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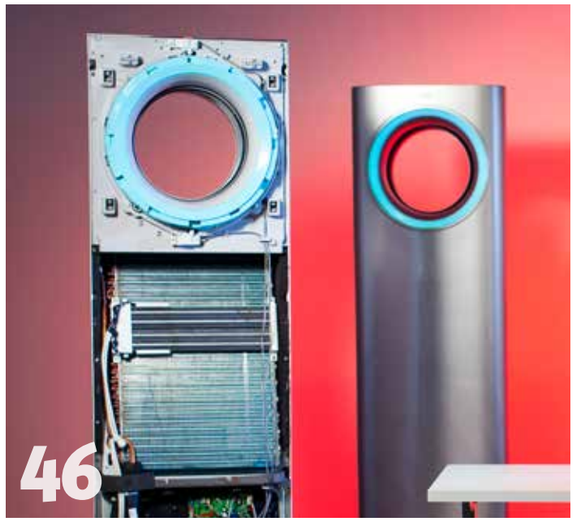
ISO focus

May-June 2015



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As innovation fuels economies, *standards smooth the ride*

For years the standardization community has been working to reverse the misperception that standards are a hindrance to innovation. In fact, standards are a strategic tool that can spur innovation and drive business growth. Particularly in dynamic sectors and areas with tremendous growth potential – energy, nanotechnologies, ICT and systems integration, to name a few – standards and conformance are critically important for translating ideas into reality.


Photo : ANSI

***S. Joe Bhatia**, President and CEO*
American National Standards Institute (ANSI)

The good news is that more and more companies are getting the message and using standardization to actualize new technologies, expand product lines, and get into new markets. As the US member body to ISO and other global standardization forums, and the coordinator of the US voluntary standards and conformance system, the American National Standards Institute (ANSI) makes it a continual priority to educate business and policy leaders – and tomorrow's generation – about the role of globally relevant standards in fostering innovation.

We know that innovation is the fuel of economic engines, and standards and conformance are a critical element of the formula. But to effectively communicate that message, we need to explain how. And there are many ways.

Consensus standards provide a solid and reliable foundation of broad-based knowledge that allows for creative innovation to grow. Research and development costs are lower when tried-and-true standardized methodologies serve as the launching point for technological advancements. By codifying and widely disseminating best practices, standards promote efficiency throughout global supply chains and can reduce time to market. Whether industries are firmly established or growing into an emerging sector, standards provide a strong infrastructure for subsequent generations of innovation.

Standardization also helps to build focus and cohesion – or critical mass – as innovative technologies develop. This increases the credibility of emerging technologies, fostering further investment, the development of complementary technologies, and more and more related and competitive products and systems. And standards help with the interoperability of old and new technologies, enabling compatibility and simultaneous use of different generations of products, processes, and systems – and throwing the economic engine into high gear.

Standards and conformance can also provide a level of trust in a new, innovative technology that is imperative for success. They help companies demonstrate to regulators and the market that innovative products or systems actually perform as they claim to. And they can help reduce the various risks associated with a new technology – not just for individual businesses, industries and users, but in terms of public health, safety, and protection of the environment. Creating public trust in an innovative technology fosters its widespread acceptance.

And international acceptance has become a key priority as markets for innovative technologies expand worldwide. Globally recognized standards and conformance measures are critical tools for ensuring new and complex products can be accepted across national borders. And standards developed through an open, consensus-based process are more likely to be broadly recognized.

Through all of these methods, standardization helps to foster the practical implementation of innovative ideas, resulting in new and improved technologies, products, and services. And to highlight these points with real-world examples, ANSI has led a public information campaign aimed at helping our current and future business and policy leaders understand how to use standardization strategically to fuel innovation and competitiveness. I invite you to explore and share the resources at **www.standardsboostbusiness.org**.

Today, more than half of America's economic growth comes from industries that barely existed 20 years ago. Those sectors offer the greatest promise for job creation and market expansion that can support our next generation. But their success depends upon continued innovation, and that innovation depends upon standards.

S. Joe Bhatia, President and CEO
American National Standards Institute (ANSI)

World Standards Day video competition:

@MariaLazarte
ISO Social Media Manager
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This year ISO, IEC and ITU are organizing a video competition to raise awareness of the importance of standards in our daily life. The best video will be awarded 1 500 Swiss francs, with the three runners-up each receiving 500 Swiss francs.

Your challenge is to imagine a world without standards. Life would be much more complicated! Exchanging goods and services, or even communicating would be more difficult because standards provide a form of common language that makes things work with each other.

We invite you to focus on just one example of something that would not work or that we could not do if we didn't have standards. Get your friends, family and colleagues to help you and capture this on video. That's all! Share it with us, and you may be our winner.

Deadline – All videos must be uploaded and the link (with hashtag) sent to us **between 1 June 2015 and 10 July 2015**.

Judging criteria

ISO, IEC and ITU will select 10 videos based on the following criteria:

- **Relevance:** Does your video show an example of something that would not work without standards?
- **Understanding:** Does your video reflect the impact that standards developed by ISO, IEC and ITU have on our lives?
- **Originality:** Is your video fresh and innovative? You will stand a better chance if you are not doing the same as everyone else.
- **Compliance:** Does your video meet all the rules and conditions?

Don't be afraid to show a sense of humour when making your contribution, we like to laugh. And of course, quality is key – although we don't expect a cinematographic production, every little helps.

The 10 selected videos will be put up for vote on our social media channels; then it will be up to the public to decide!

So what are you waiting for? Get creative!

Don't forget to follow these 5 simple rules:

Rule 1
You must be at least 2 people to participate, because let's face it, it's more fun that way.

Rule 2
15 seconds max. please, because we would like you to focus on just one example of something that doesn't work without standards. Bonus – if it's just 15 seconds, you can post it on Instagram too.

Rule 3
Don't forget to add the clip provided by ISO, IEC and ITU for the competition (QR code).

Rule 4
Upload your video on YouTube, and tweet, Instagram or message us on Facebook with the hashtag **#speakstandards**.

Rule 5
This is just a summary; read the full requirements on **www.worldstandardscooperation.org/wsd**.

Drone innovation reaches new heights

For years, drones have been left in limbo, with no standards in existence to guide the industry or its exponential growth. Now, finally, drone innovation is being taken to new heights. To understand what this means, we reached out to several people across the industry. Here's what they had to say.

At a time when drones have become a regular feature in the news and are about to proliferate our airspace, it's a good idea to take a step back and examine some very basic and important questions: What, exactly, is a drone, and how will it be affecting our daily lives?

The answer turns out to be more complex than expected. Strictly speaking, a drone is an unmanned aircraft that can fly autonomously – that is without human control.

Drones – also referred to as unmanned aerial systems (UAS) – can range greatly in size, capabilities and cost. And the world market for this technology has grown by leaps and bounds in recent years. The number of development centres and manufacturers of UASs is increasing by 3% to 7% annually. Global spending on research and procurement for UASs already exceeds billions of (US) dollars, too. With such investment taking place, it's clear the world is taking notice and focusing more on this industry, and all its related elements. This includes the aircraft, the control station and the communication link, not just the vehicle itself.

I had the opportunity to discuss the topic with several industry players, including the Swiss drone producer senseFly, to learn how contemporary unmanned aircraft are used, the challenges for maximizing the technology's efficiency, and the future trends facing both standards development and the industry itself.

Nothing to fear?

The word "drone" can conjure up a host of different emotions and, mainly to the uninitiated, a somewhat unwarranted sense of fear. Most of us have seen pictures in the media of military drones used to spy and inflict damage on targets and humans. But drones are much more than just tools for military use and are often undeserving of the perception they might have. This evolution will come as people develop a better understanding of the many positive contributions drone use can offer on the commercial side and for the public good.

Photo : Drone Adventures

Photo : Drone Adventures

Standardization clearly is an important issue of our time.

Take, for instance, the technology behind senseFly's products. In 2001, a team of robotic researchers at the École Polytechnique Fédérale de Lausanne (EPFL), in Switzerland, began investigating the control and navigation strategies of flying insects. This pioneering research led to the development of a highly integrated autopilot system, which employs smart control strategies similar to those found in flies and bees.

The company senseFly was subsequently founded in late 2009, launching its first commercial product – the swinglet CAM – shortly afterwards. In 2012, senseFly joined the Parrot Group and continues to pioneer the field of mini-drones for mapping and GIS (geographic information systems) applications. senseFly drones, for example, are used by professionals working in a wide range of industries – not only land surveying and GIS, but also for agriculture, humanitarian aid, conservation, forestry, scientific research and more.

"In short," says Jean-Christophe Zufferey, CEO and co-founder of senseFly, "what our solutions offer is the ability for our customers to improve their productivity, to enhance their professional lives – whether that means reducing a surveyor's risk on a mine site, providing an NGO with better, more actionable data, or enabling those who grow our food to better meet the world's soaring demand".

Agriculture is perhaps the emerging market with the most exciting potential. Drones enable farmers, agriculture co-ops and service providers such as crop consultants to create so-called "reflectance maps" of crops. These maps allow staff to gauge which areas of a field contain crops that are struggling, for example due to disease or lack of water, which in turn can help optimize treatments and boost yields. For senseFly, aerial imaging drones like the eBee Ag are promising huge yields – no pun intended. The eBee Ag is a mini mapping drone that can collect aerial photography of up to 2470 ac (1000 ha) in a single automated flight. These images are transformed into high-resolution orthomosaics (2D maps) by the drone's image processing software before special algorithms are applied, such as the so-called normalized difference vegetation index, to create the final reflectance map a professional will use to identify the sections of crop in need of treatment or closer examination.

"Our senseFly UAVs have fast become essential tools. They are deployed quickly and allow us to survey entire sites in a short space of time – from wind farms to dams, historic sites, and music festivals," says Mark Entwistle, Managing Director of KaarbonTech, a UK-based drone operator. "With our drones we can produce crystal clear orthomosaics and accurate elevation models more cost-effectively than traditional aerial surveying, and more quickly than using terrestrial surveying methods."

Rules and regulations… or lack thereof

Although such applications demonstrate the value and promise of drone technology, there are growing concerns about the uncontrolled use of UASs in urban areas, near airports and places where they can be seen more as a disruptive force.

Are regulations consistent around the world? In a word, no. At present, the rules concerning commercial UAS use vary widely from one country to the next. In some countries, such as France, Switzerland, Canada and the UK, clearly defined regulations are already in place. These typically stipulate things such as line-of-sight operation, non-urban use, UAS weight limits, and often a flight altitude ceiling.

Where rules exist, most countries do not permit flying systems over crowds or heavily populated areas anyway. But at the same time, activity that acquires highly accurate geographic data, allowing professionals to make better decisions, is permitted. This new approach of using drones to collect accurate geo-data is increasingly replacing time-consuming and sometimes dangerous ground-based methods of working. Otherwise, it is "filling the gap" between these terrestrial surveying methods and larger-coverage aerial imaging approaches such as using manned aircraft or satellite imagery, which can be expensive, are susceptible to cloud cover and, in the case of satellites, often deliver lower-resolution images.

In other countries, drone-specific regulations have yet to be created, and because of that some governments have blocked UAS use completely in the meantime, while others have made no firm rulings either way. However, as the market grows and changes at record speed, and society and government's understanding of drones and their potential benefits increases, so these different regulatory situations will keep evolving rapidly.

According to Cortney Robinson, Director of Civil Aviation Infrastructure at the Aerospace Industries Association in the USA and new Secretary of ISO/TC 20/SC 16, *Aircraft and space vehicles – Unmanned aircraft systems*, developing and implementing appropriate policies and infrastructure appears to be the most challenging aspect of this technology. "For UASs, the optimal infrastructure is digital, satellite-based communication, navigation and surveillance. The International Civil Aviation Organization and leading air navigation service providers, including the FAA (Federal Aviation Administration) in the USA, are influencing international standard development towards UAS transformation by investing in infrastructure like NextGen that will allow for efficient airspace access for all users while maintaining safety."

Mapping the complexities

So how exactly can standards help? UAS standardization clearly is an important issue of our time, due to the increasing market demand for civil unmanned aviation vehicles and the increasing variety of public and private uses.

Users are particularly keen on taking advantage of UASs for other activities besides agriculture, as noted earlier. Border control, forestry, water and fishery assessments, oil and gas pipeline monitoring, search and rescue operations, detecting and mapping areas of natural and man-made disasters, highway and traffic regulation – these represent many of the other challenges and opportunities associated with UAS technology, and a reason why now is the time to get a handle on all this potential.

The situation is complicated by the fact that many types of unmanned aerial vehicles exist and are used for such purposes, comprising most height ranges and differing widely in mass-dimensional types. As there are no uniform design standards, rules and regulations in the areas of communication protocols, navigation and control, and the joint presence in the same airspace of manned, unmanned and remotely piloted aircraft, this results in significant complications for operating in the air traffic around airports and residential areas. This also raises questions related to security and compatibility. Because of the low level of existing standardization, the complexities of creating sophisticated unmanned systems present a significant challenge.

Cortney believes, however, that the window of opportunity is wide open – from a technical point of view. This, in turn, will be of benefit to the regulations that are still lacking. And if current trends continue, this complexity will only increase in the course of time.

"International Standards are critical in creating the global commercial market that many publicize widely. It is vital that these standards bring about a globally harmonized airspace for routine UAS access that will increase the commercial market while maintaining safety and increasing airspace efficiency," says Cortney.

Industry stakeholders and companies such as senseFly have a big role to play in defining appropriate standards, guidelines and implementation protocols, which will improve the integration of UAS data into the precision agriculture workflow and many other areas. The invaluable market feedback that standards provide will also help senseFly, other UAS manufacturers, and companies in the supply chain to further optimize the technology in line with evolving industry needs – a case of standards breeding further innovation.

To summarize, both Jean-Christophe and Cortney agree that the complexity of UASs and the challenges involved require further analysis. "ISO's creation of a dedicated subcommittee on UASs is a valuable step forwards," explains Jean-Christophe. "It should help increase understanding and appreciation of commercial drone technology. This improved societal knowledge can only have a beneficial effect in terms of future regulations."

The number of development centres and manufacturers of UASs is increasing by 3 % to 7 % annually.

The next frontier

So where do we go from here? To start, it's important to recognize the enormous potential with respect to autonomous flight and the continuing positive impact drone technology can have on our world. This impact looks set only to grow, as more and more professionals come to realize the benefits drones can bring, and governments continue to put in place pragmatic regulations that integrate these aircraft safely into national airspaces.

In terms of next steps for standardization, we must also keep in mind that there are priorities. "We should take a risk-based approach and balance the most beneficial missions with the operational risk," says Cortney. "That's the surest route to building a strong safety case for this new technology. In the USA, the movie and film industry has developed solid arguments for how UAS operations present increased safety over using helicopters on set. Of course, flight over people is higher risk, but the FAA's decision to ease restrictions for operations in the Arctic is a good start."

Standards for detect & avoid and command & control are two critical areas of development. Detect & avoid enables the pilot to maintain safe separation between the UAS and other aircraft and is key to moving from remotely piloted aircraft to those fully autonomous. Command & control addresses using radio-frequency spectrum to ensure safe flight. There has been progress in this area and an effort is underway to obtain from the International Telecommunication Union frequency allocations for beyond-line-of-sight operations using the fixed satellite service.

Whatever approach is taken to build International Standards in harmony with national regulations, unleashing the potential of UASs is sure to be one of the more hotly contested topics in the technology and aviation sectors for the foreseeable future. But time is everything and efforts to encourage innovation while promoting safety and security should eventually win people's acceptance, keeping drones in the air for the long haul. ELIZABETH GASIOROWSKI-DENIS

Photo: Drone Adventures

What drives the connected car

With 87 million vehicles produced in 2013, the motor car has come a long way since its birth in 1886. Today, research into advanced technologies is revolutionizing the automotive world. Packed full of sensors, safety aids and remote monitoring devices, the vehicle of the future is gaining in sophistication and automation. We take a look at the new driver experience.

Connected
A wireless Internet connection feeds information to and from other vehicles and the transport infrastructure, warning of traffic, weather and road conditions, potential collisions or changes in traffic lights.

The valet parking function will locate a parking space for you – at a distance.

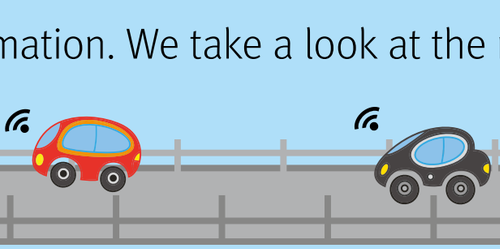
Autonomous
Self-driving cars are appearing on our radar... progressively. Destined to be used first in specific situations – motorways, ring-road traffic jams, etc. – they are expected to be everywhere by 2035.

New technologies will indicate the nearest recharging station to top up your battery.

Car manufacturers are working on "biofuels" (from recycled and organic materials) in a quest for greener mobility.

Carbon-neutral
Cars and trucks currently consume 2 billion tonnes/year of oil and emit 2 billion tonnes/year of CO_2. The hydrogen fuel-cell car will produce only... water.

RECYCLING AREA



At traffic lights, a sensor signal gets the car to stop by itself.

The connected car will have cognitive capabilities to learn the behaviours of the driver and occupants and the surrounding environment in order to continually improve, optimize and advise.

SHOP

SCHOOL

Self-taught
The smart car will "memorize" your preferred route, charting your daily trip from home to work via the kids' school and the supermarket.

Safe and sound
Smart technologies will check for mechanical problems and driver performance, warning of faulty parts and signs of drowsiness before an accident occurs.

Inside airbags exist already – soon there will be external airbags that help protect pedestrians and the car in case of impact.

Nano's big future

Just what is nanotechnology used for today? Nanotechnology (sometimes shortened to "nanotech") controls matter, modifying its effects to achieve desired results. Learn how materials made at the nanoscale have enhanced properties and their numerous applications in use today.

In the fascinating world of nanotechnology – the tiniest of the tiny innovations that stir researchers' imaginations – there are more revolutionary ideas popping up than there are angels dancing on the head of that proverbial pin. In nanotechnology, the smaller you go, the more interesting it gets, and the more teeming with ideas on how size matters. Small is infinitely better and infinitely small is best. Small though it may be, nanotechnology has the potential to be big, very big, and its commercialization is escalating the development of new and improved products. Lux Research, an independent consultancy on emerging technologies, announced in its State of the Market Report 2014 that the growth in nanotechnology-enabled products increased from USD 339 billion in 2010 to USD 713 billion in 2012. A quantum leap by all accounts. What's more, global investments in nanotechnology in 2012 were approximately USD 18.5 billion and should continue to grow exponentially.

Size matters

But what, in fact, is nanotechnology? According to the USA's National Nanotechnology Initiative, it is the science, engineering and technology conducted at the nanoscale, which is about 1 to 100 nanometres.

Nanoscience and nanotechnology are the study and application of extremely small things, which can be used across all other science fields such as chemistry, biology, physics, materials science and engineering. They can involve the ability to see and control individual atoms and molecules and take advantage of various features of materials with size at the nanoscale.

It's hard to imagine just how small nanotechnology is. Why? Because things at the nanoscale are impossible to see with the naked eye, the wavelength of light being many times longer than the dimensions of nanoscale materials. In fact, it is only in recent decades that the "tunnelling microscope" capable of visualizing objects at the nanoscale was invented.

The world's your oyster

With the dawn of nanoscience, understanding and controlling matter at dimensions of one-billionth of a metre enables scores of novel applications. Today's scientists and engineers are discovering new ways of making materials at the nanoscale and utilizing them in a variety of applications by exploiting nanoparticles' unique properties: greater strength, lighter weight and greater chemical reactivity, among myriad examples.

Nanotechnologies are delivering in both expected and unexpected ways, introducing applications that could impact our daily lives. And let's be honest, who doesn't want faster computers, lighter cars and machinery, "greener" energies and safer medical devices and procedures. Yet while the opportunities are immense, many nanotechnologies are only in their infancy and have yet to reach full maturity.

Finding an audience

As well as their economic significance, nanotechnology and nanomaterials have potential implications for health and the environment. This is why environmental, health and safety standards are all valuable to the continued progress of nanotechnology research, and for its safe, secure and responsible commercialization in the future. In order to ensure consistency, repeatability and accuracy, there must be standards of practice (e.g. procedures and guidelines) and standards for verification (e.g. reference materials).

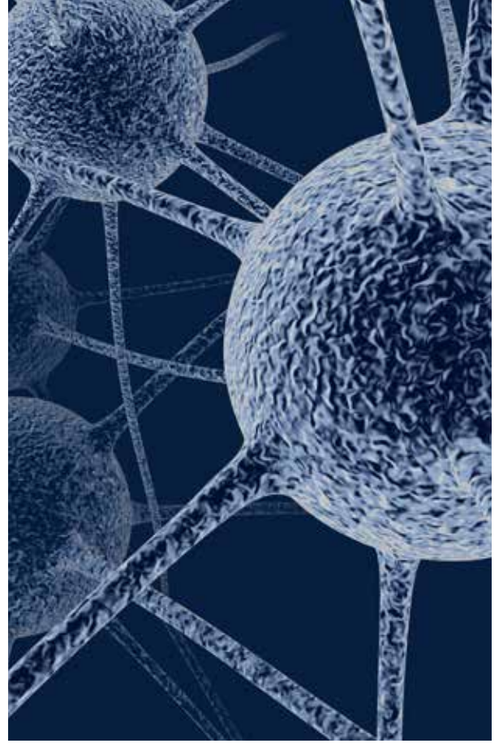
While there is strong engagement among many stakeholder communities, including representatives from government, academia, non-governmental organizations and some areas of industry, there is still plenty of scope for participation in the development of nanotechnology standards, arising from the science's growing application in specific sectors (e.g. transportation, energy, medical devices, etc.). A key benefit of standards is to facilitate commerce, both in terms of a broader acceptance of information and the increased confidence they bring in the realm of safety. The challenge, however, is raising awareness of the availability and usefulness of such standards, an issue that is further exacerbated by the fact that knowledge of their existence is not widespread.

We decided to contact experts in the field to get their views on the current state of play. We wanted to know what value companies derived from participating in the development of nanotech standards. Kazuyoshi Furuta, Chief of the Business Incubation Center, Corporate Technology Division, at Seiko Instruments, Inc., an electronics and timepiece manufacturer, offered a pragmatic answer: "We participate in order to define standard methods, not from a company point of view, but to identify and measure internationally acknowledged nanomaterials, their true characteristics and their productivity. When an International Standard is created, it promotes the dissemination of nanomaterials."

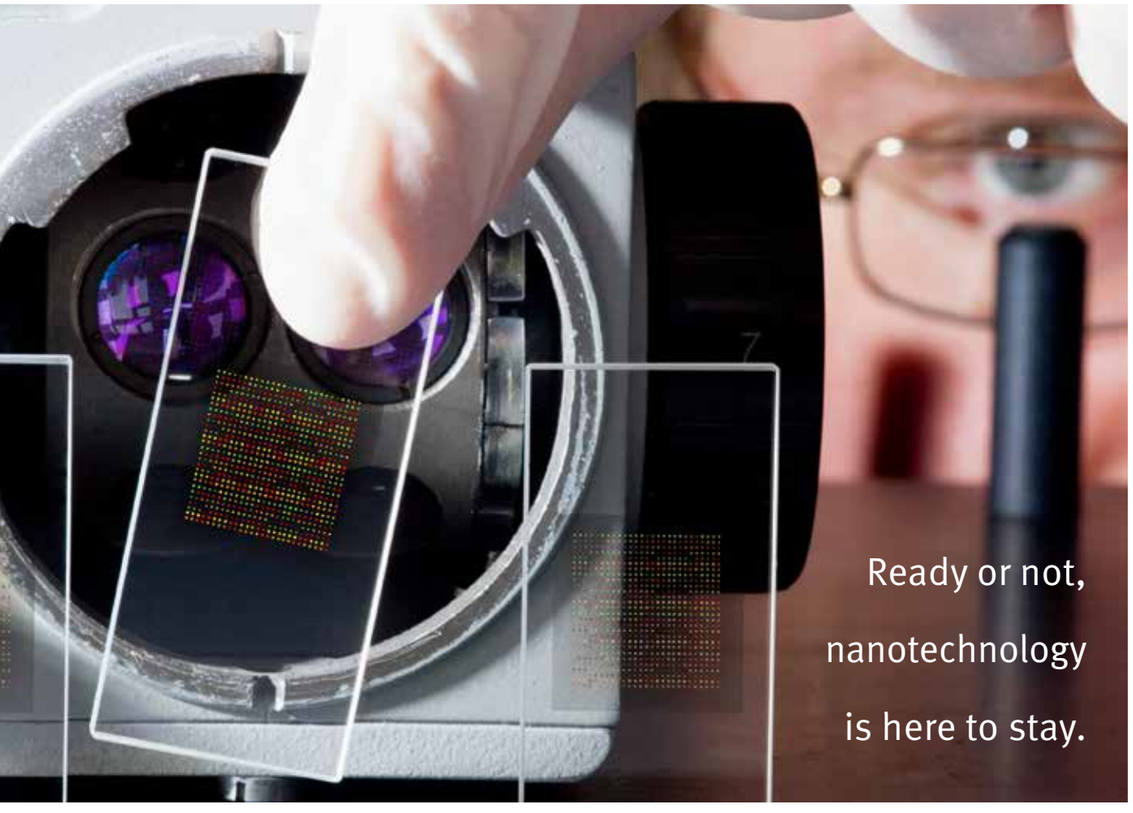
A great believer in standards, Seiko makes significant investments into participating in standardization. For, as Furuta explains, standards are at the core of the company's viability. When purchasing a process for a specific nanomaterial, for example, the supplier must confirm that measurements were made in compliance with the International Standard. What's more, internal company measurement methods must also meet requirements, and measuring equipment should be capable of performing the method defined by the International Standard.

Dr. Shaun Clancy, Director and Regional Head of Product Regulatory Services for Evonik Corporation, one of the world's leaders in specialty chemicals, is just as adamant about the value of participating in standardization efforts. "Standards in nanotechnology are generally developed by a diverse set of stakeholders who have a diversity of experience and expertise. Since these standards are intended to be used broadly, it is important for Evonik to provide solid technical expertise from an industry perspective."

As for how the multinational utilizes International Standards, the most immediate application is in standards pertaining to terminology, which give all industry players a common understanding of "what the words we use mean". The corporation is also interested in metrology and the environment, health and safety standards, and how they may be used by others.



Nanotechnology-enabled products increased from USD 339 billion in 2010 to USD 713 billion in 2012.



The road ahead

If Furuta had a crystal ball, what trends would he visualize developing to enhance nanotechnology? And what standards would be needed to support those trends? The answer was quick in coming. "Future standards that address sample preparation for the characterization of nanomaterials will be important, because they will help determine properties and characteristics of nanomaterials with a high degree of accuracy and good reproducibility." There is no doubt that the standards currently being developed will catalyse the use of nanotechnology in devices, based on increased confidence in the properties of nanomaterials.

Clairvoyance is not yet within Evonik's grasp! "Sadly, our ability to see the future needs further development," Clancy jokes, "and maybe there will be a standard for how to do that someday."

Nanotechnology is not a single technology, rather it is an enabling technology that makes other technologies better. And examples abound, including pharmaceuticals, aerospace and energy, among many others.

But a standardization effort must respond to a market need, Clancy reasons. "We use and develop nanotechnology and standards when they provide a benefit and since there are many potential benefits, it isn't possible to describe what standards will be needed. Since the development of standards is people-intensive, it is very important that we ensure that the projects we work on meet a community need."

From lab to life

To attempt to draw a bead on such a wide-ranging topic and the obvious needs that might arise for standardization, ISO created technical committee ISO/TC 229, *Nanotechnologies*. Since its inception in 2005, the committee has published 42 standards and other technical specifications and reports, with another 26 at various stages of development or approaching publication.

ISO/TC 229 has endowed the field with a vocabulary that is scientifically based, responding to the needs of regulators, lawmakers and scientists. Information has been packaged so that government and industry can make informed decisions on the economic potential of nanotechnology. The committee unites the metrology and scientific communities to confront the challenges inherent in measuring nanomaterials, thereby amassing and validating core requirements.

The effects are tangible. The standards published create a smooth transition from the laboratory to the marketplace, promoting progress along the nanotechnology value chain and facilitating global trade. And life is destined to get even simpler with the development of a nanotechnology plain language guide (ISO/TR 18401) – currently in preparation – which will allow laypeople to gain a working understanding of use and application.

It's not all a bed of roses, though, for ISO/TC 229 will face a task of enormous magnitude in the future to cover the new waves of nanotechnology advances in medicine and in the vast spectrum of applications that 2D materials bring, not just graphene but multilayer 2D materials that are the future of photovoltaic energy systems.

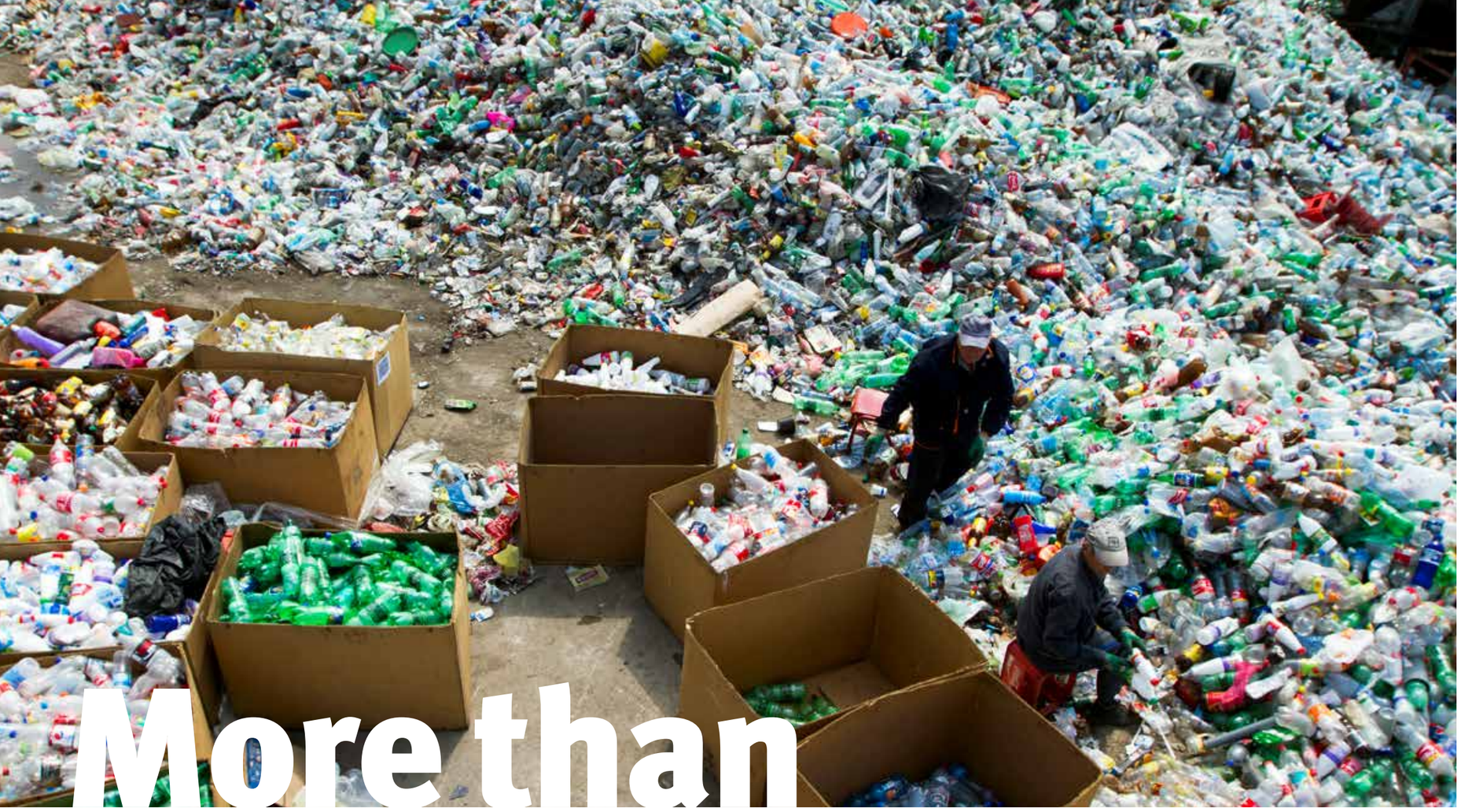
Global investments in nanotechnology in 2012 were approximately USD 18.5 billion.

Brave new world

If the focus until now has been on nanomaterials, the fields of functionality and devices remain to be explored. Future challenges will include building links to address the specific needs of various industrial sectors when faced with the tsunami of nanotechnological innovation.

In a world that questions the safety of these emerging technologies, both in the workplace and in the marketplace, ISO's robust standardization process, which captures existing best practices and reflects the state of science, will address many of these concerns. While issues of health and safety will certainly continue to fuel debate in the future, standardization can go a long way toward dispelling controversy and addressing the real concerns of the general public.

Ready or not, nanotechnology is here to stay. In the next 20 years, it will become an inescapable part of the modern world. And with its myriad potential applications, no one will need a microscope to see the impacts it is having on our everyday lives. While the benefits might be awe-inspiring, some tough questions still remain to be answered. But one thing is certain, standardization will be instrumental in helping this enabling science penetrate the zeitgeist. MARY RITCHIE



More than just plastic bottles

With around 250 million tonnes of plastics consumed worldwide, ensuring the highest possible levels of safety is one of the industry's greatest priorities. Here, as the new Chair of the ISO technical committee for plastics and rubber machines, Claudio Celata shares his thoughts about the industry, its exponential growth, and why uniform and consistent standards are important.

Plastics have become essential in a wide range of sectors.

What's light, resistant and more performant than some conventional materials? Plastic of course. As its worldwide use has exploded in recent years, so has the development of the machines that produce it. Not so long ago, the manufacture of plastics (and rubber) machines was limited to just a handful of countries, each with their own safety specifications. Today, production can be found in many corners of the world – with the big players being China, India and Brazil. The sector is buoyant, to say the least.

Claudio Celata is no novice when it comes to the industry. He has made the safety of plastics and rubber machines a key element in his career, starting out when many safety devices we see today were lacking – and losing fingers was not uncommon. Today, Celata is the new Chair of technical committee ISO/TC 270, *Plastics and rubber machines*, whose secretariat is held by UNI (ISO member for Italy). He is also consultant to the Italian plastics and rubber processing machinery and moulds manufacturers' association ASSOCOMAPLAST. Here, he shares with us some of the industry's trends, the challenges, and how standards provide the platform from which innovation can grow.

***ISOfocus*: What are the major factors driving the plastics and rubber machine market? How do they impact global sales and production?**

Claudio Celata: The plastics and rubber processing machinery industry has grown significantly since its inception in the 1950s, particularly with the new markets that have emerged over the last ten years. Where, initially, German, Italian, Japanese and American manufacturers dominated the global market, those have been superseded by producers in countries like China, Brazil and India. This is due largely to their growing industrialization and the subsequent huge increase in demand, particularly for products in the automotive, household appliances and toy industries.

What are some of the key issues and fastest-growing segments in the industry today?

The per capita consumption of plastics is globally growing worldwide year by year, but at geographically different growth rates. For example, in Scandinavia the per capita consumption of plastics is about 100 kg/year and in the USA it is more than 90 kg/year. In China, however, it is still only 52 kg/year and just 9 kg/year in India.

From these figures we can see that the rise in consumption of plastics – which in 2014 was around 250 million tonnes worldwide – corresponds with the boom in industrialization of some countries like China and India.
Another consideration concerns the typical applications of plastic raw materials. In the automotive industry, for example, plastic components in the year 2000 averaged approximately 100 kg per car; they are now exceeding 150 kg. Another obvious example is in food and beverage packaging. Here, plastics offer the best features for food preservation, resulting in much lighter containers compared to those made of glass, metals, etc.

How many innovations are introduced by the use of plastic materials in everyday life?

Plastics have become essential – and irreplaceable – in a wide range of sectors. They are effective thanks to their high performance, including:

- High tensile strength with proper structural design
- Reduced part weight
- Highly repeatable in processing (less scrap)
- Lower manufacturing costs
- Enhanced regulatory compliance
- Greater design flexibility (part consolidation)
- Lower packaging and shipping costs
- Up to six times longer tool life

***Claudio Celata**, new Chair of ISO/TC 270,* Plastics and rubber machines.

It has become essential to make standards uniform and consistent.

Automotive and aerospace companies have been most active in converting existing metal products or parts to plastic, driven by the need to reduce weight and improve fuel efficiency. With proper design, engineered plastics can be just as strong as metal. They can also be more chemical-resistant with exceptional resistance to heat, making them good choices for fuel systems, fluid handling systems, and other high-temperature applications.
Plastics are used today in a variety of different settings. Consider, for instance, their significance in medicine. With an increasingly ageing population, the demand for, and importance of, plastic prosthetics has never been greater. These are being increasingly used in routine procedures such as hip replacements. And this is a drop in the bucket!

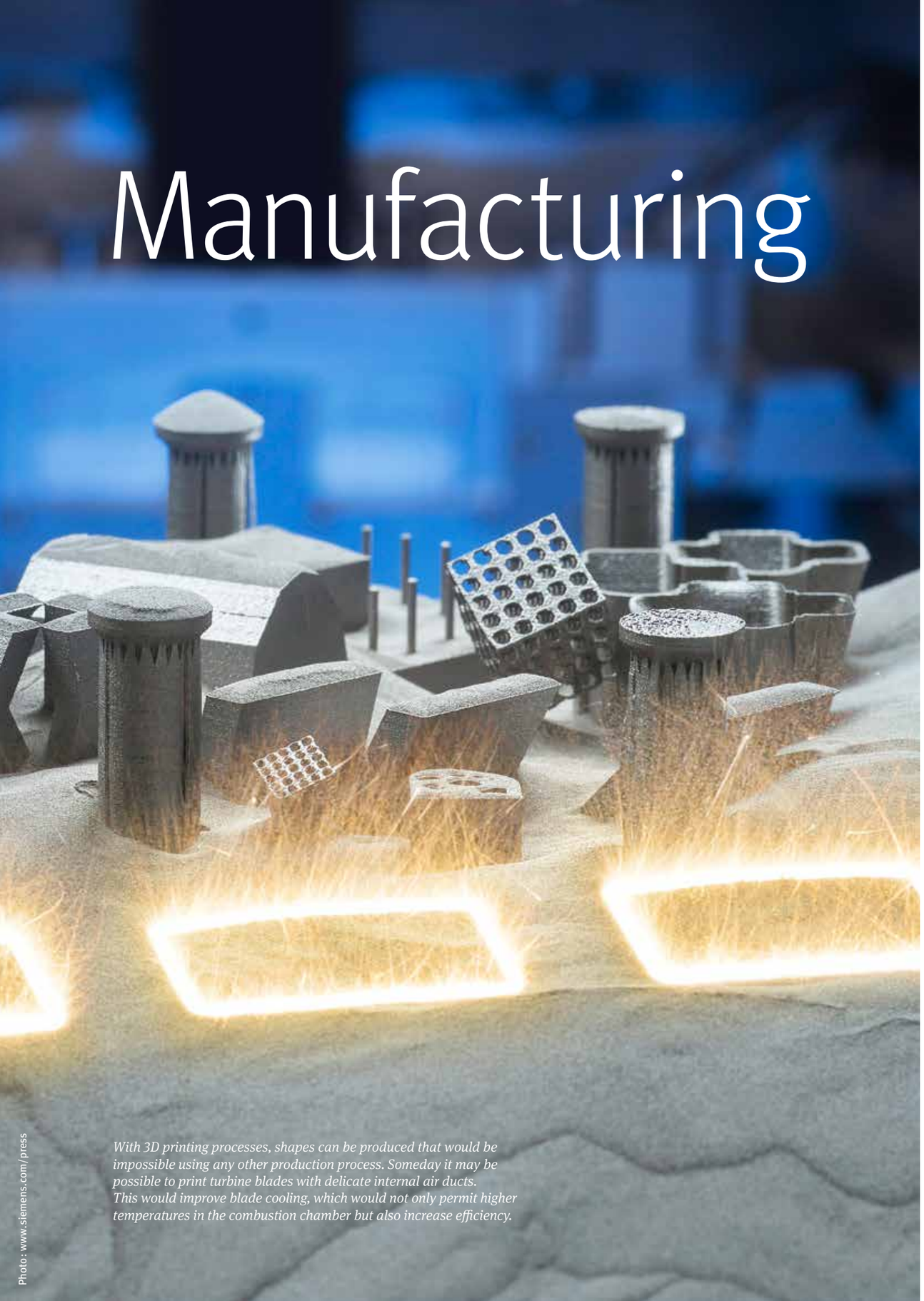
With the global market for injection-moulded plastics estimated to reach 116 171.4 kilotonnes by the end of 2018, will there be an increased need and demand for standards?

The demand for ISO standards concerning the safety of plastics processing machines represents an evolution in standards development. With an increase of global plastics and rubber components, and delocalization into a number of different continents, it has become essential to make standards uniform and consistent, ensuring the highest possible levels of safety around the world. This will then remove the risk of safety devices and measures becoming barriers to the international trade of plastic materials.

What are some of the challenges you face in ISO/TC 270? Any plans or projections?

The most frequent challenge – if I can call it that – is to bring together the technical requirements applied by the standards or regulations used in different countries and regions of the world into a single standard. This is no easy task.
For my part, I have to accept to be more patient. In the meantime, the committee will start to study draft standards on other processing machines mentioned earlier. We hope to have great things come from this study, and look forward to keeping all of our followers and users posted on these new developments!

A detailed insider look at a turbo jet engine.



With 3D printing processes, shapes can be produced that would be impossible using any other production process. Someday it may be possible to print turbine blades with delicate internal air ducts. This would improve blade cooling, which would not only permit higher temperatures in the combustion chamber but also increase efficiency.

Photo: www.siemens.com/press

our 3D future

Don’t be afraid to see big. Additive manufacturing – known in popular culture as 3D printing – is a concept that has captured the attention of many with its science fiction connotations. Yet the technology is important not just for its current capabilities, but even more so for its future potential.

Additive manufacturing (AM), often erroneously called 3D printing in mainstream media, is a fast-expanding market. If proof were needed, in 2014 it registered a compound annual growth rate of 34.9%, the highest in 17 years. According to the Wohlers Report 2014 – the reference on the AM industry’s progress – the industrial and business machines sector makes the most use of the technology with an 18.5% market share, followed by electronic goods, motor vehicles and medical devices. Aerospace is another one to watch and companies such as Airbus are using AM processes to produce complex metal parts for next-generation aircraft.

Although often casually referred to as 3D printing, an AM machine is poles apart from your ordinary 2D printer. In a nutshell, it is a machine that enables the layering of materials to make parts or objects from 3D model data under computer control. AM itself is an inherent part of the product development process used to manufacture prototypes, tools and industrial parts. Instead of milling a workpiece from a solid block, it builds up 3D structures from fine powders and liquids. There are actually many different process categories and AM is a principle that can be applied to the creation of widely differing technologies.

The direct metal laser sintering (DMLS) process used for dental crowns and bridges.

The major areas of additive manufacturing

Industrial/business machines : **18.5 %**

Consumer products/ electronics : **18.0 %**

Motor vehicles : **17.3 %**

Medical : **13.7 %**

Aerospace : **12.3 %**

Source : Wohlers Report 2014

Accidental history

Groundbreaking it is, yet creating objects by successive addition of material is as old as the world itself. Think of ceramic before the pottery wheel or the additive building of a swallow's nest. In fact, it is the most natural way of manufacturing complex geometries. Moreover, the processes for making three-dimensional photographs and maps have been patented since the 1800s.
Old hat then ? Not quite, as it was not until the development of computer technology that the three-dimensional solid modelling inherent in the definition of AM could be developed. The impulse was given by the American automotive industry, which met serious competition from Japanese auto makers during the 1980s. The main problems it faced were time and cost : it simply took too long and was too expensive to develop new models. Hence several processes for " rapid prototyping " were developed – a group of techniques used to quickly fabricate a scale model of a physical part using CAD software – which are at the origin of today's additive manufacturing industry.

Getting parts fast

The strengths of additive manufacturing lie in those areas where conventional manufacturing reaches its limitations. If there is one thing engineers can count on, it is that there will be modifications and redesigns during production. With additive manufacturing, they now have the freedom to redesign and innovate " on the fly ", a freedom without time or cost penalties. This yields significant rewards : compressed production schedules, better quality products, more diversified designs and, in the end, more revenue.
This streamlining of traditional manufacturing (compressed processes) also means a smaller environmental footprint. Additive machines can read CAD files to know how long it will take to build a part and how much material is needed before it's even on the machine, resulting in very little waste and much time saved. The upshot : a more fluid product development and design process that produces parts on demand. This is an attractive proposition for making lightweight parts for vehicles and aircraft, tailored dental implants or that made-to-measure replacement hip-joint. Which brings us back full circle to the freedom to redesign without penalties.

When the printer is finished, large quantities of metal powder are left behind and must be carefully removed.

The standardization process must follow market needs.

The argument for standards

Despite the obvious benefits, there are issues. One of the stumbling blocks to the technology's wider application is the lack of a supporting framework and industrial standards. It is difficult for AM to compete with traditional techniques ; for companies looking for a rejection rate of just a few parts per million, there is no way AM can come close to that. This is where a set of standards can help guarantee a level of reproducibility, and give business and manufacturers the much needed assurance that AM processes, materials and technologies are safe and reliable.
But where do you start ? For Jörg Lenz, Chair of technical committee ISO/TC 261 on additive manufacturing, one of the challenges is " understanding which applications and parts are suited to AM standardization, and choosing them accordingly ". The traditional application areas for AM include fit-and-assembly, patterns for prototype tooling and metal casting, presentation models, visual aids, and education and research, which result in improved communication, faster product development and fewer defective parts. But these are well-established fields, which do not necessarily require industrial standards.
According to Klas Boivie, Convenor of ISO/TC 261's working group WG 1 for AM terminology, the market for functional parts has reached an impressive 29 %, while tooling components are at 5.6 %. With functional parts pervading everything from aerospace to dentistry and medicine, since these products often have a critical function, there is a growing need for standards to accommodate the requirements for all these areas.
As in any field where standards are present, the standardization process must follow market needs. There has been a lot of hype surrounding AM, which has attracted interest on almost all fronts. But the science is young ; it will develop and mature over time as knowledge of the technology grows, and any standards developed now must leave room for innovation. As Lenz sees it, " International Standards are really needed to provide clarity and dispel concerns, to provide reliability, acceptance and safety, and to further the technology in the market."

Together we grow

The appetite for AM standards is relatively recent. " The initiative came from the AM community, " explains Boivie. " It was very clear that this technology had the capability for much wider industrial application, but the industry was slow and skeptical about using it, unless for very special or non-critical applications." This motivated a group of key actors within the international AM community to initiate a discussion for the creation of technical standards for AM.

However, since this group could not be certain to gather a wide enough international support, the initiative was brought to ASTM International (formerly the American Society for Testing and Materials), which led to the creation of ASTM committee F42 for additive manufacturing technologies in 2009. While this debate was going on, the Association of German Engineers (VDI) was hard at work on a series of guidelines for what was then called "rapid technologies". These guidelines eventually led to the creation of ISO/TC 261, *Additive manufacturing*, in 2011, whose secretariat is held by DIN, the ISO member for Germany.

With the international AM community being so small, many of the experts invited to review the VDI standard proposal were already involved with ASTM F42. The creation of ISO/TC 261 raised serious concerns about work duplication, or worse, the development of competing standards. Happily, what might have been a source of discord led to fruitful collaboration between the two organizations and the development of an ASTM/ISO partnership agreement.

Opportunities and constraints

Despite the urgent need for standards to shape the industry, AM standardization is hampered by time constraints and underfunding. Boivie has experienced these first-hand: "Since all standardization work is based on voluntary participation, and has no funding attached with it, this means we have to do our regular work alongside the development of AM standards."

To ensure that additive manufacturing delivers on promise, it is important to build a foundation that guarantees the reproducibility of AM components. Their strength is that they can be redesigned and could then very well reach superior quality and performance. Besides, Lenz adds, "We also need quality assurance procedures in cases where standards for AM parts do not exist or where existing standards do not apply completely."

Meanwhile, more and more organizations are keen to get their foot in the door and develop their own AM standards, which could leave the sector with competing standards after all. As Boivie explains, the community of experts currently involved in the ASTM and ISO collaboration clearly have the broadest expertise in AM technology anywhere in the world. There is a real risk that standards developed outside this collaboration will not have the same level of insight, which would only stifle the steady development of the technology.

On the horizon

Despite the apparent confusion, though, there is a plan. Priority has been given to terminology and general principles, which will provide the bedrock for the development of any future standards. When asked where all this is going, Boivie muses, "The use of the AM terminology standard in an open-information database will do a lot to spread the operative 'word' and give the industry a common voice."

What was once considered science fiction – the ability to produce objects on demand – is in the process of becoming a reality. AM is an enabling technology that makes it possible to produce parts that may not have been feasible or realistic in the past, creating endless possibilities for innovation. So although it is hardly possible to foresee where this technology is taking us, we know our three-dimensional future is looking bright. And with standards in the offing, let's wager that AM will soon become an industrial strength, improving the way we live our lives. SANDRINE TRANCHARD AND VIVIENNE ROJAS

The market for additive manufacturing grew to USD 3.07 billion in 2013.

The compound annual growth rate (CAGR) of 34.9 % is the highest in 17 years.

Source: Wohlers Report 2014

3 QUESTIONS ABOUT ADDITIVE MANUFACTURING

Additive manufacturing (AM) is the life passion of Jörg Lenz, Collaborative Projects Coordinator at EOS GmbH, the technology and market leader for design-driven, integrated e-manufacturing solutions for additive manufacturing. With over 20 years' experience in the field, the Chair of ISO/TC 261 tells us why standards development for the sector is essential.

Tell us a little about additive manufacturing at EOS?

For EOS, AM is mostly about developing the right solutions for our customers although we also use laser-sintered components in our own products (machines, peripheral devices, etc.). These are designed by our engineers and manufactured both internally and by external suppliers so that we can make informed decision about how to design, produce, purchase and use AM parts, all based on experience.

What is EOS' standardization strategy with regard to additive manufacturing? How important are ISO standards for a company like EOS with global operations?

Our strategy is to actively encourage and support the creation of standards in areas that are relevant to the use of our products. It's a two-way collaboration. On the one hand, standards must increase industry acceptance of AM parts, and benefit our customers accordingly; on the other hand, it is easier for us to fulfil our customers' needs and expectations if they have common requirements, based on standards. Standards with a global reach, such as ISO's, support these goals better than a host of individual standards (e.g. national, industry- or company-specific) relating to the same topic.

How does EOS' participation in ISO/TC 161, and in standardization in general, assist the company in its own work?

Essentially, it helps us to understand our customers' likes and dislikes, and to achieve our long-term goals.

For more information, see the Online Browsing Platform that provides free access to terms and definitions: **www.iso.org/obp/ui/**

Photo: EOS

EOS P 396 plastic system for additive manufacturing.

STANDARDS ARE **AN EDUCATION!**

What role does standardization play in innovation and entrepreneurship? This was the topic of a roundtable discussion organized by the World Standards Cooperation – an alliance of ISO, IEC and ITU – at the University of Washington, WA, USA, in January 2015.

Two themes on the agenda. The first, on innovation, featured examples from the fields of medical devices and communications, while the second focused on entrepreneurship and the supporting role of standards for entrepreneurs from business management, policy and legal sectors.

Most universities and business schools recognize the need for greater standards knowledge in executive education and several courses of action were identified by the participants to promote teaching about standards and standardization:

- Creating demand – if academia recognizes a need, it will seek to fill it
- Embedding standardization modules in other courses, which is often the easiest and most practical way to introduce this area of study in academic curricula
- Taking a holistic approach to the subject in order to cover a wider range of disciplines

It's high time the academic world built links with standards makers to equip future leaders for the modern business world.

For more information: **www.iso.org/teaching-materials**

NEW PRESIDENT FOR **IFAN**

The International Federation of Standards Users (IFAN), dedicated to promoting the interests of standards users worldwide, has a new President.

David Felinski, who began his three-year term on 1 January 2015, is no newcomer to the cause. He served on the IFAN Board as Vice-President for the last six years, representing its North American member organization SES (Society for Standards Professionals). Felinski manages the standards programmes for two ANSI-accredited standards developing organizations in the area of machinery safety. He succeeds Ross Wraight who will continue to serve as immediate past President of IFAN.

IFAN is an independent, non-profit-making international association of national organizations for the application of standards, companies, professional and trade associations, and governmental agencies, concerned with the use of standards.

For more information: Vered Oren, IFAN Vice-President, **vered@sii.org.il**

ARGENTINA'S GREEN SCHOOL PROJECT

Twenty per cent of the world's population is aged between 10 and 19. Clearly, what children and young people think and do about the environment today will influence the world they live in tomorrow, so developing their environmental awareness is essential.

The *ISO Kids' 14000 Programme* aims to harness the energy and imagination of children and young people around the world to tackle environmental challenges. Just recently, the project moved to a number of schools in Argentina. Over 400 students, together with their teachers, made sculptures from plastic waste, which they entitled "Earth Guardians".

IRAM, the ISO member for Argentina, attended the award ceremony where primary school children received a certificate for having reached sustainable improvements in energy, water and waste. The Kids' ISO 14000 Programme was carried out within the framework of the Green Schools Project of the Ministry of Education, whose closing ceremony was held at the Paseo de las Naciones in Buenos Aires in December 2014.

Launched in Japan in 2000, the *ISO Kids' Programme* has become a global initiative. Children participating in the scheme become environmentally aware, increase math, science and technology skills, and learn to network with their peers across the globe to tackle the world's environmental problems.

STRATEGIC STANDARDS **FROM CANADA**

Business, governments and consumer groups interested in gaining a deeper understanding of the US standardization system will want to read the Standards Council of Canada's (SCC's) latest report, *A Perspective on US Standardization: A Strategic Session with Joe Bhatia, President and Chief Executive Officer of the American National Standards Institute (ANSI)*.

The 12-page report highlights SCC's meeting with Joe Bhatia as part of an ongoing series of best practice exchanges for setting national standardization priorities. As emerging nations gain an increasingly influential international voice, Canada and the USA need to join forces more than ever – aligning standards and certification requirements – to defend their shared interests. As Bhatia states, "Simply put, standards boost business."

A Perspective on US Standardization features excerpts from Bhatia's presentation and a message from SCC's Chief Executive Officer, John Walter. Readers will gain insight into the value and benefits of long-term standardization solutions for both countries' businesses, economies and quality of life.

For more information: **www.scc.ca**

Photo : Dräger

A kind of cocoon : thermoregulation ensures a protective environment inside the regulator.

Dräger grows its global business on **standards**

As an international corporation that does the majority of its business in markets outside of Germany, Dräger has a long history of developing global product standards in the fields of medical and safety technology. Here, the company's management tells us how a culture of standards has made the brand one of the most successful today.

Founded in Lübeck in 1889, Dräger has grown into a worldwide, TecDAX-listed enterprise in its fifth generation as a family-run business. Bernhard Dräger was a trail-blazing inventor of the "Lubeca valve", which he developed with his father, Johann Heinrich, founder of Dräger, during the company's early days. For the first time, the valve made it possible to precisely control the removal of carbon dioxide from a high-pressure cylinder. The young engineer then laid the foundation six years later for the first standardization project by attempting to standardize the connection threads, which would significantly improve the use of pressure-reducing valves. A pioneer in the true sense, Bernhard was also a humanist at heart, motivated both by a genuine concern for safety and a need to make the mixed use of different valves possible. Today, as a member of the Presidential Board of the German Institute for Standardization (DIN) and current Chairman of the Executive Board of Drägerwerk Verwaltungs AG, Stefan Dräger is continuing in his great-grandfather's illustrious footsteps by actively engaging in standardization work. He is quick to emphasize the importance of such efforts for cross-border safety and quality : "International Standards enable technology for life manufactured by Dräger to be used all across the world at a reasonable cost."

A modern closed-circuit breathing apparatus can provide rescue workers with an independent supply of breathing gas for up to four hours.

We are actively working to continuously improve standards.

Putting safety first

Standards play a key role in helping the company live up to this claim and ensure product reliability. A miner rushing to the aid of fellow workers has to be able to rely completely on a closed-circuit breathing apparatus. A paediatrician at a hospital responsible for the life of a premature baby must be able to place the same kind of trust in an incubator. An incubator is a complex product, and there are standards for nearly every component and accessory. These standards aim to eliminate potential operational risks and dangers for both the premature baby and the users, namely the paediatric team. Consider the heating mat that the infant lies on. There is an International Standard in place which specifies that thermal beds for infants are not to exceed a temperature of 40°C to prevent damage to the underdeveloped skin so typical of premature babies.

The standard also requires control mechanisms, such as a readout of the incubator's temperature settings and a continuous display of the surface temperature of the mattress. "We initiated a regulation governing the safety of heating mats used in thermal beds and under radiant heating systems for premature babies and newborns," explains Dr. Jochim Koch, who headed a standards committee for neonatal care for decades as a Dräger employee. "Our constant objective is to transform what begins as a regional solution for Germany into an international standard. These can become internationally recognized ISO standards in turn."

Wolfgang Drews, who is responsible for International Standards management in Dräger's safety division, also believes that the way in which a product can be used more effectively represents a key motivational force driving collaboration on standards. "The users – which is to say, human beings – are always the focal point of our activities. We aim to maintain high product standards with a view to enhancing the protection afforded to users."

Drews mentions one new higher standard for the respiratory minute volume of a breathing apparatus for mine rescue teams and firefighters that Dräger experts actively helped shape years ago.

Studies had revealed that the amount of breathing gas needed by people during periods of physical exertion was significantly greater than the previously assumed respiratory minute volume of 20 l/min. During initial testing, Dräger recorded volumes of between 50 l/min and 60 l/min, and even up to 100 l/min in later tests. These results were subsequently included in standards (EN 145, EN 137) for such devices, which are still in effect today.

In the future, even respiration rates of up to 135 l/min for a closed-circuit breathing apparatus are poised to become the international norm.

Drews does not believe that trying to introduce a standard first and foremost for economic or competition-related reasons is the right approach. "The point is to reach a consensus, which calls for objective arguments, such as the findings from feasibility studies. That is the only way to ensure that a standard will have a chance at being accepted and applied by the industry," he says.

Changing the status quo

These examples highlight Dräger's approach. "From hospitals to public authorities and industry, we are actively working to continuously improve standards," says Matthias Marzinko, Head of the company's International Standards Management (ISM) department. Consider the Test Center at the Dräger headquarters in Lübeck, Germany. Not only do a number of employees test products here according to national and international standards, they also research new testing procedures, in part with universities and other partners.

One such example is the functional efficiency of products over their entire life cycle. As part of these efforts, a method was developed to determine the actual age of a breathing mask. Based on that information, it is then possible to conclude how much longer the product can still be used.

Another testing procedure enables Dräger experts to verify the proper composition of the raw materials supplied. A key contribution to this process of continuous improvement comes from the personal initiative shown by Dräger employees, who are able to see the bigger picture. The company has always taken responsibility for its action, a concept that is rooted within its corporate culture and aims to ensure quality of life for years to come. After all, those people using Dräger equipment are entrusting their lives.

For Dräger, quality means complying with current recommendations, in addition to performing checks using its own test methods. Cooperation with international standards bodies makes it possible to include new testing procedures in the development of global standards, so that Dräger can continue to make products that protect, support and save lives. ELIZABETH GASIOROWSKI-DENIS

About Dräger

With sales and service subsidiaries in over 50 countries, Dräger is an international leader in the fields of medical and safety technology. The company has about 13 500 employees worldwide and is currently present in more than 190 countries. Its development and production facilities are based in Germany, Great Britain, Sweden, South Africa, the USA, Brazil, the Czech Republic and China.

Dräger standards experts at a meeting in Lübeck, Germany. Dräger employees around the world are acting on behalf of the company.

Denmark's experiment

The world of standards is notoriously arcane. To help demystify the beast, the Danish Standards Foundation (DS), ISO member for Denmark, had a revolutionary – if somewhat unorthodox idea – to get the word out : an "experimentarium" for standards. Enjoy the visit !

Jesper Jerlang, *Director of Standardization (DS).*

Standardization is an abstract notion, and famously difficult to apprehend, yet its influence on growth and job creation is second to none. Studies reveal that companies using standards in the development of products and solutions record better export sales and higher productivity than their counterparts that do not use them. The verdict is clear : standardization does improve competitiveness.

" We wanted this message to reach far and wide, so we decided to create a learning centre where you can see, touch and feel what standards are all about, and learn about the value they create for Danish business and society, " explains Jesper Jerlang, Director of Standardization at the Danish Standards Foundation (DS). No sooner said than done : the standards Experimentarium was born. DS called its new home the House of Standards, headquartered in a striking building in Nordhavn, a waterfront-turned-business district of Copenhagen. This is where Danish standards are developed and where you can learn about standards in a novel and interactive way.

Learning from science

To achieve its dream, Danish Standards enlisted the competencies of science communication experts from the Danish Science Museum, Experimentarium City in Copenhagen, a centre that has had great success with increasing people's inquisitiveness about natural sciences. The result is quite a feat. The state-of-the-art exhibition consists of eight interactive installations that take visitors through an inspiring " story of standards " and their significance for Danish trade and industry.

You will learn, but in a wonderfully involving way, moving from short films to mind-boggling live

House of experience

Welcome to the Experimentarium. Here, you will find out all you ever wanted to know about standards, but never dared to ask. Touch, prod and explore fun phenomena as you move around the House... and get smarter. It's all part of the experience!

1. **Meet Nova.** An expert on standards, Nova, the resident robot, will introduce you to the House and help you get around.
2. **Explore the House.** Your visit requires a mobile phone. Nova will ask you to turn on Bluetooth and download an app, which will signal ten important locations as you move around the building. When the tone sounds, a message will pop up on your screen explaining about that part of the construction and the relevant standards that were used to make it.
3. **Click the kaleidoscope.** At reception, a kaleidoscope with changing photos gives you an insight into the different construction elements used in the building. Scroll between photos at a touch of the screen: for each construction element, a beautiful interpretation appears in the kaleidoscope.
4. **Get a picture of management systems.** What does Plan-Do-Check-Act mean? Through a touch screen, ask representatives of four different enterprises how their business has implemented the four-step management system for continuous improvement of products and processes.
5. **Harness wind power.** How do you anchor a wind turbine on the seafloor? How much wind is needed to power said turbine? And how much noise should a wind turbine produce? Find out by placing a mock-up of a "suction bucket jacket" on the sand and feel how the platform is sucked in... until it is completely steady, whilst you blow on a real wind sensor cup (anemometer) and listen to wind turbine noise in your headphones.
6. **Focus on freight.** Gone are the boxes, barrels and sacks in which goods were shipped across the water. On the 11th floor, learn how one standard revolutionized the freight industry by defining the size of shipping containers, lowering transport costs and significantly reducing CO_2 emissions.
7. **Go solar.** Standards for photovoltaics and energy-efficient pumps provide great commercial value for Danish businesses. On the roof terrace, catch the rays on a 1 m^2 photovoltaic panel and experience how much electricity the sun produces – and enjoy the great view over Copenhagen.
8. **Check your canteen.** The House of Standards' canteen carries the Nordic Ecolabel, a guarantee that the food produced has a low environmental impact – from the detergent dosages used to waste sorting. On the 12th floor, test how close to obtaining the Nordic Ecolabel your canteen or restaurant is.


Photo: DS

Welcome to the House of Standards. It's fun and informative!

Photo: DS

demonstrations of what standards can do. As well as computer-enhanced activities, the educational exhibits are hands-on and dynamic, shaking off any preconceptions you might have of standards being dusty and boring. Be prepared to find standards concealed inside the walls, in floorboards and in elevators. Test yourself, trick yourself and be surprised.

The Experimentarium reaches out to a broader audience than the usual standards professionals and hopes to show customers and the simple citizen that standards are a big part of our community – locally as well as globally.

Getting noticed

Over the years, Denmark has embraced more than 25000 International Standards as national adoptions. Yet, market surveys run by Danish Standards have shown time and again that companies – especially small and medium-sized enterprises (SMEs), which make up the bulk of the Danish business community – fail to understand the impact standards can have. SMEs, in particular, often have trouble identifying the standards that might be relevant to them.

It is crucial, therefore, that more companies, big and small, are able to learn about standards and the value they bring to their core business, acting as a springboard for growth. DS is on a mission to encourage more SMEs to use International Standards. "The mission in a nutshell: to promote knowledge about standards and their value in order to enhance the competitiveness of Danish businesses and benefit society at large," says Jerlang.

DS works on many levels to achieve its goal, not only by publishing standards and technical handbooks, but by answering customer queries through its information centre (WTO Enquiry Point), and providing consultancy and training services. It also runs a number of standardization committees, spearheading the development process in many fundamental areas. "Essentially," Jerlang summarizes, "we strive to become more visible and intensify our communication to better reach our target groups. Our Experimentarium is just one example of this." Welcome to the House of Standards – it's fun and informative! **HELLE PRYDS BRUUN,** *MEDIA MANAGER (DS)*

Indonesia's best and brightest

What are the key challenges for standardization in education in the 21st century? Discover how Indonesia is getting young people on board. The results are nothing but straight A's.

Let's take education to the next level.

Education, most believe, is a special type of service. One that will have a major impact on the future of society, from its basic roots to the most sophisticated technological aspects. Education has to anticipate the needs of future generations, years in advance!

What does it mean to associate standardization to education, and what kind of role can ISO members play? A case in point, the National Standardization Agency of Indonesia (BSN) is already developing educational tools to spread the word about Indonesian national standards (SNI). Here, we catch up with BSN's Teguh Budiono to discuss the ins and outs of their campaign as well as the other initiatives designed to shape tomorrow's leaders.

Campaign that counts

In Indonesia, standardization education begins in childhood thanks to the "Standard Introduction Campaign at an Early Age". Introduced by the former Chairman of BSN, Dr. Bambang Setiadi, the operation aims to raise awareness of standards related to product safety among young children. It also encourages them

Photo : BSN

Photo : BSN

The "Standards Introduction Campaign at an Early Age" in Indonesia kick-starts with major attendance of young people across the country.

In Indonesia, standardization education begins in childhood.

SNI Fiesta, a stage drama about the daily life of children, helps demystify standards.

***Teguh Budiono**, Public Relations, National Standardization Agency of Indonesia (BSN).*

to look to the future with hope and confidence, by helping each one of them to get ahead.

Why target children? Teguh Budiono explains that children, from the moment they are born, are already consumers of a number of products, especially food and toys. They will become future consumers, entrepreneurs, scientists and innovators with influence to shape tomorrow's destiny.

As one method of addressing global product safety issues, the children are taught to be critical and smart in selecting products developed using quality and safety standards. Not an easy task considering the convoluted language of standards.

"The beginning was challenging," says Teguh Budiono. "We faced difficulties because the language in standards is often technical and difficult to understand, particularly for youngsters."

How it works

The campaign is run by a team of young professionals from BSN, with support from its Chairman and Deputy of Information and Documentation, Dewi Odjar.

Various activities are undertaken, including:

- **Storytelling –** a book, *Standards in Daily Life*, charting the history and benefits of standardization
- **SNI Fiesta –** a simple stage drama about the daily life of children
- **Detective SNI –** a game focused on finding products that have the SNI mark
- **Giant Snakes and Ladders –** a classic board game featuring giant snakes and ladders
- **Puzzle –** a puzzle in the form of a poster with the theme "SNI around me"

The BSN campaign team also participates in the National Scout Jamboree, which gives them the opportunity to speak to thousands of scouts from all over Indonesia about the importance of standards in everyday life.

Expanding horizons

Each year, BSN holds the SNI Youth Jamboree (Jamboree of GEMA SNI) by taking primary school children to visit companies using national standards. Among these are companies producing milk, bikes, helmets and food. The hope is to show children first-hand how standards are used and give them a better understanding of what this means for product quality and safety.

BSN has also recently built educational facilities in the Yogyakarta Science Park, at the heart of Yogyakarta City – a tourism destination that combines the two elements of amusement and learning – to help youngsters find out about standards while having fun.

While Indonesia has already made great strides in linking up education and standardization, there is still a great deal to be done. "Up until now, Indonesia has had no formal curricula for standards education," says Teguh Budiono. "The next step will be to provide a course curriculum all the way from kindergarten to high school."

So what can other ISO members do? Quite a lot actually. It is up to those who represent the standards community to promote and translate standards into action: whether this involves promoting quality management in the education system, developing standards on professional qualifications, teaching the principles of standardization within this system, or using standards as part of the course curriculum and learning material.

Let's take education to the next level. But most importantly, let's make the journey together. ELIZABETH GASIOROWSKI-DENIS

BULGARIA'S STUDENTS
SET FOR STANDARDS

Bulgaria recognizes the vital contribution higher learning institutions bring to raising awareness of standardization and its benefits. As the ISO member for Bulgaria, BDS has recently started a pilot project for establishing information centres at the country's universities.

The pilot project at the Technical University in Sofia is an important step for promoting standardization among faculty and students, particularly those in the field of engineering. The centre will provide free access for academic staff and students in the pilot to 15 collections of thematically grouped standards, all of them related to their unique curricula.

Participants in the pilot programme will become familiar with the standards relevant to their industry and how the standards system works – a strategic asset to their future employer. Incorporating standards into a university curriculum provides an excellent introduction to the impact of standardization on the marketplace and gives young graduates a competitive edge when entering the workforce.

CHINA BRINGS TOGETHER LEADING EXPERTS

China is adjusting to the changing dynamics of the global economy by bringing together experts involved in international standardization. More than 150 representatives attended a recently held meeting of Chinese chairs and secretaries of ISO and IEC technical committees in Beijing, China, last December. Organized by SAC, the ISO member for China, the event seeks to promote the development of the national governance systems through standardized services.

In his keynote speech, SAC Administrator Tian Shihong stressed the importance of Chinese experts participating in international standardization activities, explaining how the recovery of the global economy and the emphasis on sustainable development require a strategic approach for standards. ISO Secretary-General Rob Steele made a video speech, speaking highly of China's outstanding contributions to international standardization.

New rules, procedures and requirements effective in international standardization work were also introduced at the meeting, prompting extensive discussions about the challenges and solutions to developing standards.

2015 ISO
SEOUL KOREA

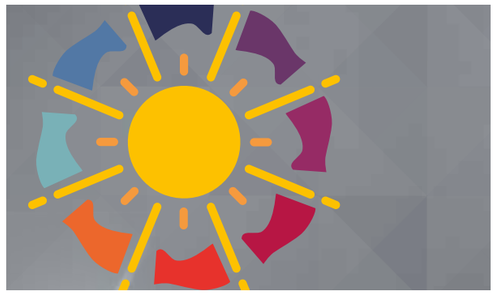
ISO GENERAL ASSEMBLY PREPARATIONS UNDERWAY

Preparations are underway for the 38th ISO General Assembly, which this year will take place in Seoul, the Republic of Korea, from 16 to 18 September 2015. The annual gathering brings together representatives from ISO members and other partners and provides a forum to meet, exchange best practice and define the future of the organization.

For the Korean Agency for Technology and Standards (KATS), the ISO member for the Republic of Korea, hosting this year's event is a chance to encourage organizations to actively participate in standardization in addition to raising public awareness.

"Korea has achieved export-oriented growth over the last 60 years by improving the quality of its goods. While, historically, we have grown as a "Fast Follower", we want to be "First Mover" in the global market. To do that, we need to invest in innovation, industrialization and standardization," explained KATS Administrator Si-Heon Seong.

He added that international standardization is essential for the country to expand commercially, so applying International Standards in technical regulation at the national level is a very important step.



WORLD METROLOGY DAY

Many decisions in life are based on measurements, which need to be sufficiently accurate for the purpose. Making quality-assured measurements is an expertise in its own right, and must be carried out in such a way that everyone can have full confidence in the results.

To help support these objectives, ISO plays an important role each year in the BIPM/OIML World Metrology Day, held on 20 May on the anniversary of the signing of the Metre Convention in 1875. The theme of this year's event "Measurement and Light" coincides with UNESCO's International Year of Light 2015.

ISO/TC 12, *Quantities and units*, is supporting quality-assured measurement of light and radiation through its eponymous ISO/IEC 80000 series of standards. This, in turn, can enable quality-assured deployment of light-based technologies and the reliable exploitation of light as essential ingredients in many novel measurement technologies. Robust communication, interoperability among optical systems, and safety to light exposure are just a few of the many important applications.

The BIPM and OIML, which organize the event, actively liaise with a number of ISO technical committees and ISO joins them in the work of the Joint Committee for Guides in Metrology (JCGM), amongst other fields of activity.

For more information: **www.worldmetrologyday.org**

OPPORTUNITIES FOR POLICY DIALOGUE
IN THE USA

Global supply chain policy issues took centre stage at the American National Standards Institute (ANSI) event held in March 2015 on Capitol Hill, opening opportunities for policy discussions and collaboration.

The event had nearly 150 attendees including congressional staff members, representatives and other stakeholders, and featured four panels highlighting leading issues that affect the global supply chain: global worker safety and the new ISO 45001 standard, a new ISO anti-bribery initiative ISO 37001, global food safety initiatives, and the global distribution of clean and efficient cookstoves. Representative John Lewis of Georgia was the lead sponsor of the event, which featured several speakers who discussed practicable comprehensive solutions to supply chain issues.

The global marketplace has brought about unintended consequences. At the far ends of supply chains, where most of the world's consumer products are now made, factories burn, buildings collapse, and corruption and bribery hamper economic development.

"I hope that we can start a policy dialogue today that can help with these issues," said Kevan Lawlor, Chairman of the ANSI Board of Directors and President and CEO of NSF International, a product testing and inspection organization. "Perhaps this discussion will also act as a catalyst to expand the list of outstanding global issues that, by working together, can be addressed through similar public-private partnerships".

Photo : Haier

Haier's air conditioners make new waves

One of the most hotly debated topics in many modern offices is the air conditioning. But a wind of change is blowing. The Chinese-based Haier's latest technology combined with innovative design has resulted in a breath of fresh air and maximal comfort for all. Introducing the SKFR air conditioner!

The future is all about standards.

Chinese-based household appliance giant Haier has been recently recognized as one of the most innovative companies in China, ranking high in *Strategy + Business* magazine's annual list of the top ten innovative companies for R&D and innovation. A well-deserved accolade, it seems, as the company just recently introduced a new type of technology into its fleet of air conditioners.
We asked Mr. Lei Yongfeng, Director of Planning for Haier Air Conditioning Products, to give us the insider's view on how the company is making waves with its SKFR technology. As a product professional, Yongfeng knows that standards are vital to a product's success, which is why Haier turned to ISO 7730.

***ISOfocus:* Can you explain the concept behind this new type of air conditioner?**

Yongfeng: Designed according to ISO 7730, *Ergonomics of the thermal environment*, Haier's new air-conditioning systems are equipped with an intelligent control system enabling things like remote controlling, a self-defined sleeping temperature curve, electricity usage analysis and alert, as well as the automatic circulation of fresh air. The SKFR air conditioner uses the principles of a wind tunnel by replacing the common fans with an annular air outlet. This "wind tunnel" design comes from the need to transform the structure and mode of air blowing. The new technology overturns the traditional refrigeration theory by mixing cold and hot air inside the air outlet instead of inside the room. This results in cooler temperatures without the drying effect – an immediate plus for comfort.

Photo: Haier

Compared with traditional air conditioners, what are the benefits in terms of the comfort level?

The difference in comfort is huge. A health-conscious system, the SKFR air conditioner completely eliminates concerns with "air conditioner disease". Our intent was to design the SKFR systems according to ISO 7730, which specifies evaluation methods for the thermal comfort experience of different groups of people like the elderly and young children. Thus, you need a minimal air temperature of 21.3 °C, which is pleasantly cool but always higher than the average air conditioner, which can reach lows of 10.1 °C.


Photo: Haier

***Lei Yongfeng**, Director of Planning for Haier Air Conditioning Products.*

The Ergonomics Center at the China National Institute of Standardization has conducted testing on the thermal comfort of Haier SKFR air conditioners. It found that people felt thermally comfortable with the conditioned air, and did not feel partial coldness at different positions and distances.

What about energy efficiency? How does the SKFR air conditioner perform compared to other systems?

The SKFR series of air conditioners already meets the national requirements for energy-saving products. It is also in compliance with the ISO 14000 family of environmental management standards in both design and production. We've made environmental performance a priority at various stages of the product's manufacture, use, and end-of-life.

In your opinion, do standards help or hinder Haier's innovation? Can companies embracing standards still make a profit?

The future is all about standards – nothing can be accomplished without them. Standards are regarded as the criteria for everything in our lives. This was already well reflected in ancient Chinese philosophy where a strong set of customs and practices moulded society, from technology to intelligence, from taking orders to using initiative... Haier innovation has set an example for its industry, and even the Chinese industry as a whole. Haier Group has realized stable improvements in the constantly innovative exploration and practice. In 2014, our global business volume reached 200.7 billion yuan, which is an 11% increase, and a rise in profits of 39% – profit amplification being three times that of income. Similarly, our online trading volume has reached 54.8 billion yuan, a staggering hike of 2391%.
As indicated in the 2014 global large-scale appliance data released by market intelligence firm Euromonitor International, Haier has ranked No. 1 in the global market for the sixth consecutive year in terms of its global retail sales of major household appliances. At Haier Group, we thrive on standards!

About Haier

Haier Group is the world's No. 1 consumer appliances brand, as ranked by Euromonitor International Research Report 2014, and a global leader in consumer electronics. The multinational employs over 70 000 people worldwide and distributes products in more than 100 countries and regions, with global revenues reaching USD 32.1 billion in 2014.