INDUSTRY SPOTLIGHT

Industrial automation
Cutting risks in human-robot interaction

TECHNOLOGY FOCUS

Smaller and safer
Hazardous substance detection
MEMS
Humanizing the automobile safely with sensors

CONFORMITY ASSESSMENT

Raising awareness
Workshop for developing countries in Bangladesh

IEC FAMILY

New member
Moldova joins IEC as Associate member
Sensors play a central role in environmental and safety issues, detecting hazardous substances like gases or chemicals MEMS, tiny electro-mechanical systems, are now an indispensable component of portable consumer electronics Sensors measure all kinds of information that make the driving experience safer, more reactive, productive and efficient The use of a variety of sensors and other devices in the production chain has improved safety for industrial staff ISO/IEC Marketing & Communication Forum: Ideas and strategies on how best to involve stakeholders using the wealth of tools available today IEC TC 114 issues first publication for marine energy conversion systems
The introduction of automation and robots has made the workplace safer. Constant technological advances have increased the reliability of all sensors that support the various modes of operation and man-machine interface, thus improving greatly the safety of those who work in an industrial environment.

But the safety provided by sensors is not limited to industry. They can detect movement, the presence of humans, objects and hazardous substances and can be used in farming and mining, in the medical field, in rescue operations and in any potentially dangerous environment.

Sensor technology plays a major role in residential and commercial areas. Motion detectors, alarm systems, multimedia, home appliances, lighting, cars, elevators, escalators and automatic doors are some of the applications in which sensors play an indispensable role in ensuring safety.

Miniaturization is a growing trend. While MEMS (micro-electromechanical systems) have been used for a number of years in computers, medical devices and cars, they are now increasingly being fitted into portable devices such as smart phones and tablets, opening up a new world of possibilities.

Many IEC TCs (Technical Committees) and SCs (Subcommittees) have been developing International Standards for sensors and for the devices and equipment that use them. The standards ensure that the performance and quality of sensors improve constantly, allowing them to fulfil more tasks more efficiently and with greater safety.
Helping to deal with hazards effectively

Environmental sensors

Sensors, devices that react to heat, light, radiation, chemicals or other stimuli, are central to our everyday life. They detect movement, the presence of humans, objects or certain substances and they switch on or off appliances, devices or machines to save energy or for other reasons. They can send visible or audible signals or be totally unobtrusive. They also play a central role in environmental and safety issues, in particular as regards hidden or invisible hazards, such as the presence of gases or chemicals. The IEC is pivotal in ensuring that the performance and quality of sensors improve constantly, allowing them to fulfil more tasks more efficiently as well as to save more lives.

Fire

A significant number of fatalities that are not transport- or work-related happen at home and are caused by fires. Many occur at night when occupants are asleep, with most deaths resulting from smoke inhalation and poisoning rather than from burns. In case of fire, a timely warning allows residents to evacuate buildings unharmed. In countries where the compulsory installation of fire alarms in dwellings has been imposed, the number of fire-related deaths in domestic environments has been cut drastically.

Smoke detectors are the main fire alarm system. They can use different types of sensors and can be optical only, heat only, ionization only, or combine some or all of these types of sensors to provide better and quicker reaction.

All have different properties: optical smoke alarms are particularly good at detecting slow smouldering fires, ionization smoke alarms react quickly to fast flaming fires, detecting the alteration in ionized properties of air through smoke. Heat alarms are best for smoky and dusty environments: reacting to heat instead of smoke they are less likely to give false alarms.

Silent killer

Another major killer in the domestic environment is CO (carbon monoxide). CO is a colourless, odourless gas that results from the incomplete combustion of fossil fuels. It replaces oxygen in human blood, leading to dizziness, loss of consciousness, coma and eventually death. Although CO poisoning isn’t usually provoked by fires at home, any fuel-burning appliance can be a potential source of fatal or hazardous CO levels. CO can be formed by open flames, space heaters, water heaters or blocked chimneys. This explains the relatively high rate of fatalities it causes in many countries during cold spells.

Fire alarms cannot serve as CO detectors. CO requires special detectors; however, dual CO and smoke detectors are also available. The installation of CO detectors is now required by law in some countries or states, such as California.

Gases represent a major source of risks. IEC SC (Subcommittee) 65B: Measurement and control devices, has prepared the IEC 61207 series of International Standards for gas analysers, which are used to identify certain constituents in gaseous mixtures. These standards concern high-temperature electrochemical sensors, paramagnetic oxygen, photometric and tunable laser gas analysers.

The most common and toxic gases and substances that need to be detected for health and safety issues are CO, hydrogen sulphide, ozone, chlorine, methane / natural gas / propane, CO²

An open fireplace may spark a house fire and a blocked chimney can be a source of deadly CO
(carbon dioxide), hydrogen, nitrogen, oxygen and hydrocarbons. Some devices can detect several of these gases at the same time.

**Industrial environment**

Workers in entire industrial sectors, like mining, oil refineries, paint shops or chemical plants, may be exposed to very different environmental conditions and to the presence of a wide variety of gases, some harmless, others toxic and some even presenting risks of explosion. Risks may be compounded by environmental factors such as humidity or temperature.

The wide range of hazards and the need to react in a timely fashion, mean that the use of dedicated detectors or sensors to identify the presence of harmful substances is absolutely essential.

**Emergency and security services**

The same applies in other sectors in which there may be exposure to hazardous substances. In case of industrial accidents, in particular in chemical plants, rescue workers, police or medical staff who intervene need to know the nature and seriousness of the risks they face. This is valid not just for major accidents but also for smaller ones. For this task, detectors are absolutely essential. Emergency services are using a very wide range of these devices, including multigas devices, to identify the nature of the danger.

**Wide range of hazards**

Not just chemical hazards but environmental factors too must be taken into account to minimize risks. Humidity control is an important factor in safety. IEC SC 47E: Discrete semiconductor devices, prepares IEC International Standards for humidity sensors.

Other TCs also prepare International Standards for components used in detectors. For instance TC 20: Electric cables, works on cables for fire alarm systems, and TC 79: Alarm and electronic security systems, prepares IEC International Standards on EMC (electromagnetic compatibility) immunity requirements for components of fire and security alarm systems.

**Multiple applications, purpose-designed detectors**

Sensors and detectors compliant with IEC International Standards are used by many safety equipment manufacturers. They are found in all domains, from farming or mining (detection of methane) to the medical environment (identifying content or pressure of oxygen and other gases such as nitrogen) and all industries that use gases or chemical products.

Advances in sensors have made a significant contribution to better safety in industry, with the production of tailor-made equipment and the availability of a wide range of devices, including portable and fixed detectors, single or multigas systems, radiation and compound specific detectors.

Most of these devices rely on IEC International Standards and comply with IEC Conformity Assessment systems to ensure their safe and reliable operation.
MEMS, tiny electromechanical systems, are now an indispensable component of portable consumer electronics where they increase the performance, accuracy and reliability of existing technologies in ways that are not possible with traditional electronics. At CES 2012 literally hundreds of devices now include sensors, gyroscopes, accelerometers that enable innovative services on smart phones and tablets and allow for the miniaturization of projectors and other devices.

From industrial applications to consumer electronics

MEMS (Micro electromechanical systems) were all over the 2012 Consumer Electronics Show, though you might not know it unless someone told you. While MEMS have been used in automobiles, PCs, medical devices and industrial applications for years, their widespread use in portable consumer electronics is relatively new, propelled by reductions in the cost, size and their power consumption.

They’ve become vital for a multitude of consumer electronics including remote controllers, gaming devices, smartphones and tablets as well as printers, pico-projectors, digital cameras, microphones and hundreds of other products.

Progressively, MEMS incorporating one or several different functions such as accelerometers, altimeters, magnetometers (compasses), inclinometers, gyroscopes, and pressure sensors are built into a rapidly increasing number of consumer hardware that work in combination with apps on smart phones and tablets.

Processing motion

MEMS motion sensors detect the orientation of any device, where it is heading and its absolute location in three-dimensional space. By fusing the data streams from different MEMS (accelerometers, altimeters, inclinometers, etc.) they are for example used to control the hardware of game consoles or inform software such as security protocols or location-based services. MEMS are increasingly small, inexpensive and low-power enough for use in even the tiniest mobile devices. In 2012, mobile device makers will begin integrating navigation accelerometers, gyro and magnetometers allowing augmented reality and device tracking. Smartphones will soon know not only where you are but what floor of a building you or your device are on.

Sharper images in millions of shades

The MEMS micro mirror chip (DMD) is frequently used in consumer electronics and particularly in video projectors and televisions. This chip uses microscopic moving mirrors to improve the image quality and reliability of these products. In a way it is like a light-switch composed of millions of hinge-mounted mirrors, each of which measures approximately 1/5 of a human hair and corresponds to one dot
or pixel in a projected image. The mirrors are mounted on tiny hinges that allow them to tilt either towards the light source to reflect the light or away from it to block the light. The length of time the mirror faces the light determines the brightness of each dot. They are able to produce over 16 million shades of colour and an image quality that enables them now to replace film projectors in movie theatres.

More storage and better sound
MEMS are revolutionizing mass data storage in the computer industry by miniaturizing components for disk drives, servers and peripherals.

Acoustic MEMS chips are changing the way sound reaches the human ear. They provide less distortion and higher clarity and quality of sound. For this reason they are built into cellphones, music devices but also hearing aids.

Increasing safety
In the automotive industry MEMS accelerometers are a key element of modern airbag systems. These MEMS contain a central mass that moves in response to the vehicle's acceleration. The mass is mounted on a hinge that allows it to move during driving, returning it to its original position when the car stops. Sensible electronic circuitry read the mass's movement and relates its data to a connected micro-processor. When the mass's movement changes at an unsafe speed, the airbags are deployed protecting passengers from impact. Previously airbag systems were composed of numerous electronic components: today, two small chips suffice to operate this complex system. This not only decreases cost but also increases operational accuracy and reliability.

Opening the way for new applications
In medical applications, in addition to improving speed and reliability, MEMS open the way for novel innovations: MEMS chips inserted under the skin of patients are able to release an exact amount of drug over time; built into a scalpel they measure the length and depth of incisions during delicate operations. Environmental sensors (for temperature, humidity and air quality), medical sensors (such as in blood-pressure monitors, glucose meters, weight scales and pulse oximeters) and wearable sensors that can invoke a personal emergency response system, all use MEMS sometimes connected wirelessly to the Internet.

Sensing danger
MEMS low-power nano sensors are also used to detect gas leaks or saturation levels. They are so small that they can be sewn into clothing to be worn by soldiers in the field or by the elderly at home. Increasingly these MEMS sensors are placed along pipelines, around factory perimeters and in workspaces where they help increase safety and enable early warning systems.

IEC work for MEMS
IEC SCs (Subcommittees) 47E and 47F prepare a multitude of International Standards that enable manufacturers to build better, more resistant, efficient and reliable sensors and MEMS. They cover terms and mechanical properties, basic characteristics, essential and optimal operating ratings, as well as a multitude of testing methods for materials such as bonding strengths in composites, resistance to stress or bending or thermal expansion. Together they facilitate the design, manufacture and use and reuse of microelectromechanical systems.

MEMS are miniaturized mechanical and electromechanical elements (Photo: NXP)
Humanizing the automobile
Providing safety through multiple sensors

Motor vehicle manufacturing has changed beyond recognition in the last few decades. Consumers once bought a simple chassis with four wheels and an engine attached; now they purchase a highly sophisticated motoring solution which has several computer systems working together to make the driving experience more reactive, productive and efficient. At the same time, cars have become an everyday necessity for households and the estimated number of vehicles on the roads worldwide is set to quadruple by 2050.

Sensors are the first link in the data communication chain
The computer systems which are embedded in today’s cars rely almost exclusively upon sensors, which give the driver a greater insight into their vehicle’s performance and status. This is because sensors are the first link in the data communication chain, sniffing out raw data and passing it on to systems to analyse and report upon. Many of these revolve around increasing safety for the driver, such as ABS systems, bumper radars to help parking, driver behaviour monitors and light and rain sensors which automatically switch headlights and windscreen wipers on and off.

From sensor-based monitoring to semiconductors
Many of these sensor systems include components which are based upon IEC International Standards. These range from ISO/IEC 24753, which defines RFID protocols for sensor-based monitoring, to IEC 60747-14-1, Semiconductor devices - Part 14-1: Semiconductor sensors - Generic specification for sensors, which describes sensors made from semiconductors and is additionally applicable to dielectric and ferroelectric based sensors. In between there are a whole host of other standards detailing crucial aspects of sensor deployment, such as wiring, batteries and electrical connections.
However, as the world of vehicle management has expanded, so has the sophistication of the sensors involved, and so too the extent of relevance of IEC work to help ensure a car’s safety, no matter where in the world it’s being driven.

**Charging the EV through the Smart Grid**

One example of this is through the growth of Smart Grids to charge electric vehicles. IEC 62196-2, which is currently in final draft form, defines the plug/socket connectors for one and three phase electric charging and the more sophisticated of these include sensors to communicate information between the car and the charging point to ensure the correct power supply is used and that overcharging doesn’t occur.

As smart grids grow, it will become increasingly important to have standards governing sensors so as to ensure an EV (electric vehicle) manufactured in one country, but driven or sold in another, can still be recharged safely. This can help manufacturers increase their geographic reach while also helping them achieve regulatory and industry body compliance.

However, the ambition for on board sensors goes much further than with single sensors such as those envisioned for Smart Grids. The SARTRE (Safe Road Trains for the Environment) project has been running since 2009. It’s currently conducting trials of a system for use on motorways whereby a car could automatically set its pace and distance to the car in front and, in effect, follow it. Such a system would require the use of sensors that are aware both of the vehicle being followed and of all the other vehicles in close proximity to the car. SARTRE is currently undergoing field trials; one consists of a four car road train travelling at up to 90 km / hour.

Multi-entity sensor systems such as SARTRE build upon the broad move to use sensors to make energy efficiency an integral part of our day-to-day lives. Some of these were highlighted in the June 2011 edition of *e-tech*, which looked at how multi sensor systems are being applied in the busy environment of an office building, with applications ranging from variable elevator speeds to networked solutions that analyse data from around the building and adjust power availability accordingly.

**Communicating between vehicles**

However what SARTRE relies upon most of all is the ability of different manufacturers’ cars to be able to communicate with one another. It will only gain widespread acceptance if it’s underpinned by a common standard defining the sensors’ interfaces, irrespective of the technology, country or make of car involved.

Speaking at the recent Mobile World Congress, Ford’s executive chairman, Bill Ford, embraced this when setting out the company’s “Blueprint for Mobility”.

“We need to think of vehicles on the road the way we think of tablets, laptops and phones – as pieces of a bigger network,” he said. “It doesn’t make sense that Fords can only talk to Fords and Peugeots can only talk to Peugeots. There needs to be a standardization of that tech.”

**Standardizing mobility for safe driving**

Creating the International Standards to underpin this mobility and ensure car safety is just one of the areas in which the IEC is active. The IEC members, the NCs (National Committees) in each country, are always happy to hear from new experts who are interested in helping set down new standardization work and further this fast growing area of automotive safety.
Cutting risks in human-robot interaction
Sensing risks to prevent accidents

Industrial activity requires tools or equipment that is capable of causing serious injuries or even fatalities if not used with due care. The introduction of automation and robots in manufacturing has greatly improved safety at work by transferring a number of hazardous and harmful tasks from humans to machines. However, it has also introduced its own set of risks for workers and operators. The use of a variety of sensors and other devices in the production chain has improved safety for industrial staff, yet there is still room for improvement in this field. The IEC is actively working to achieve this.

Hazardous environment
The operation of any industrial power tool, stationary or portable, such as saws, grinders, presses or drills, entails risks. Even when used carefully, these tools may cause serious injury or death. International data on occupational workplace injuries and fatalities is difficult to collect, let alone interpret, owing to significant divergences of health and safety regulations and the existence of different levels of industrialization. Yet statistics from the US Department of Labor give an indication of the seriousness of the problem in industrial societies. Approximately half of all occupational-related amputations in the country occur in the manufacturing sector, with stationary and portable machinery being the primary cause of the amputations.

Automation: reducing workplace risks?
As automation – the use of machines directed primarily by electronic control systems – spread into manufacturing, replacing workers for straightforward but unsafe, repetitive and unpleasant tasks, the incidence of machine-related injuries and accidents dropped. However, automated machines introduced their own set of hazards, mainly at the point of operation, and also where components such as pulleys, belts, rods, or chains transmit energy to the machine and where moving feed mechanisms and auxiliary parts are found. Appropriate training and the gradual compulsory introduction of protective gear and safety devices have cut risks markedly in the industrial environment over the years. Physical safeguarding mechanisms, as well as electromechanical sensors and switches that may halt operation automatically in case of danger, are some of the devices used to prevent accidents and reduce their severity when using powered equipment.

From industrial automation to robots
In contrast with an automated machine with its limited range of motions and tasks, a robot is defined by ISO (International Organization for Standardization) as “an automatically controlled, reprogrammable, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications.” The definition has been adopted by the International Federation of Robotics and many other organizations. Robots can be programmed to perform different jobs, react to changes in their environment and even make a limited number of choices. Although they share many of the more common safety issues with industrial automated machines, robots operate on more axes and with greater freedom to determine their work envelope (the volume of working or reaching space). They also present three major differences regarding the safety of workers: differences that concern the speed and predictability of movement and hazard zones that, unlike those for automated machines, are not fixed.

Operations safer than robot set-up, maintenance or repair
Studies in countries that use robots extensively, notably Japan and Sweden, have shown that many accidents involving robots do not occur during normal use when operators, if needed, run robots from a safe distance and area. Accidents tend to occur during programming, maintenance, testing or repair.
Unlike automated machines, robots perform more advanced tasks, often apparently randomly and on a multitude of planes. Therefore, proper and accurate programming of robots is essential for safety. This may be done remotely by computer or directly through “personal” lead-through or walk-through teaching, with an operator physically present in the work envelope, directing a robot to scan and store values and coordinates for the work to be done. Other individuals who may find themselves close to a robot’s operating range and in harm’s way include materials’ handlers and maintenance or repair staff.

Keeping a safe distance
For humans, the main hazards associated with robots include being struck by the moving part, being trapped between a moving part and a machine or surface, being hit by an object or material dropped or ejected by a robot, falling from the equipment or structure and exposure to dangerous levels of heat or electricity. Robots may also malfunction following software failure and error or electromagnetic and radio-frequency interference. It can be inferred from all this that keeping humans away from a robot’s work envelope and protected will be the safety option of choice.

As a general rule, the design of robot workcells comprises a number of safeguarding systems aimed at keeping humans at a safe distance. These may include an external physical barrier (a secure fence or enclosure) around the workstation perimeter and a variety of sensors to detect the presence of humans in restricted or dangerous locations within that perimeter and to indicate unsafe or potentially unsafe operating conditions or events. Sensors may be installed to shut the robot down completely upon detection of an intruder in the perimeter.

Safety sensor systems cover all areas and at least three levels of hazards. The first level of system identifies perimeter penetration, the second detects a presence inside the workcell and the third a presence within the immediate vicinity of the robot.

Sensors, switches and other safety devices
Different types of sensors are used to ensure the safety of operators close to robots. They are linked to other devices that can activate alarms and shut down operations if necessary. The most common are:

- Pressure sensitive sensors placed in floor mats within the workcell perimeter that react to the weight of an individual and can be used to detect intrusion in the perimeter and inside the workcell
- Light curtains consisting of photoelectric barriers of several aligned beams between emitting and receiving columns. Interrupting a single beam will trigger the emergency stop for any machine. Different resolutions permit intrusion of a finger, hand, limb or body. These photoelectric sensors can also detect the presence of an unauthorized individual in the restricted zone. IEC International Standards for electro-sensitive protective equipment apply to these devices
- Key-operated safety switches and emergency stops and switches
- Other common safety measures and devices include the presence of a workcell controller who can shut down the robot and activate warning alarms, and the installation of flashing lights of different colours, repetitive beepers and continuous horns as well as emergency stop/live-man switches

IEC standards central to automation and robotics safety
Many IEC TCs (Technical Committees) and SCs (Subcommittees) prepare International Standards for the devices mentioned and relating to the safety of automation and robotic systems. They include, among others, TC 65: Industrial-process measurement, control and automation, which developed the 61508 series on Functional safety of electrical/electronic/programmable electronic safety-related systems; TC 17: Switchgear and controlgear, working on safety and emergency stops and switches; TC 44: Safety of machinery - Electrotechnical aspects; SC 47E: Discrete semiconductor devices, which develops International Standards for pressure sensors; and TC 79: Alarm and electronic security systems.

No technical silver bullet
However safe automated and robotic systems have become over the years, following major technical improvements, the possibility of component failure or malfunction still exists. The weakest link in the industrial safety chain is likely to remain the human factor: most occupational accidents result from unsafe actions by workers. The cause may be insufficient training of operators, careless or improper actions by staff, incorrect programming or other activities.

To improve safety and minimize the risk of accidents it is crucial to understand ergonomics and be familiar with human factor issues. Training is also essential. Industrial staff who work with robotic systems must be thoroughly trained and understand that they are inherently unpredictable: if a robot is not moving, it does not mean that it is not going to do so; if the robot is repeating patterns, it should not be assumed that it will continue to do so.
Electrosmog
Measuring and setting EMC limits

CISPR, the international special committee on radio interference, is one of two IEC TCs (Technical Committees) that deals with EMC (electromagnetic compatibility), the other being IEC TC 77: Electromagnetic compatibility. CISPR deals with interference, or rather the unwanted effects of it. In a world of increasing electrification, CISPR is faced with new challenges to ensure that limits are adapted and standardized in line with the technologies being developed. One of the key areas for new EMC work concerns renewable energies, where the flow of energy generated for the grid is often irregular and inconsistent.

Controlling the noise in an electromagnetic world
CISPR sets the limits for electrical interference that is caused or emitted by all types of electrical appliances on radio reception so that different devices can function as expected in the same electromagnetic environment.

Electrosmog, as it’s sometimes called, can be transmitted through the air on any radio-controlled device such as a phone, or it can be fed back into the power grid in the form of electronic noise that interferes with the useful sinusoidal waves being transmitted.

New challenges include the Smart Grid and renewable energy
CISPR also deals with the instrumentation and the various methods used for measuring the relevant emission levels. With the advent of the Smart Grid and new methods for generating energy from renewable sources, CISPR is faced with the challenges of ensuring that minimal limits are adapted and integrated in line with the new technologies being developed.

Using the sun’s energy brilliantly
The current generated by a PV (photovoltaic) module, for example, is DC (direct current) and has to be converted to AC (alternating current) by inverters in order to be useful for running electrical equipment. The solar inverters are often the most expensive component of a solar energy system.

PV energy can originate from a few simple modules mounted on the roof panels of an isolated house. Alternatively, it may come from a solar farm where there is an entire field of modules converting the energy gathered from the sun. PV power is thus inherently variable in quality due to the wide variety of the installations at which it is generated.

Because the inverters used for the DC to AC conversion for PV energy vary tremendously in wattage and electronic quality, the quality of the AC electricity produced for integration into the Smart Grid also fluctuates. In comparison, power generated from another renewable energy source, hydroelectricity, is purer and more consistent since the sinusoidal waves are produced electronically.

Differentiating noise from the data in Smart Grid transmission
Sources of interference include ignition and electricity supply systems, electric transport systems and industrial, scientific and electromedical radio frequencies, sound and television broadcast receivers, IT (Information Technology) equipment and so on.

Inherently, all electronic equipment – because of the electricity it uses – generates unwanted radio emissions. Any radio receiver such as a television, for example, needs to have its emissions defined by relevant limits that will enable it to receive the air-transmitted signals from all the radio and TV stations to which it is tuned.

When it comes to dealing with the needs of the Smart Grid, CISPR’s work involves not only radiated emissions, but also those that are conducted. In order to provide the Smart Grid with the necessary intelligence about when and where power is needed, what is available and so on, it is necessary to be able to exchange and communicate the relevant data along the power lines.

Sensors in meters transmit data for intelligent use
Using PV modules is not just about generating renewable energy, however, it’s also about being able to re-inject the power into the Smart Grid. Thus, when there is a surplus of supply it’s possible to recuperate some of the costs of the installation by selling it to the utility.

To do so, it’s necessary to be able to measure what has been produced and how much of the electricity has been consumed. This type of system relies on sensors mounted in a meter. The meter is connected to the Smart Grid and the information sent through broadband communication to a centre where it can be processed. The intelligence of
the system relies heavily on being able to differentiate the frequency and the voltage of the data signal that is sent along the broadband power line from any extraneous electronic noise that happens to be there.

CISPR is working on ensuring that common household appliances and lighting equipment, for example, are designed so that when they are switched from stand-by mode to active mode they do not create any disturbance or trigger unwanted events in the meters that might then be communicated falsely over the Smart Grid.

### Setting immunity levels that allow data to be transmitted without interference

The role of CISPR in this respect is to set the immunity levels, and to define and allocate the various acceptable frequency ranges for transmitting the data. In turn, IEC TC 77, is working on defining the International Standards that will allow the electronic noise to be filtered properly so that the data that travels along the line can be recognized and not confused with the noise.

CISPR has set up a Steering Committee Working Group to coordinate future Smart Grid work and ensure that it takes an international uniform approach in protecting the entire spectrum of radio frequencies. The committee is presently drawing up a list of all International Standards it has produced to date that are relevant to the Smart Grid which it will submit to SMB (Standardization Management Board) ACEC (Advisory Committee on EMC).

### Annual meeting highlights new challenges

CISPR’s annual meetings of sub-committees and working groups and its main plenary held in Seoul, Republic of Korea, in October 2011, presented an opportunity for CISPR to look again at its policy and the driving forces behind its work.

It was also an occasion to present two of its TC experts, Philippe Lancelin and Heesung Ahn, with the IEC 1906 award in recognition of the work they have carried out respectively in SCs (subcommittees) I and B.

Over the two weeks in Korea, 76 experts from 22 countries, together with the CISPR Chairman, Don Heirman of the US (United States), Secretary Stephen Colclough of the UK (United Kingdom) and Technical Officer Pierre Sebellin from IEC Central Office in Switzerland, discussed a variety of new strategies for taking into account the new challenges of connecting devices to the Smart Grid on a global level and transporting the relevant data about the generation and use of energy without interference.

### CISPR liaisons

Due to the widespread effect that radiated emissions have on so many areas, CISPR maintains special relations with its liaison members and tries whenever possible to provide them with assistance.

This year at the CISPR plenary, ECMA (European Computer Manufacturers Association) was invited to outline its views on the activity of CISPR, in particular that of SC I: Information Technology Equipment.

The ITU-R (International Telecommunication Union Radiocommunication Sector) representative underlined the strong liaison that exists with Subcommittee H: Generic Emission Limits while the EBU (European Broadcasting Union) reported on possible FM (frequency modulation) radio interference caused by PLT (power line transmission) services.

The IARU (International Amateur Radio Union) talked of two sources: plasma TV and LED lighting, that sometimes cause interference.
Creating the big picture
IEC TC 65 and ISO TC 184 join forces to plot automation

There’s strong motivation among some of the world’s leading industrial automation experts to streamline their future international standardization work and make it clearer and more coherent for their users. Recently, IEC TC (Technical Committee) 65: Industrial-process measurement, control and automation, set up an ad-hoc group with ISO TC 184: Automation systems and integration, to harmonize their efforts and rule out duplication of work in the two organizations. The joint meeting they held in December 2011 resulted in their drawing up what they’ve called the Big Picture Matrix.

Industrial automation – an integral part of production
Just as multimedia has now become an integral part of any home, so there is some form of industrial automation in any production site that involves continuous or batch processes and measurement or control of the pneumatic, hydraulic, mechanical or whatever other system is installed. In a production environment, automated digitized systems facilitate data exchange between the various posts in order to provide equipment control, functional safety and the varying relevant measurements.

In a recent IEC Global Visions interview, the Chairman of a manufacturer of automation systems said that “the transformation of IT connected manufacturing to optimised plant and supply network” was the “most important trend in manufacturing today”. Indeed, his point of view is generally accepted by all leading manufacturers of automation systems in the world today. The interview states that automation is motivated by three drivers: “global competitiveness, an agile supply chain and sustainability”. Because resources are finite, so the environment is a very hot topic for many customers. As a result, “an information-enabled factory increases plant safety and enhances product reliability and quality. Sustainable process improvements help manufacturers meet and exceed regulatory requirements and increase their competitiveness in the global market”.

In an industrialized environment where certain production lines rely on an uninterrupted exchange of data, it follows that systems need to be able to continue transmitting and receiving their information without a break. As with any automated system, the lack of human intelligence whenever there is a glitch can have significant repercussions and the economic effects can be high. The risks incurred can affect not only employees and production output but also the environment and safety, with pollution and uncontrolled chain reactions occurring as a result.

The IEC SC (subcommittee) that has the most links with ISO TC 184, its SCs 1, 2, 4 and 5, but in particular the last-named SC, ISO 184/SC 5: Interoperability,
As a first step, the joint IEC and industrial automation as a whole. It added value which in turn will benefit and combining their efforts they can give realized that by converging their work have an industrial background and they industry. Indeed, all the TC Officers have an industrial background and they realized that by converging their work and combining their efforts they can give it added value which in turn will benefit industrial automation as a whole.

Speaking the same language leads to sharing competencies
The experts from the relevant SCs of IEC TC 65 and ISO TC 184 are highly conscious that they not only need to speak the same language, but that when they are able to share their competencies, it adds much greater value.

Similar environment, different application
Both IEC TC 65 and ISO TC 184 deal with industrial automation. However, the areas in which they apply it are different. The IEC committee deals more with the system aspects of industrial automation, how it is set up and the equipment that is installed. ISO concentrates more on how automation is applied, for example in managing production unit resources and the planning and archiving aspects of industry.

A common self-appointed mandate
IEC TC 65 deals with the production work floor and its components whereas ISO 184 concentrates more on how the business deals with these. Nevertheless, the distinction between the two is not quite so clear cut.

Deciding to review both IEC and ISO committee standardization work and to harmonize their efforts, cutting out the overlap between the two, was motivated by the strong ties they both have with industry. Indeed, all the TC Officers have an industrial background and they realized that by converging their work and combining their efforts they can give it added value which in turn will benefit industrial automation as a whole.

Common understanding in industrial production
Today, the majority of manufacturing plants and production units around the world are putting into place systems that will make them more efficient, both in terms of the energy they use and the output they generate. Increasingly therefore they will have introduced some measure of automation in their processes.

In a Digital Factory production facilities have to be able to function seamlessly and continuously. There is greater need for standardizing the data that is dispatched from one production unit to a management service elsewhere. This implies a common understanding between the hardware – i.e. the equipment and the systems on one hand – and the software – the data – that is exchanged and drawn from the administrative services on the other. The information needs to be clearly understood so that it can be used equally well by both sides.

In the same way that data needs to be exchanged and understood between the different services, so the language needs a common basis. To connect systems together in a safe and useful manner you will almost certainly need to describe the needs for current. If, however, you use the term utilization voltage while others refer to it as nominal voltage you are likely at some time to have an unresolved contradiction in your data exchange!

While the two standardization committees might have a common understanding of the notion of the data they are describing, if the terminology they use is different, ultimately they will effectively be speaking a different language.

Ruling out errors in data exchange through standardization
Until very recently, data exchange was carried out on the basis of non-standardized properties that were simply written down and passed between users. Now, thanks to the work of TC 65 in determining standardized definitions for equipment, systems and applications, that data no longer needs to be retyped and entered into each partner system with the attendant possibilities for error. Suppliers and users, resource management and production facilities alike have gained in terms of time, interoperability and their use of common data.

Drawing up the big picture matrix
The ad-hoc group set up on IEC TC 65’s initiative is paying special attention to ensure that any new NPs (New Work Item Proposals) relating to the scope of the Digital Factory are included in their matrix. They are also identifying potential gaps, problems and associated risks.

They are structuring their approach so as to class all their publications according to a pre-agreed system. This takes into account the object of each International Standard, where it emanated from, the level of its genericity. [note: taken from the word generics to mean “parameterized types”, a mechanism commonly used in Java databases to describe specific types of objects], and so on.

The ad-hoc group has analysed the terms used in each publication. Each International Standard is classified according to its genericity, i.e. whether its use is generic, partial or totally implemented. They are referencing the content on an explicit relationship basis: is it referenced directly, or mentioned? Is the element used or made use of? Each standard is being listed together with the WG (Working Group) responsible for its development. They are covering technicalities such as the degree of impact it has on the committee’s universe of discourse [note: in logic-related fields the universe of discourse, or universe is understood to cover entities or ranges of objects, events, attributes, relations, ideas and so on, so that in future iterations it is no longer necessary to re-specify the relevant variables].
**Future work**

In their process of harmonization, drawing up a big picture matrix, where they have positioned all the standards issued by the various IEC and ISO TCs, represents the first step for the ad-hoc committee.

Once each SC has finished positioning their standards in relation to the common table, the experts in the ad-hoc group have agreed that they will go ahead and put into place new tools that will then enable them to use the information they have gathered.

As a result, industry will benefit greatly from a streamlined set of International Standards on automation. It will help connect information systems that are based on different models and, in the future, with this common understanding of the Digital Factory, make the technical interrelationships between the factory and the workshop more transparent.

**Shocking electronics**

Standards define test impulses, mostly

*by Jeff Lind, Compliance West*

Electronic products must pass some level of immunity test when subjected to conducted or radiated energy. Some of those tests include subjecting the equipment under test to electrical impulses – short duration single events using defined voltage and current waveforms. Engineers also use impulse tests to verify electrical spacings on PCBs (printed circuit boards) and to periodically check motor-insulation.

Several international standards define impulse waveforms, but only at certain points, in how a voltage or current will rise and fall. The waveform shape, peak voltage, impedance, and application of the pulse vary and depend also on the characteristic of the test object. The test pulse you use depends on the standard you apply because standards define impulses differently.

**Waveform Definition**

The IEC has at least two International Standards that define impulse tests and their waveforms. Use IEC 60060-1, High-voltage test techniques - Part 1: General definitions and test requirements, when testing insulation systems and use IEC 61000-4-5, Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test, for switching and lightning-transient tests. Many standards that define testing of specific products reference one or other of these two standards.

In some end-use standards, both the insulation system of the DUT (device under test) and the ability of the device to withstand lightning and switching transients are important. The requirements of IEC 60060-1 and IEC 61000-4-5 are different, so the authors of the end-use standard must decide which standard to reference. A relevant example is IEC 61730-2, the Standard for PV (photovoltaic) panels, which references IEC 60060-1 as its impulse standard definition, which is applicable to insulation systems. In the PV standard, the authors note that the test is, “To verify the capability of the solid insulation of the module to withstand over-voltages of atmospheric origin. It also covers over-voltages due to switching of low-voltage equipment”. While this scope would be closer to that of IEC 61000-4-5, the authors elected to conduct the test under the requirements of an insulation impulse test, which they deemed a better definition of their test program.


**Jeffrey D. Lind**

Jeffrey D. Lind has over 33 years of electrical engineering experience. He launched his career working at UL (Underwriters Laboratories) and then for Atari\textsuperscript{TM} and Sega Gremlin\textsuperscript{TM}. In 1997, Lind started Compliance West. He received his Bachelors of Science in electronic engineering from Cal Poly San Luis Obispo.
Raising awareness
IEC speaks at UNIDO conformity assessment workshop for developing countries

While conformity assessment is a given in industrialized countries, the concept has not necessarily been fully integrated into developing economies. Recognizing the need to raise awareness and provide a better understanding of the specific requirements linked to standardization and conformity assessment activities, UNIDO (United Nations Industrial Development Organization) has been implementing a series of projects, tailored specifically for developing countries.

**Partnership with international standardization organizations**
UNIDO saw the benefit of working in partnership with international and regional organizations that have broad experience and know-how in the fields of standardization and conformity assessment. After initially working on some projects with ISO (International Organization for Standardization), the UN agency felt it was important to expand into other areas such as electrotechnology and telecommunications to cover the broadest possible scope and allow developing countries to tailor their infrastructure development to their own specific circumstances and needs. To do so, UNIDO approached the IEC and ITU (International Telecommunication Union).

Although each of the three international organizations has its specialist areas, there are commonalities as well, allowing a synergistic approach to be developed.

To promote this synergy, UNIDO has started to organize regional workshops. The objective is to engage developing countries in standards and conformity assessment activities and help them better understand the electrotechnical and telecommunications sectors, so that they can bridge specific gaps in their infrastructure.

**Bangladesh hosts first workshop**
The first of these workshops, which took place on 1-2 February 2012 in Dhaka, Bangladesh, brought together participants from Asian countries. They included policymakers and regulators, industrialists, academics, laboratory professionals and accreditation officials.

On the first day of the workshop, experts from UNIDO, IEC, ISO and ITU introduced their respective organizations and presented their conformity assessment activities. They were joined by two other organizations: ILAC (International Laboratory Accreditation Cooperation) and IAF (International Accreditation Forum).

**IECEE: efficiency, protection and participation**
The first part of de Ruvo’s presentation focused on IECEE organization and structure and its membership. He then explained in greater detail the function of the IECEE CB Scheme and the IECEE CB-FCS (Full Certification Scheme), the cooperation agreement between the IEC, ILAC and IAF and the new services that the System provides, e.g. energy efficiency, electric vehicles, hazardous substances.
De Ruvo then addressed the more specific issue of conformity assessment for developing countries, describing how developing countries can use and benefit from the IECEE System:

- to protect their countries from importing non-conformant or inefficient electrical goods
- as a basis for establishing a national conformity assessment structure – a testing laboratory and/or a certification body – to test non-certified products or to retest certified products as part of market surveillance activities
- to facilitate trade

In using the IECEE System, developing countries can ensure that products are safe and efficient, minimize risks to persons and property, take into account and contribute to environmental aspects and public health and support regulatory policies.

In the second part of his presentation, de Ruvo presented the other two IEC CA Systems: IECEx and IECQ.

**Ex environment**

Ex (explosive) environments are not found solely in industrialized countries: oil and gas extraction, refineries, mining, woodworking, grain handling and storage and textiles, as well as aircraft refuelling and petrol stations, can be found anywhere in the world. The IECEx System is designed to provide assurance that those who work in hazardous areas have the requisite skills and competence and that the equipment they use has been tested and complies with the relevant IEC International Standards in the IEC 60079 series on explosive atmospheres. And because equipment and machinery used by companies operating in hazardous areas has a high capital cost, it is often less onerous to repair a piece of equipment than to replace it. IECEx also assesses and certifies that organizations and workshops that provide repair and overhaul services to the Ex industry do so respecting the strict requirements outlined in IEC 60079-19, *Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation*.

**Electronics**

In recent years, developing countries have played an ever increasing role in the electronic components sector. A great number of manufacturers have relocated part or all of their operations to Southeast Asia and, to a lesser extent, to Latin America and North Africa. This trend may in turn encourage local entrepreneurs to start their own electronic components business. In order for them to be competitive, developing countries have to ensure that their products are of the highest quality. Acquiring the know-how and the expertise to produce quality goods can also lead to the eradication of counterfeit and substandard components from their markets. IECQ is the perfect tool to help them achieve this goal.

Together, all three IEC CA Systems cover testing and certification for all electrotechnical areas, ensuring that products, equipment, installations and services are safe and reliable. Developing countries that participate in the IEC CA Systems also have the opportunity to attend regular workshops and trainings.

**Local perspectives**

Following the IEC, ISO and ITU presentations, representatives from the Asian countries attending the workshop talked about the existing conformity assessment infrastructure in their country and specific market needs in the areas of electrotechnology, information technology and telecommunications. A panel discussion addressing conformity assessment routes to meet industry concerns about costs of certified testing and needs of developing countries to increase quality of service was last on the first day’s agenda.

The second day was devoted to breakout sessions. The assignment for each working group was to develop and present a roadmap for strengthening and upgrading existing standardization and conformity assessment infrastructure to achieve regional and international recognition. This again was followed by a panel discussion and the workshop’s final remarks and recommendations.

The workshop in Bangladesh was the first of its kind and a similar event may be organized in Africa later this year.
From singing to sensing
IECEx certifies modern gas detectors and sensors

A BBC News item dated 30 December 1986 announced that more than 200 canaries still employed in UK mines were to be made gradually redundant throughout 1987. The article stated that “new electronic detectors will replace the birds because they are said to be cheaper in the long run and more effective in indicating the presence of pollutants in the air otherwise unnoticed by miners.”

Like a canary in a coal mine
The use of canaries as gas detectors had been a mining tradition in the UK since 1911. Toxic gases such as carbon monoxide, carbon dioxide or methane in the mine would kill the bird before affecting the miners. Because canaries tend to sing much of the time, they would stop singing prior to succumbing to the gas, so alerting miners to the danger.

As reliable as canaries might have been, the switch to electronic gas detectors actually made sense and brought greater safety. Technologies are evolving constantly and modern gas detection devices are state-of-the-art, extremely sophisticated devices that use sensors to identify potentially hazardous gas leaks. They are usually part of larger safety systems that can be found in a wide variety of locations such as mines, oil rigs, refineries, paper mills and industrial and waste water treatment plants. They are also widely used by firefighters. These devices often interface with control systems so that a process can be shut down automatically in dangerous situations.

Sophisticated sensors
Gas detectors can be portable, battery-operated devices worn on clothing or a belt, or can be fixed units. They transmit warnings through alarms, flashing lights and often visual displays, when dangerous levels of gas vapours are detected. As detectors measure a gas concentration, the sensor responds to a calibration gas, which serves as the reference point or scale. As a sensor’s detection exceeds a preset alarm level, the alarm or signal will be activated. Originally, detectors were produced to detect a single gas, but modern units may detect several toxic or combustible gases, or even a combination of both types.

The various types of gas detectors are classified according to their operation mechanism: semiconductors, oxidation, catalytic, infrared, and so forth.

Instant detection anywhere and everywhere
To ensure the safety of those working in hazardous areas, the instant and accurate detection of life-threatening gas concentrations is essential. Equally important is the ability of a monitoring device to operate reliably in the harsh and extreme conditions often found on an offshore platform, in a mine, a refinery or an industrial plant.

The trend in gas sensors goes towards wireless sensing, where sensors and sensor networks can be deployed anywhere and everywhere to provide a constant stream of information about the people who use them and their environment.

Based on MEMS (microelectromechanical systems) technology, these
new wireless sensors are ultra-low power, ultra-thin and flexible, have a long lifetime and can be “tuned” to detect specific gases. They can be integrated into modern electronic platforms such as smart phones, tiny wireless sensor modules, ultra-thin RFID (radio-frequency identification) and portable devices. They can also be fitted into clothing or be placed in strategic areas in refineries, offshore platforms, mines and any other hazardous locations.

Ensuring safety and reliability through IECEx

Today, gas detection devices are an integral part of the basic equipment of anyone working in a hazardous environment. As such, they must undergo the same testing and certification process as any other piece of equipment used by the Ex (explosive) industry.

A great number of companies that manufacture such devices rely on IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, for the testing and certification of their products. Manufacturers have to meet the very strict requirements specified in the IEC 60079 series of International Standards on explosive atmospheres as well as those put in place by national or regional regulations and legislation. Proving their adherence to these requirements can be costly and time-intensive.

Testing, assessment and/or certification conducted within the IECEx is accepted in all its member countries and way beyond. It is widely recognized as the truly international system for Ex equipment, provides access to the global market and drastically reduces costs by eliminating multiple re-testing and certification.

Highly skilled staff

To cover all safety aspects in Ex environments and to complement the Certified Equipment Scheme, IECEx has developed the IECEx Certification of Personnel Competence Scheme to assess and certify individuals working in potentially hazardous areas.

The IECEx CoPC (Certificate of Personnel Competence) provides independent proof that the certificate holder has the required qualifications and experience for working on electrical equipment located in hazardous areas and can implement IEC International Standards covering explosive atmospheres.

For the CoPC, competence is defined as “the ability to apply knowledge” rather than simply assessing knowledge. In this sense, the assessment of persons includes assessing their ability to perform certain Ex-related tasks.

To obtain a CoPC, a person submits an application to an approved IECEx Certification Body. Regular re-assessment also ensures that the certified person maintains these competencies. The certificate is personal, non-transferable and is valid across international borders.

And the winner is…

IECEx Executive Secretary Chris Agius honoured for lifetime contribution to Ex industry

Based on an article published on the HazardEx website

IECEx Executive Secretary Chris Agius received the HazardEx Lifetime Contribution to the Industry Award on 29 February 2012 at a gala dinner that took place during the annual HazardEx event in Harrogate, UK. The Award recognizes an individual for making a significant personal contribution to improving health and safety in hazardous areas.

By a large margin of nominations from the international Ex industries,
CONFORMITY ASSESSMENT

About HazardEx
HazardEx is the brand name for a suite of products – website, journal, newsletter, annual event – dedicated to the provision of up-to-date information specifically relevant to those companies and individuals responsible or interested in safe working operations within hazardous area environments.

Extremely reliable and incredibly safe
Safe sensors for safe devices through IEC Certification

We don’t see them, most of us don’t even know what they look like, but we are all dependent on them. They make life easier and safer. Modern technologies couldn’t do without them. In short, sensors are indispensable.

Sensors are used to measure data, which they convert into signals that are communicated to a system. Most sensors are used to measure light, temperature, touch, sound, position and magnetism. Others are used to measure speed, pressure or flow or are capable of recognizing images.

Making the world safer
Sensors and sensor systems are a key underpinning technology for a wide range of applications. They can be used to improve quality control and productivity in manufacturing processes by monitoring variables such as temperature, pressure, flow and composition. They help ensure the environment is clean and healthy by monitoring the levels of toxic chemicals and gases emitted in the air, both locally and – via satellites – globally. They monitor air quality and detect potential threats, ensuring the safety of people and the environment.

LED light and infrared light sensors

Agius was the unanimous choice to receive the award this year. Thanks to his enthusiasm and drive, IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, has become the global standard in conformity assessment. Additionally, the United Nations, through UNECE (United Nations Economic Commission for Europe), has published a regulatory framework that allows countries to gradually align differing national regulations on explosive environments with internationally-harmonized best practice of the IECEx.

A truly global system for Ex industry
Until now, the lack of harmonized legislation for equipment for use in hazardous areas has meant that countries that don’t represent a sufficient market opportunity are de facto denied access to state-of-the-art Ex equipment. Because differing legislation often doesn’t allow countries to accept the testing and certification carried out in another country, manufacturers have generally had to have devices re-tested and re-certified whenever they have wanted to enter a new market.

Ultimately this results in a sub-optimum level of safety both for local industry and the populations that live around the sites that harbour potential explosion risks.

Countries that lack Ex regulation may now use this IECEx framework as a blueprint for their legislation. This provides significant improvement in accessibility to high-level Ex equipment.

The Award
Receiving his award, Agius said: “The award was special as the nomination was made by peers in the industry and then voted on by industry itself. I see this as acknowledgement for the work and efforts done by the entire IECEx Secretariat team, Chair and Executive, and the IEC Central Office, along with all IECEx Members.”

This is the third Lifetime Contribution to the Industry Award bestowed by HazardEx. The previous recipients were Chris Towle of MTL (Measurement Technology Ltd) and Ron Sinclair MBE, of Baseefa. Both have been members of IEC TC (Technical Committee) 31: Equipment for explosive atmospheres, for many years and Sinclair is also a member of the IECEx Management Committee.

The full article reporting on all HazardEx Awards is available on the HazardEx website.

We don’t see them, most of us don’t even know what they look like, but we are all dependent on them. They make life easier and safer. Modern technologies couldn’t do without them. In short, sensors are indispensable.
area and regional compliance with environmental standards. They enhance health, safety and security in the home and workplace through their use in air-conditioning systems, fire and smoke detection and surveillance equipment. They play a major role in medical devices, transportation, entertainment equipment and everyday consumer products.

Technological innovations have brought a new generation of sensors, such as MEMS (micro electromechanical systems). These are smaller, smarter and can be integrated into fixed and portable devices.

But whatever the size of the sensor, the device has to be accurate and reliable. Whatever it measures, the measurement has to be extremely precise. A defective sensor can have serious consequences, putting human lives in jeopardy.

As with any other electronic component, a sensor has to go through a battery of tests before it hits the market, to ensure that it complies with specific requirements.

IECQ: Safety inside

Sensor manufacturers and suppliers all over the world have a powerful tool at their disposal, enabling their products to meet the strictest requirements: IECQ testing and certification. IECQ is the IEC Quality Assessment System for Electronic Components.

About IECQ

As a worldwide approval and certification system covering the supply of electronic components, assemblies and associated materials and processes, IECQ provides a certification system that enables manufacturers and suppliers to provide independent verification that the claimed specifications (including International IEC standards) are met. This gives end manufacturers the reassurance of knowing that suppliers holding IECQ certification do not need stringent second party assessment or monitoring.

The plethora of electronic components and processes covered by IECQ are used in all kinds of technologies, from the smallest device to the most complex piece of equipment. At present, eight families of components are certified by IECQ:

• active components, including integrated circuits
• electromagnetic components
• electromagnetic components
• electro-optic components
• hybrid integrated circuits
• passive components
• printed boards
• wires and cables

IECQ’s contribution to a safer and more reliable world can only increase with the development of new technologies and state-of-the-art electronic devices.
Many countries have introduced labelling programmes and minimum energy performance standards for electrical appliances. Most countries first focused on refrigeration appliances, which, after central heating, are the biggest domestic users of energy, because they run all the time. These measures were then expanded to cover a greater number of equipment such as lighting, washing machines, dryers, dishwashers, water heaters and even smaller appliances.

**Labels and standards go together**
Apart from concerns for the environment, saving energy and money is the main driver for consumers when they acquire new energy-efficient appliances. Modern refrigerators, for instance, use at least 40% less energy than conventional models did 10 years ago. Investing in an energy-efficient fridge, freezer or integrated fridge/freezer can make a significant difference in household energy consumption and annual running costs.

Labelling programmes, which help consumers to compare the energy efficiency of the different appliances on sale, are usually complemented by minimum performance standards in the great majority of countries.

Several IEC TCs (Technical Committees) and SCs (Subcommittees) have introduced specific requirements that address the energy efficiency issue in the International Standards they are developing.

**Standards for a green society**
The ever increasing demand for “green” requirements in products prompted JISC (Japanese Industrial Standards Committee), in collaboration with IEC-APRC (IEC Asia-Pacific Regional Centre), to organize a regional seminar to promote awareness and developments in energy efficiency requirements in standards for electrical and electronic products, as well as the need for the harmonization of these requirements. The two-day event, hosted by the IEC National Committee of the Philippines, took place in Manila on 6-7 December 2011 and attracted more than 40 experts from 8 countries.

**Why participate in the development of International Standards?**
The keynote address was delivered by Setsuo Harada, Executive Advisor of JSA (Japanese Standards Association) and former IEC SMB (Standardization Board) member for Japan, who explained the need to be involved in international standardization from the perspectives of experts, products and organizations. He stated that, with active involvement of experts and organizations, both the individual and the organization would grow as involvement translates into a better understanding of the global market.

**Standards for energy efficient products**
Hiroshi Sasaki, Chairman of IEC SC 61C: Safety of refrigeration appliances for household and commercial use, and Jun Nakamura, member of IEC SC 59M: Performance of electrical household and similar cooling and freezing appliances, talked about the latest developments in their respective Subcommittee. Their presentation focused on refrigerators and stressed the need to encourage the use of the latest edition of IEC 62552, Household refrigerating appliances - Characteristics and test methods.

In the area of energy efficiency for multimedia equipment, Tadashi Ezaki, Secretary of IEC TC 100: Audio, video and multimedia systems and equipment, addressed current topics such as power consumption measuring methods, common battery charger interfaces, DC power supply for laptop personal computers and smart grid related activities.
Dr Takaaki Miyashita, JBMIA (Japan Business Machine and Information System Industries Association) made a presentation on the energy efficiency of office equipment.

In addition, Dr Takao Shiino, Nomura Research Institute, gave a presentation on energy saving in data centres, which will have a big impact on IT systems in the future.

The seminar also included presentations by participants from China, Indonesia, Korea, Malaysia, Philippines, Singapore and Vietnam who shared their national perspectives in these areas.

Dennis Chew, Regional Director IEC-APRC, gave an update on the latest developments in the IEC and an overview of the IT tools that help experts participate more effectively in the IEC.

Networking opportunity
The seminar was an excellent opportunity to promote not only the latest trends in the IEC relating to the energy efficiency of electrical and electronic products but also served as an important networking opportunity in facilitating more active participation in the IEC. Following positive feedback from the participants, JISC and IEC will explore the possibility of organizing a future seminar under the theme of Standards for Green Society in 2012.

The A to Z of drafting IEC publications
New IEC website section provides comprehensive guide for standards developers

Drafting standards is a long and complex process that obeys strict rules and requires a certain amount of discipline. To help the thousands of experts around the world who participate in standardization work, the IEC Editing and Document Preparation team has developed an A-to-Z guide on how to draft IEC publications; it is available now on the IEC website.

A step-by-step approach
This new section, entitled Drafting IEC Publications, is designed as a one-stop shop that provides standards developers with all of the elements – rules and recommendations, templates, advice and tips – that are needed for drafting IEC publications.

The section provides experts with a well-documented and comprehensive guide that assists them in the process of drafting a new publication or maintaining an existing one and helps them with the layout and formatting of IEC publications. It also aids the presentation of graphics and figures and provides the IEC templates to be used in standardization work.

The Guidance by keywords page facilitates searches through the whole section. Although the list of topics is quite long, filters help narrow down searches. When a keyword is entered – image, for example – all entries dealing with images will be brought up.

This step-by-step approach should ease considerably the life of all those who participate in the drafting process.

Grouping the information
Most of the information contained in the Drafting IEC Publications section was already in existence on the IEC website,
but it was scattered across the site and, with the exception of the ISO/IEC Directives, often difficult to find.

The ISO/IEC Directives, Part 2, provide the framework for structuring and drafting documents published as International Standards, Technical Reports or Technical Specifications. These are the core documents that standards developers have to comply with when drafting new publications or revising existing ones.

Over the years, the IEC has developed in-house rules and recommendations that cannot appear in the Directives (which are presented in a more general document) but have to be taken into consideration when preparing IEC publications.

The IEC also has templates that have to be used when creating and revising publications.

A valuable complement to training
The IEC Technical Department receives daily phone calls and emails from experts, requesting assistance and asking questions related to the drafting process. IEC TC/SC (Technical Committee and Subcommittee) Chairmen and Secretaries benefit from specific training sessions that, among other things, address the topic of publication drafting. On the other hand, the vast majority of TC/SC convenors, project leaders and experts have less direct contact with the IEC, and therefore reduced opportunity to receive direct training from the IEC. In both cases, a single training session will never be enough to cover all aspects linked to the drafting of documents. This makes it the more important to have a primary source of information which can both provide further training and also assist in resolving any questions that may arise in the course of drafting an IEC document.

The IEC Editing and Document Preparation team therefore undertook the task of going through all these requests and grouping them by topic. This served as the basis for the Guidance by keyword page. Having this search function should save precious time both for experts and the IEC Editing and Document Preparation team.

Dynamic process
The Drafting IEC Publications section has been designed in such a way that it can be further developed and expanded as new questions and topics arise. If experts cannot find the answer to their questions in the section, they can still contact the IEC team directly and the issues they raise may provide updates for the site.

ISO/IEC Directives, Part 2
This part of the ISO/IEC Directives specifies rules for the structure and drafting of documents intended to become International Standards, Technical Specifications or Publicly Available Specifications. As far as is practicable, they are also applicable to documents intended to become Technical Reports or Guides.

The rules are intended to ensure that documents prepared by the TCs of the IEC and ISO are drafted in as uniform a manner as possible, irrespective of the technical content. There is also some guidance with regard to presentation.
Better communication
Making standards and standardization work more accessible to potential customers

The third joint ISO IEC Marketing and Communication Forum took place in Geneva on the 22-23 February 2012, bringing together more than 150 marketing and communications specialists from 56 national standardization bodies. The theme of the forum was ‘What can we do for our future?’ and participants were invited to reflect on a variety of issues ranging from social media best practice to making standards more accessible through mobile apps and a range of new products and ways for effectively communicating to stakeholders. Break-out sessions followed by group presentations allowed for the consolidation of the ideas discussed and a social media ‘clinic’ was in place for those participants wishing to receive guidance from a social media specialist. Four external speakers also gave participants food for thought with presentations on issues as diverse as information overload and what the future could hold for financial services.

Social media – helping the standardization community connect
The first panel discussion of the forum was moderated by Sylwia Presley, social media specialist at Voice who is helping the IEC with social media outreach and activities. Members of a number of international and national standards bodies discussed the different social media channels and extent to which they are used in their organizations. There was consensus in the need for standards organisations to actively make use of social media platforms so as to further engage with customers as well as professionals, although the point was made that social media was used as a complement to, rather than a replacement of, traditional marketing strategies. Social media it was agreed also help organizations to be seen as transparent, while allowing to monitor both positive and negative comments and react accordingly. A big advantage mentioned by everyone was an increase in traffic to the respective websites which ultimately results in more sales.

Making standards more accessible through mobile apps
David Roessli, whose company Cybermedia Concepts builds web platforms that are able to satisfy traditional needs as well as those of the increasing number of mobile devices, opened the afternoon session on mobile applications with a presentation on best practice for web design. He made the point that with mobile browsing soon expected to overtake desktop-based access to the internet, flexible designs that adapt to different devices are key, allowing access to larger audiences. Responsive web design, he said, should take mobile devices as their starting point which, because of the limited screen space, help focus on key tasks and messages to engage audiences. And his final word of advice: “design from the content out rather than from the canvass in”.

During the second panel discussion of the day panelists shared their experience and expertise in regards to new formats for presenting information, including mobile and web applications. In this context, the IEC presented the Electropedia app which will allow professionals to translate electrical and electronic terms on the go into a multitude of languages.

Following the breakout session, participants explored the financial aspect of developing applications. There was general agreement on the need for market research in order to define potential customers.

Products to better navigate standards
For the first session of the second day, representatives of IEC, ISO, ABNT (Associação Brasileira de Normas Técnicas) and BEC (Belgian Electrotechnical Committee) presented...
the latest products developed by their respective organisations to help users navigate through the often complex world of standards. Everyone felt there was a need to provide frameworks that would allow users to more easily search for, find and aggregate information on standards.

With an increasing amount of standards and standards-related information available on the web though, an issue faced by all standards bodies is copyright infringement. The session focused on how to identify websites selling standards illegally and ways of tackling piracy, including sharing information between organizations and, if needed, taking coordinated legal action.

**Tailoring messages to different audiences**

The final panel discussion of the forum focused on ways of communicating to stakeholders and presenting the benefits of standardization to audiences who are not necessarily familiar with standards and how they work. Panelists presented campaigns their organizations had rolled out which aim to emotionally connect with audiences and make standards more relevant to their everyday lives.

On the other side of the coin, and just as important, is fostering awareness of standardization among industry leaders and approaches encompassed campaigns specifically targeting executive leaders. Participants agreed that stakeholders are often unaware or confused about what standards really are and what they can offer their businesses and the word ‘standards’ often only heightens their misunderstanding. It was pointed out that it is important to “tailor messages to different audiences” and talk to people in their own language, helping them to understand how standards can benefit their particular business.

**Insights into the past and future**

The ISO IEC Marketing and Communication Forum took place in parallel with the Lift12 conference and three of the speakers were generous enough with their time to accept an invitation to talk at the Forum.

Anaïs Saint-Jude, Director of the BiblioTech Program at Stanford University gave a speech on ‘information overload’. Often considered a very modern condition and linked to the rise of the internet, Saint-Jude showed how, starting in ancient times and throughout the ages humans have felt overwhelmed by the amount of information available, each time considering it a ‘new’ phenomenon, despite it being pretty constant in every era. She argued, however, that far from being a cause for concern, information overload has been and continues to be a force for innovation.

In a similar vein, J.P. Rangaswami, Chief Scientist at salesforce.com talked about how new technologies have helped to speed up evolution. While social media for example often get bad press in regards to invasiveness or privacy issues, Rangaswami pointed out that new technologies evolve in order to fill a gap or need and that sharing information can, and in many cases has, been used for good causes. His message: “we spend too much time questioning new technologies rather than focusing on how value can be generated from them”.

On the second day David Birch, Director at Consult Hyperion gave participants an insight into what financial services, and in particular money, might look like in 2050. His belief that in the not-too-distant future national borders will become meaningless in economic terms as “power shifts away from nations and the ‘west’ towards cities” and different communities begin issuing their own currencies captivated everyone’s attention and sparked many questions from attendees.
IEC welcomes its 82nd member
Moldova joins IEC as Associate member

In January, the IEC welcomed the Republic of Moldova as its 82nd member. Moldova’s addition means that 163 countries (82 members and 81 affiliate countries) are now involved in electrotechnical standardization work under the aegis of the IEC Family.

The Republic of Moldova is a landlocked state in Eastern Europe located between Romania (to the west) and Ukraine (to the north, east and south). It lies between two rivers, the Dniester and the Prut. Moldova has a population of 4.3 million, of whom 650 000 live in the capital, Chișinău. Statistics show estimated annual electricity generation of 3 412 billion kWh and consumption of 4 463 billion kWh. The country imports all of its supplies of petroleum, coal and natural gas. Its main industries are sugar, vegetable oil, food processing, agricultural machinery, foundry equipment, white goods, shoes and textiles.

From IEC Affiliate...
Moldova was one of the first countries to join the IEC Affiliate Country Programme for developing countries when it was launched in 2001. In July 2010 it was granted Affiliate Plus status, having adopted more than 90 IEC International Standards as national standards and having established MEC (the Moldovan Electrotechnical Committee). MEC represents the country’s main electrotechnical stakeholders: industry, regulatory authorities, academic institutions and the national standards body.

The President of MEC, Mr Vitalie Dragancea, is also General Director of INSM (National Institute for Standardization and Metrology) while Ms Tatiana Rusu, Secretary of MEC, is a senior specialist in international relations at INSM.

...to IEC Associate member
As an Associate Member, the Republic of Moldova will be able to attend all technical and some management meetings (such as those of Council and the Standardization Management Board) that take place during the annual IEC General Meeting.

Associate Members have access rights and can comment on all IEC technical documents, except FDISs (Final Draft International Standards). They may also request to become P-members (Participating members) on a maximum of four TCs (technical committees) or SCs (subcommittees). P-members have a duty to vote on the work produced by those committees.

Moldova is located between Romania and Ukraine
For most people, mention oils in terms of an industrial environment and they immediately think of the lubrication of machines. However, the public at large is less aware that oils are also used in the electrotechnical domain as insulating elements in a wide range of equipment. IEC TC (Technical Committee) 10: Fluids for electrotechnical applications, has just published the latest version of an International Standard that covers unused mineral insulating oils for transformers and switchgear.

Wide range of applications
Oils have been used in electrotechnology for a long time, leading to the creation of IEC TC 10, initially called “transformer oils”, as early as 1924. The scope of this TC has been extended a number of times, first in 1926 to include “insulating oils” and later to cover additional applications and equipment, including lubricants for steam turbines and substances like gases.

Some electrical equipment and systems, such as power transformers and switchgear, use mineral insulating oils. The functional requirements of these oils are insulation, heat transfer and arc quenching.

The standards issued by TC 10 in this domain provide guidelines to insulating fluids producers and are of interest to manufacturers of electrical transformers, switchgear and other equipment, and to engineers in charge of plant operation and control.

Quality matters
Certain properties of mineral insulating oils, such as viscosity, pour point or water content, may deteriorate with use and as a result of the influence of other elements during their service life. This may in turn affect equipment performance and even lead to failure.

Defining quality criteria for insulating oils is essential, as they deteriorate with time and contact with external factors and contaminants. The quality of unused oils is also important as, once initially spent, they can be recycled and reused. TC 10 works on standards that allow this.

With use and when in contact with air, insulating oils are affected by oxidation, a phenomenon that can be accelerated by high temperature of the oil and the presence of catalysts, such as small metal particles. Oxidation can produce water and acids and affect equipment.

Insulating oils can also be contaminated by moisture (through oxidation, water ingress or other factors) and by substances such as solid particles that the oil causes to be removed from equipment or that infiltrate during maintenance or repair.

Following strong market demand, TC 10 has worked on the revision of its 2003 edition of IEC 60296, Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear. This revised International Standard was released in February 2012.

Expanded definitions
For the purpose of this standard, mineral insulating oils are classified into two categories: transformer oils and low temperature switchgear oils. To maintain the quality of mineral insulating oils as long as possible, chemicals such as oxidation or corrosion inhibitors need to be added to them to improve some of their properties. IEC 60296 expands significantly on the previous version as regards the definition of some of these additives.

The revised standard also includes a comprehensive note, lacking in the previous edition, on specifications for corrosive sulphur compounds that can lead to the build-up of certain substances in transformers and on their potentially corrosive impact.

Other International Standards prepared by TC 10 concern different aspects of the use of mineral insulating oils in electrotechnical equipment.
Flowing with the tide
Renewable energies committee on marine energy issues its first publication

One of the more recent of the IEC TCs (Technical Committees), TC 114, is responsible for International Standards for marine energy conversion systems. It has issued its first publication, specifying the most important renewable energy terms relating to ocean and marine energy.

Facilitate communication between organizations
IEC TS (Technical Specification) 62600-1 defines the terms used in the marine renewable energy industry and relevant to ocean and marine energy. These renewable sources include wave, tidal, current, and other water current energy converters. Providing uniform terminology for use at an international level helps organizations and individuals to communicate with each other and thus facilitates interaction between them.

Not necessarily the same definition
Ghanashyam Ranjitkar, from Natural Resources Canada, Project Leader for IEC/TS 62600-1, commented on how the different people in the team, all very familiar with the context, had different understandings of terminology. “It was interesting during the process of developing this TS how even established terms were understood differently by the experts in the field.” He illustrated his comment saying that, for example, “added mass was modified probably 8 to 10 times until we agreed on the final definition”.

Ranjitkar commented that the challenge of working on this type of project was to keep the definition concise and he was happy about the consensus they had obtained. “Finally, agreeing on the definition for added mass pleased the team.”

Add clarification
Terms are not always used consistently across the globe and one of the aims of the TS is to add clarification. One example, he gave was the terms array and farm which are used interchangeably. “This TS will certainly help to clarify that”, said Ranjitkar.

Illustrate with figures
Ranjitkar is particularly proud of the three figures that are included in the TS. They form the basis for clearer understanding of the terms used. “I believe”, said Ranjitkar “that this publication will help provide better knowledge of the emerging sector of marine energy and remove any ambiguity that may have risen.”

Way forward to help future work
Having set down the basics in this first publication Ranjitkar says it will also help in their future work in defining further TC 114 publications. “I am proud that I had such a dedicated hard working team. They provided valuable time in preparing this TS”, added Ranjitkar.
Shipping is at the core of international trade as tankers, bulk carriers, general cargo or container ships transport between 80% and 90% of all raw and finished products between countries. Safety of maritime crews at sea has been a concern ever since ships started transporting goods and people thousands of years ago. Today ships are very advanced machines that rely ever more on electrical equipment. Several IEC TCs (Technical Committees) work with the shipping industry, the International Maritime Organization and international bureaus or registers of shippings to prepare International Standards for reliable and safe electrical systems on ships and offshore units.

With the share of electrical and electronics systems in motor vehicles growing steadily over the years, the IEC’s work is vitally important to the automobile industry. Today all major automobile manufacturers are proposing at least one electric – hybrid – model as part of their product range. Issue 03/2012 of e-tech will look at some of the challenges facing the EV (electric vehicle), be it a car, a bus or a bicycle.