When launched, it will allow users in different roles working on various Smart Grid projects to easily and efficiently search for standards that are applicable to their needs. The concept and methodology allow for mapping of standards at various levels – from high-level Smart Grid objectives to use cases, down to system components and actors.

"The beauty of the project and tool is that it continues to improve with the inputs of various stakeholders both at the IEC level and people from different organizations and backgrounds," she added.



She works extensively on Smart Grid solutions and IEC 61968 CIM is key

IECEX-AFSEC seminar in Africa

Raising awareness on risks and liabilities in the Ex sector

Observation of safe practices in hazardous areas is a must. When equipment is not installed, maintained, inspected or repaired by competent persons and according to strict Ex standards, the results can be devastating. What may be acceptable in non-explosive atmospheres can, in a different environment, lead directly to explosions that not only destroy property but can cost human lives or cause severe injuries.

Need to raise awareness

Africa has oil and gas in abundance and its mining sector is thriving, but the extraction of these resources is sometimes carried out under conditions that do not meet the strictest safety requirements. Recognizing the need to raise awareness on Ex risks and liabilities on the continent, AFSEC (African Electrotechnical Standardization Commission) approached the IEC with the request to organize an event addressing issues pertaining to safety in explosive atmospheres.

The first international seminar for the Ex sector, jointly organized by IECEX (IEC System for Certification to Standards relating to Equipment for Use in Explosive

Atmospheres) and AFSEC, took place in Abidjan, Côte d'Ivoire, on 28-30 November 2012.

Regional cooperation

The event was organized in collaboration with several African organizations: AFREC (African Energy Commission of the African Union), UPDEA (Union of Producers, Transporters and Distributors of Electric Power in Africa), and CODINORM (the Côte d'Ivoire national standardization body) and in partnership with two Ivorian electrical utilities: CIE (Compagnie Ivoirienne d'électricité) and CIPREL (Compagnie Ivoirienne de production d'électricité).

The seminar brought together 40 delegates from 9 countries – Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Ghana, Kenya, Mali, South Africa, Tunisia and Zimbabwe – with 14 participants attending the session in English and 26 the session in French. They represented the oil, gas and electricity industry sectors, hospitals, NSBs (National Standardization Bodies), telecommunications organizations, ministries – mines, oil and energy, and industry – as well as Côte d'Ivoire's BNETD (Bureau National d'Etudes

Techniques et de Développement) and LBTP (Laboratoire du Bâtiment et des Travaux Publics) and the multinational group ABB.

Official opening

The official part of the seminar was on 29 November – preceding visits to the CIE and CIPREL facilities – in the presence of the Chief of Staff of the Ministry of State for Industry, the Director General of CIE, the Director of CODINORM, a representative of the Director of CIPREL and the President of AFSEC. In their speeches, all thanked the IEC and AFSEC for organizing this event, the first of its kind in Africa.

From theory to practice

The seminar was conducted by two IECEX experts, Peter Thurnherr and Thierry Houeix, who shared their experience and knowledge, answered questions and provided advice, information and background material.

The seminar encompassed both theoretical and practical approaches. The first day was entirely devoted to theory. Participants were able to familiarize themselves with the structure and content of three IEC International Standards prepared by IEC TC 31: Equipment



On the first day, participants familiarized themselves with the structure and content of three IEC International Standards



Site inspections at the CIE...



...and CIPREL facilities

for explosive atmospheres. These publications are essential for anyone using equipment and installations in a potentially hazardous environment.

The three IEC International Standards to come under scrutiny during the seminar were:

- Ex area classification, basic and general requirements, types of protection for gaseous atmospheres (IEC 60079-10-1, *Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres*)
- Ex area electrical installation design, selection and erection (IEC 60079-14, *Explosive atmospheres - Part 14: Electrical installations design, selection and erection*)
- Ex area inspection and maintenance (IEC 60079-17, *Explosive atmospheres - Part 17: Electrical installations inspection and maintenance*)

This first theoretical stage was followed the next day by on-site sessions at CIE and CIPREL power stations. Participants had to use and apply the knowledge acquired on the first day to a series of practical exercises prepared by the course instructors. This gave the delegates the opportunity to go through the steps

involved in Ex site inspections. The reports and findings resulting from the site inspections were presented and discussed on the last day of the seminar.

Safety applied

Throughout the seminar, participants showed great interest in the presentations and practical exercises and engaged in animated discussions with the instructors. They agreed that the seminar was highly informative and that it made them aware of the risks and liabilities their companies or governmental agencies could face in

case of an accident.

The comment made by one of the participants is revealing: "In fact it is not for my company that I must ensure safety of the equipment but for myself and my family, to make sure that when I leave for work in the morning I will come home in the evening."

Both organizers and participants felt it was a step in the right direction, raising awareness of IEC standardization work, of IECEx and of safety in explosive atmospheres.

About the speakers

Thierry Houeix

Thierry Houeix is a Certification Officer at INERIS, the French National Institute for Industrial Environment and Risks, and an expert in IEC TC 31: Equipment for explosive atmospheres. Houeix, an IECEx Lead Assessor, is also one of the founding member experts behind the IECEx CoPC (Certification of Personnel Competence) Scheme.

Peter Thurnherr

Peter Thurnherr has many years' experience in the design and production of electrical apparatus for use in gas and dust explosive atmospheres. He heads up the Swiss company thuba Ltd., which has been manufacturing explosion-proof electrical apparatus since 1955. He is Chairman of the Swiss TC 31 mirror committee and a member of several IEC TC 31 working groups and maintenance teams.

Latest nominations and extensions

New Chairmen and extensions of terms of office

The New Year sees a number of TC (Technical Committee) Chairmen and Members take up their new positions, as well as the extension of terms of office of several existing Chairmen.

NOMINATIONS



IEC TC 1

The SMB (Standardization Management Board) approved the nomination of Luca Mari as chairman of IEC TC 1: Terminology, for the period 2012-10-01 to 2018-09-30. Mari researches, and has a strong interest in, measurement science and system theory and is author and co-author of a number of scientific papers published in international journals.



IEC TC 25

Jan Obdrzalek has been named Chairman of TC 25: Quantities and units, for the period 2012-10-01 to 2018-09-30. Obdrzalek is Associate Professor at the Institute for Theoretical Physics at Charles University, Prague. He has been active in the IEC as expert, project leader and WG (Working Group) convenor since 1999.



SMB SG 3

Danny Ackerman has been approved as Israel alternate member to SMB SG 3: Smart Grid. Ackerman is Program Manager at the Standards Institute of Israel and has been Secretary of the Israeli NC (National Committee) of the IEC since 2007.



IEC TC 20

TC 20: Electric cables, saw Jan Schutten take over as Chairman at the beginning of the year for the period 2013-01-01 to 2018-12-31. Schutten is an engineer with a Ph.D. in polymer materials technology from the Technical University of Eindhoven and has wide experience of standardization and regulatory work in which he has been active since 1995.



SMB SG 4

SMB SG 4: LVDC (low voltage direct current) distribution systems up to 1500V DC welcomes two new members. Patrick Lusse has been voted Dutch member to SG 4 while Enrico Blondel is the new Swiss member.



IEC TC 34

Richard Kotschenreuther has been named Chairman of TC 34: Lamps and related equipment, for the period 2013-01-01 to 2019-12-31. Kotschenreuther has 28 years of experience in the field of lighting products and is co-author of a winning entry of the DIN Prize for Innovation 2012.

EXTENSIONS

SMB has also approved the extensions of terms of office of the following IEC TC Chairmen:



IEC TC 59

Fabio Gargantini, first extension of term of office as Chairman of TC 59: Performance of household and similar electrical appliances, for the period 2012-12-01 to 2015-11-30.



ACTAD

The SMB has approved the nomination of Joseph L. Koepfinger as ACTAD (Advisory Committee on Electricity Transmission and Distribution) expert member and of Bernd Schulz as ACTAD member representing TC 13: Electrical energy measurement, tariff- and load control.



IEC TC 35

Michael Babiak, third extension of the term of office as Chairman of TC 35: Primary cells and batteries, for the period 2012-12-01 to 2015-11-30.

Tackling the energy challenge

Renewable energy and energy efficiency are key themes

Energy consumption will double between now and 2030; demand for electricity will triple by 2050. To reduce emissions and produce enough energy for developed and developing nations in the future, the IEC believes that the whole energy chain will need to be reworked. The need for EES (Electrical Energy Storage) will increase significantly over the coming years. With the growing penetration of wind and solar, Smart Grids will help add intelligence to existing grids and facilitate the integration of small scale energy generation into them.

Cooperation at all levels

The December 2012 COP18 Doha climate change conference focused on talks and did not address the most pressing issues linked to the global energy challenge. Despite this stalemate, global, regional and local cooperation initiatives are being developed and implemented. They address key issues such as electrical energy efficiency and energy storage from a variety of different angles and perspectives.

IEC at the forefront

RTCC (Responding to Climate Change) TV spoke to IEC General Secretary and CEO Frans Vreeswijk about the need for change within the electrical industry and for cooperation as a means of moving forward, as well as the increasing importance of storage in achieving a broader roll-out of energy-efficient technologies.

For several years, the IEC has been a trusted partner of industry, governments and international organizations, supporting them in their efforts to meet these challenges. By providing consistent measurement and rating methodologies, including efficiency, IEC work brings the most relevant solutions to the table, in a



RTCC TV interviewed IEC General Secretary and CEO Frans Vreeswijk

form that can be implemented immediately. Examples include:

- The IEC is one of many organizations and agencies participating in the UN (United Nations) Sustainable Energy for All initiative. In bringing the IEC into its network, the UN recognizes that IEC International Standards play a major role in meeting this challenge.
- IEC 62087 is the International Standard for measuring the energy efficiency of the latest generation of television sets, video recording equipment, set top boxes, audio equipment and multifunction equipment for consumer use. The complete package enables power

consumption to be measured and offers manufacturers a means of providing accurate energy label ratings for consumers. Many other IEC International Standards are available for measuring the performance and energy efficiency of a wide range of household goods such as dishwashers, washing machines, refrigerators, and so on.

- Standby power consumption is an important energy-efficiency issue and for a number of years the IEC has been preparing International Standards to measure it efficiently. The IEC also included the reduction of standby power in its list of recommendations in the September 2010 White Paper, "Coping with the Energy Challenge".
- "Coping with the Energy Challenge" was the first in a series of White Papers published by the IEC. It was followed by "Electrical Energy Storage" in 2011 and "Grid integration of large-capacity Renewable Energy sources and use of large-capacity Electrical Energy Storage" in 2012. All have been hailed as major contributions to the integration of energy-efficient



IEC White Papers have been hailed as major contributions to the integration of energy-efficient technologies into the grid



IEC TC 120: Electrical energy storage systems, aims to help make energy supply more efficient through standardization for EES (Photo: AES Energy Storage)

technologies into the grid and have received a high level of attention from governments, regulators and industries.

IEC work allows the roll-out of the most efficient technologies on a global level. IEC International Standards are the basis for conformity assessment; they also promote international trade and support transfer of expertise across countries and industries. The IEC also recently created IEC TC (Technical committee) 120: EES (Electrical Energy Storage) Systems, whose aim is to accelerate the integration of renewable energy into the grid and to enable a more reliable and efficient supply of electrical energy.

About RTCC

RTCC (Responding to Climate Change) is a Non-Governmental Organization and an official observer to the United Nations climate change negotiations dedicated to raising awareness about climate change issue.

Raising efficiency

Changing the quality paradigm

IEC Global Visions interviewed Dr Zhengrong Shi, Founding CEO and Executive Chairman of Suntech Power, one of the biggest global manufacturers of solar products for residential, commercial, industrial and utility applications. In the interview he explains how his pioneering role in the IEC and in certification changed how the players in China now approach production and certification. His work in the IEC has allowed his company to steadily increase the efficiency and quality of its products, while reducing overall development and commercial costs.

Before it all started

Because of his background as a scientist and engineer Shi was trained to understand the importance of standardization. He participated in IEC work for 14 years during his time in Australia. That's where he learned that IEC International Standards are an absolute necessity for the certification of the quality of PV (photovoltaic) modules and a basic requirement for field deployment. Later, when he founded Suntech Power it was evident that he would continue on this path and Suntech became the first company in China to build and test products according to IEC International Standards.



A strategic advantage

In an industry where constant innovation, the use of new processes and new materials is a must, standards need to be kept up to date. There is a lot of interaction among different industry players. This provides participants with access to global industry knowledge and allows them to design better, more reliable products. Shi underlines that this is one of the key reasons why he continues to be involved in the IEC.

“Chinese companies are export-oriented and to be successful, they need to demonstrate that they fulfil all basic quality requirements. Participation in the IEC, the use of IEC Standards in the design and development processes simplifies certification and makes it easier to market products,” said Shi.

Shi strongly believes that CEOs and executives of start-up companies should pay great attention to standardization because they need to achieve certification, reassure investors and achieve regulatory approval before accessing and growing markets. Customers and consumers simply like quality assured products better.

Built in quality

In Shi's mind quality needs to be built into the product and controlled from the start. Suntech Power participates in the development process of standards for technical reasons, for example to improve product design, a production process or new material testing. It becomes a more efficient and actually a cost saving process for any company that designs

and builds its own products. Being involved in standardization makes it easier to achieve certification.

However there is a difference between certification and participation in standardization work. To achieve certification, the components and material selection as well as product design needs to follow strict principles. Suntech suppliers are also required to comply with IEC International Standards; otherwise Suntech will not purchase their products.

Shi underlines that certification is the final judgement on how well quality was built into the product and how the production process was managed. “At the end of the day, the product only achieves certification, if all of these steps are quality controlled from the start; otherwise it's hit and miss.”

He feels that companies who don't understand this approach to quality assurance often try to obtain certification at the very end of the production process, when the product is ready to be delivered. What they fail to understand is that certification is not just a rubber stamp; compliance with a standard has to be realized through procurement, through production and then through quality assurance along the way. This makes it easier to achieve certification.

“When you try to assure the quality for your products at the end it's much too late and can be way more expensive.”



Dr Zhengrong Shi, Founding CEO and Executive Chairman, Suntech Power



Suntech Power

Suntech Power Holdings Co., Ltd. (NYSE: STP) produces industry-leading solar products for residential, commercial, industrial, and utility applications. With regional headquarters in China, Switzerland, and the United States, and gigawatt-scale manufacturing worldwide, Suntech has delivered more than 25 000 000 photovoltaic panels to over a thousand

customers in more than 80 countries. Suntech's pioneering R&D creates customer-centric innovations that are driving solar to grid parity against fossil fuels. Suntech's mission is to provide everyone with reliable access to nature's cleanest and most abundant energy source.

The future of vehicles

2013 Fully Networked Car Workshop – Keep the date free

The eighth Fully Networked Car workshop will be held on 6 March 2013 at the Geneva (Switzerland) International Motor Show.



The Fully Networked Car workshop takes place on 6 March 2013 in Geneva, Switzerland

A World Standards Cooperation event

The workshop is organized every year at the Geneva Motor Show by the WSC (World Standards Cooperation), a partnership consisting of the IEC,

ISO (International Organization for Standardization) and the ITU (International Telecommunication Union).

It provides a unique opportunity for the automotive industry to engage with the three organizations and discuss needs and priorities for international standards in coming years.

The programme will encompass a number of topics and feature experts from a wide variety of sectors of the industry. With your participation, we will explore new approaches to establishing international standards, examine the status of current needs from manufacturers, discuss new challenges for the networked car, and set priorities to help the industry to move forward.

The 2012 workshop covered a series of interactive discussions revolving around the need for standardization as it relates to electric vehicles and electromobility, driver distraction and vehicle safety, ITS (Intelligent Transportation System)



Participants in the workshop are given access to the Geneva Motor Show

communications, and standards for cooperative ITS systems.

The 2013 workshop will focus on further developments in these areas and any new solutions or challenges that have arisen since 2012.

A full agenda of the sessions will be available nearer the date of the workshop.

Registration is free and participants are given access to the Geneva Motor Show.

To register and obtain more information on the upcoming workshop: <http://www.worldstandardscooperation.org/fnc2013.html>



Networked concept EV (electric vehicle)

Right caps for the right lamps

Precision adjustment to standards

There are dozens of models of lamps for countless applications, for residential, industrial and office lighting, for domestic appliances, medical lighting and projection equipment, within the automotive industry, etc. Lamp caps and holders must be standardized to ensure lamps designed for the same purpose are interchangeable. IEC SC (subcommittee) 34B: Lamp caps and holders, prepares the IEC 60061 series of International Standards to ensure this is the case. Three amendments to the series have just been published.



Light bulbs may come with bayonet caps...



...or screw caps (Edison), like this LED bulb (Photo: GE)

A long involvement

IEC work on lamp caps and holders and gauges used to measure them precisely dates back to 1925, when an Advisory Committee for the standardization of lamp caps and holders was set up with the objective of achieving international interchangeability. The committee cooperated with INDECO (the Independent Committee on Standardization of Lamp Caps and Holders) up to May 1939.

Activities resumed in 1947 following an interruption caused by the war and IEC TC (Technical Committee) 34: Lamps and related equipment, was created in 1948.

The first edition of "International recommendations regarding lamp caps and holders together with gauges for the control of interchangeability", prepared by SC 34B: Lamp caps and holders, was published in 1952, under the reference "Publication 61".

This first publication was later expanded, becoming the IEC 60061 series of International Standards, a database of Standard sheets for all lamp caps, holders and gauges.

Regular updates needed

Lamp caps and holders are identified by a coding system that comprises letters, numbers and symbols, such as E27 for a

27 mm diameter Edison screw cap lamp, or BC22 for a 22 mm diameter bayonet cap lamp. New types of caps and holders are introduced on a regular basis.

In view of the increasing number of Standard sheets contained in IEC 60061, in 1969, when the third edition of this International Standard was published, it was decided to split the single publication into three parts, numbered IEC 60061-1, IEC 60061-2, IEC 60061-3, covering lamp caps, lampholders and gauges, respectively. A supplementary part, IEC 60061-4: Guidelines and general information, was added in 1990.

As new types of lamps are being introduced, such as LED-based bulbs which may require a heat spreader, for instance, this database is updated on a regular basis. Three Amendments, for parts 1-3: *Lamp caps and holders together with gauges for the control of interchangeability and safety*, were published in September 2012.

Latest amendments

Amendment 48 to IEC 60061-1: *Lamp caps*, concerns five types of lamp caps and includes drawings and details of these caps.

Amendment 45 to IEC 60061-2: *Lampholders*, concerns three types of lampholders whose characteristics match those of three of the caps listed in Amendment 48 to IEC 60061-1.

Amendment 46 to IEC 60061-3: *Gauges*, gives details for gauges used to check maximum insertion and withdrawal torques in lampholders and for "go" and "no go" gauges for checking pin diameters of caps for the base.

The numbering of these amendments from - 45 to 48 - gives an indication of the frequent changes made to lamp caps and holders and to the gauges used to control interchangeability and safety.

These frequent amendments require a precise procedure to keep the database up to date. Detailed instructions for removing the existing title page, content, foreword, existing contents by designation and the individual Standards sheets themselves, as well as for inserting replacement pages and amended Standards sheets, are clearly given in each amendment, together with the precise numbers of the content being replaced.

The IEC 60061 database is constantly updated as the amended Standard sheets are inserted as soon as they are published, ensuring subscribers always have access to the latest information.

All the amendments together with the entire IEC 60061 database are essential for the lamp, luminaire and related industries to ensure they manufacture the right products.

Increasing clarity for Japanese users

IEC databases for graphical symbols now available also in Japanese

Graphical symbols for many goods and services can be found throughout the world. Because they are not linguistically based they help people overcome barriers such as those imposed by language and understand vital information where written words might confuse or not be understood. They are particularly important for electrotechnical products. The IEC databases of graphical symbols for diagrams and for use on equipment are now available in Japanese. They will benefit the Japanese industry and improve the understanding of these symbols for local consumers.

Graphical symbols central to everything

The use of figures, or so-called pictograms, to convey an intended meaning dates back to ancient times. However, the use of internationally-recognized graphical symbols on products or for many other daily uses is more recent.

Electrotechnology goods, from components to finished products, are produced and traded across the world; this makes it essential for manufacturers and users to be able to understand their characteristics and operation easily, independent of language and with minimal or no resort to text.

IEC TC (Technical Committee) 3: Information structures, documentation and graphical symbols, and its SC (Subcommittee) 3C: Graphical symbols for use on equipment, prepare International Standards for graphical symbols for diagrams and for use on equipment. IEC TC 3 is one of the oldest TCs, having its roots in IEC AC3 (Advisory Committee 3): Symbols, which was formed in 1911. This shows clearly that graphical symbols were seen as essential by the industry from its very outset.

Manufacturing process

The design and production of electrotechnical components and systems often require complex diagrams. IEC TC 3 prepares International Standards



IEC graphical symbols essential for engineers in diagrams for consumers on equipment are now available in Japanese

for graphical symbols used in such diagrams. Around 1 750 such symbols have been brought together in IEC 60617, *Graphical symbols for diagrams*. This database covers the following areas:

- Conductors and connecting devices
- Basic passive components
- Semiconductors and electron tubes
- Production and conversion of electrical energy
- Switchgear, controlgear and protective devices
- Measuring instruments, lamps and signalling devices
- Telecommunications transmission, switching and peripheral equipment
- Architectural and topographical installation plans and diagrams
- Binary logic elements
- Analogue and hybrid elements

The database now contains metadata not present in the previous publication (symbol name, alternative names, keywords, remarks, etc.) as well as links to related symbols and application notes. It also provides classified views (by shape, function and application) and a search facility.

For end users too

Graphical symbols are also used to identify equipment or parts of equipment, to indicate functional states, designate connections and to provide information on packaging or instructions for operating the equipment.

Around 1 200 such symbols have been brought together in IEC 60417, *Graphical symbols for use on equipment*, which is prepared and maintained by IEC SC 3C.

Each graphical symbol in IEC 60417 is identified by a reference number and a name, and includes a description of the meaning, optional note(s), a graphical representation in GIF and vectorized PDF formats and additional data as applicable. Various search and navigation facilities allow for easy retrieval of graphical symbols.

Widening the user base

In Japan, the industry felt there was a growing need for IEC 60417 and 60617 to be made available in Japanese without significant delay due to any changes.

Thanks to close collaboration between IEC Central Office, which provided the platform, together with the necessary IT skills, and the JNCs (Japanese National Committees) for TC 3 and SC 3C, which provided the Japanese texts, both databases are now available in Japanese in addition to English and French.

IEC 60617 in Japanese was published in June 2012 and IEC 60417 is now also available in that language.

“The JNC is committed to maintain and add necessary texts in Japanese in coordination with changes to IEC 60417 and 60617”, JNC chairman for TC 3 Prof Hiroaki Ikeda, recipient of the 1999 IEC Lord Kelvin Award, told *e-tech*.

The Japanese versions “will make both international symbols databases available to a wider base of users than ever before and should increase the IEC’s visibility as a whole”, added Mr Motoya Mohri, JNC chairman for IEC SC 3C.

Interest in IEC graphical symbols has also led to the recent creation of an IEC LinkedIn subgroup focused on IEC 60417.



Natural and transient phenomena

Solar storms may provoke stunning sights when they hit the earth expanding the reach of Aurora Borealis, or Northern Lights, and making them visible in more places around the globe. However, beyond this spectacular display the amount of geomagnetic activity created by these so-called transient phenomena may cause grid failures and widespread power outages. They can also disrupt many other services relying on electronic systems and components, such as satellite communications or air transport.

The IEC works with other organizations on projects aimed at dealing with the vulnerability of power networks to these phenomena.

Other natural factors, such as cold and heat, lightning, dust – where the IEC has a universally recognized rating system – or humidity and water, can have an adverse impact on the operation of many electrical components and systems.

Many IEC TCs (Technical Committees) have to take these into account in the preparation of their standards.





e-tech

News & views from the IEC

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