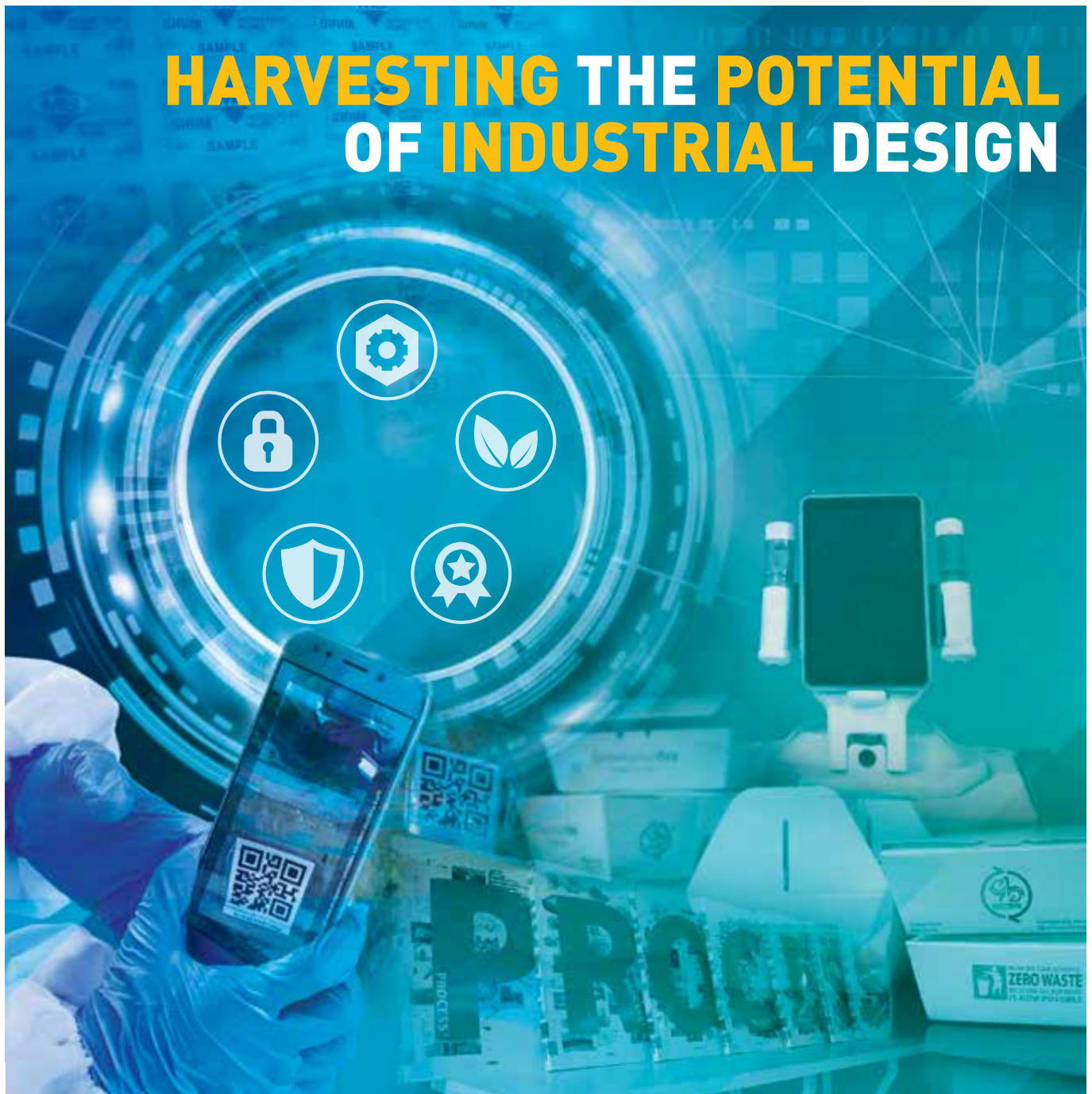



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Environmental Requirements*

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Best Partner for Innovation



FOREWORD

GOING BEYOND AESTHETICS

Consumerism, coupled with globalisation, has yielded a marketplace much bigger than ever before; but along with this, competition has also increased tremendously. Enter Industrial Design. Contrary to common perception, industrial design involves much more than just outward appearances. It includes the features, ergonomics and materials that go into creating the products that we use every day. Consequently, industrial design is perceived to be an invaluable asset. It is a key differentiator that enables manufacturers to cut through the clutter. It becomes the main driver of economies around the world.

As a primary liaison with Malaysia's industries, SIRIM is at a vantage position to assist local manufacturers and the general public in enhancing their industrial design capabilities toward moving the country's economy forward. The first step is by increasing awareness of its significance. "Industrial design impacts life," states the International Council of Societies of Industrial Design. It is all around us, entrenched in our everyday life. Now it is time to give it the recognition it deserves.



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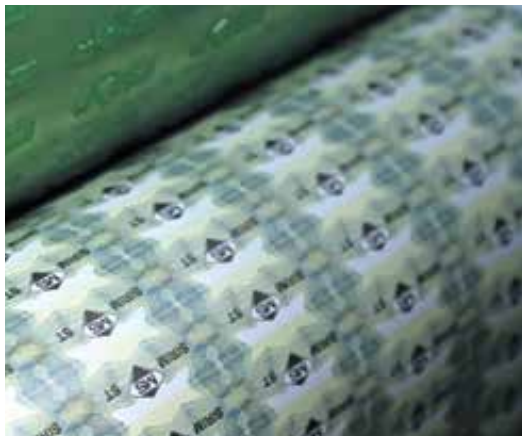
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15 > *Educating the Nation
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Enhancing Malaysia's Design Landscape

Malaysia is steadily moving up in the global industrial design scene. Nevertheless, Malaysians in general need to be more aware of the importance of design in their daily lives. As the country's official authority on design, the Malaysia Design Council plays a very important role in paving the path for our designers to move forward. One way of doing this is with the establishment of a design roadmap that could serve as a guideline for all things related to design.



While Malaysia's industrial design capabilities are progressing steadily and on par with our international counterparts, there needs to be an increase in public recognition and acceptance of local brands and capabilities, particularly among manufacturers. This is essential to move the industry from an Original Equipment Manufacturing (OEM) phase to Original Design Manufacturing (ODM) phase and consequently to Original Brand Manufacturing (OBM).

"Manufacturers have to be willing to invest in the design process. There has to be a design culture, where everybody in the organisation can appreciate design. When the management can value the importance of design, then the organisation will be able to move forward," explained Assoc. Prof. Dr. Mohamad Hariri Abdullah, the General Manager of the Malaysia Design Council (MDC). "We need to push the industry to move toward OBM – from a 'copying' ethic to a 'creating' ethic!"

To ensure that people are truly able to grasp the importance of design, MDC aims to foster better linkages with industry, academia, government agencies and the general public. This will hopefully pave the way for the industry to see the significance of investing in and moving toward commercial products.

This is where SIRIM plays an integral part as well. "In addition to acting as the secretariat of MDC, SIRIM is also essential in linking MDC with industry, helping us get our name out to industry players," Dr. Mohamad Hariri pointed out.

“

We need to push the industry to move toward OBM – from a 'copying' ethic to a 'creating' ethic!"

Instilling a Culture of Dynamic Innovation

Established in 1993 under the auspices of the then Ministry of Science, Technology and Environment, with SIRIM as its secretariat, the Malaysia Design Council aims to pave a future of innovation and design for Malaysia. In addition to spearheading design programmes to boost the industry's design expertise, capabilities and standards, MDC is also considered a think tank and advisor to facilitate the evolution of innovative designs in Malaysia and ensure that the country's capabilities are on par with international standards.

Heart of Design

One way for MDC to move forward in enhancing the country's design capabilities is with the development of a design roadmap that will become a guideline for everybody involved in design-related activities.

The goal of this roadmap is to assist the industry to have a successful future. This requires the equal involvement of various parties, including support from other government agencies and higher institutions that nurture future designers and administrators, as well as public participation to enable the monitoring of local design acceptance by consumers.

MDC's efforts to increase awareness within the industry of the importance of

design in attracting customers include various programmes such as design conferences, workshops, industrial linkages and project collaborations. The increasing willingness of organisations to move from OEM to ODM is evidence of the effectiveness of these programmes.

Therefore, the council is also setting its sights on establishing a design centre that will become a reference point for any issues related to design. There, people will not only be able to find out more about design, but also connect with others. The centre will be an ideal platform to cultivate young talents toward boosting the country's economy in the future through design.

"If we see the potential for a product to be commercialised, we can provide them with the right resources to hone their innovation and design skills and build their entrepreneurial skills," said Dr. Mohamad Hariri.



Taking Malaysia's Design Capabilities Further

In its efforts to increase awareness and acceptance of the important role that design plays in our daily lives, MDC rolled out the Good Design Mark award 17 years ago. As one of MDC's signature initiatives, this international award aims to highlight the definition and importance of good design, and how it can be part of an organisation's marketing strategy.

To be eligible for the award, interested parties merely have to send their commercialised product to MDC, which will then be inspected by a panel comprising industry players, design practitioners and other relevant organisations.

While one of the criteria requires the product to be designed in Malaysia, the award is not restricted to just Malaysians. "The commercial product does not have to be designed by a local. This is because we want to encourage international designers to come to Malaysia so we can team up and boost the nation's design competitiveness. We want to acquire a good mix of global cultures and obtain different perspectives from other countries. This will help to open up our minds to see the trends in other parts of the world," explained Dr. Mohamad Hariri.



Manufacturers have to be willing to invest in the design process. There has to be a design culture, where everybody in the organisation can appreciate design. When the management can value the importance of design, then the organisation will be able to move forward."

Award recipients will receive international recognition, which will facilitate the expansion of their marketplace globally. Those who submit their products for the award will also enjoy invaluable advice and insights from industry experts on how they can improve their product design.

Another popular award organised by MDC is the Young Designers Award, which was introduced 15 years ago to encourage Malaysia's young talents to hone their passion for design. The award is open to those in the industry (institutions and professionals) aged 35 and below, as well as school children.

Other programmes organised by MDC include design innovation exhibitions, during which it works closely with school children to cultivate their creative, design and innovation skills, as well as training sessions, seminars and workshops to educate industry players, particularly those in the management level, on the importance of design.

MDC is also instrumental in forging a strong international network with design councils from other countries to facilitate the exchange of ideas and innovations across borders. "We participate in an annual design summit among countries in the Asia Pacific. This helps us to understand the design capabilities and trends we have on this side of the world," said Dr. Mohamad Hariri.

Additionally, for the past two years, the council has been part of an exchange programme with Korea, which sees

designers from Korea and Malaysia teaming up to create new designs. "It's very interesting to see how the designers from both countries are able to merge the different cultures and incorporate this diversity in their designs," enthused Dr. Mohamad Hariri.

In the past, MDC has also collaborated with the Malaysian Timber Industry Board (MTIB) to get designers from countries such as Italy, Sweden, Australia and Austria to have a dialogue with the local designers and share their experience on creating successful designs and brands.

“

We participate in an annual design summit among countries in the Asia Pacific. This helps us to understand the design capabilities and trends we have on this side of the world.”



Upholding Innovation

Design is much more than just about how nice something looks. According to Dr. Mohamad Hariri, it actually transcends aesthetic value. "The product design should also incorporate functional, practical and commercial value, which has been derived from a systematic design process."

This is where innovative designs sell. In order for Malaysia to boost its competitiveness in the global landscape, we need to have the necessary capabilities to ensure that our products are able to stand out from the rest. It is imperative, therefore, for industry players to understand and adopt a culture of innovation in the workplace.

Today, the design aspect of a product has also become an instrumental factor in forging emotional bonds between the user and the product. "A designer creates. To create, you need to have a good understanding of what you are doing, including the behaviours of the users. Only then will you be able to come up with something useful and practical that can be accepted by consumers. This is how the emotional bond is created," explained Dr. Mohamad Hariri.



“

A designer creates. To create, you need to have a good understanding of what you are doing, including the behaviours of the users. Only then will you be able to come up with something useful and practical that can be accepted by consumers. This is how the emotional bond is created.”

Defining Trends

Driven by rapidly advancing technology, industrial design capabilities are flourishing in leaps and bounds, with consumers being identified to be a primary factor in dictating future trends. “Gadgets are getting more intelligent and mobile within a shorter period of time,” mused Dr. Mohamad Hariri.

Citing the process of designing cars as an example, he observed that while it previously took a few years to design a car, now only a few months is needed.

“Design is going global. To keep up with it, we need to adopt new ways of thinking,” he said.

Today, more and more organisations and agencies are choosing to collaborate with MDC as they realise the advantage of incorporating strong design innovations in their products. The council, on its part, hopes to be able to increase its significance to the country by being more involved in other



design-related areas such as the design and planning of amenities, housing and even cities.

“I think what is notable is that we are getting our name out there and, together with it, the awareness of the importance of design. This, to me, is a testament of MDC’s capabilities in shining the spotlight on design and innovation in developing the nation’s economy,” concluded Dr. Mohamad Hariri.



“

Design is going global. To keep up with it, we need to adopt new ways of thinking.”





Eco-design Excellence in the Wake of Industry 4.0

With a growing demand for consumer goods, especially electrical and electronic items, eco-design capabilities are playing an increasingly important role.

Recent times have witnessed the proliferation of new innovations. This can be attributed to a number of factors, including a growing population, increasingly sophisticated lifestyles and, of course, technological advancements. As this trend is set to continue, it is unlikely that the demand for electrical and electronic gadgets will diminish anytime soon.

It has, therefore, become more crucial than ever for industry players to adopt eco-designs as a main element in their product development process.

“Unused or unoptimised materials could become a big issue in the future, which is why we need to nip the problem in the bud right now,” said Mohd Shahrul Azmi Mohd Yusoff, the Director of SIRIM’s Industrial Centre of Innovation (IC-Innovation) in Industrial Design. “It is very important that we use the right amount of the appropriate materials for the right design and the right strength,” he continued.

By integrating eco-innovations in the industrial design process, one is able to generate products, systems and processes with minimal environmental impact, while still taking into account the aesthetic, ergonomic and usability aspects of the products. This ensures that the product created has the least environmental impact throughout its entire life cycle.

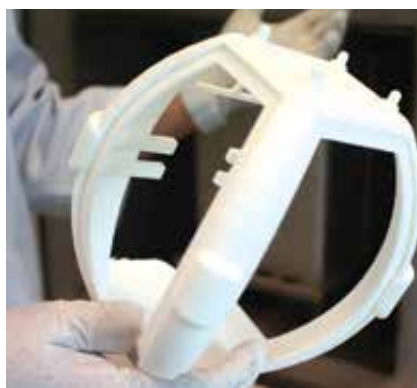
Design For Sustainability

Some places, like the European Union (EU), have introduced eco-design directives such as RoHS. “Even when designing mobile phones, they take the brightness of the display screen into consideration, as that affects the energy usage,” explained Mohd Shahrul. All this is new in Malaysia; but the country is steadily catching up.

When it comes to electrical and electronic products, hazardous waste is a major issue. “Even the ion batteries that we use need to be disposed of properly. With the increase in demand for energy, it is inevitable that we need to come up with better solutions,” he said.

Eco-design refers to designing with consideration for the environment. Eco-design considerations include:

- Weight reduction of products
- Product life extension
- Energy efficiency
- Ease of reuse
- Ease of recycling, including ease of separating, sorting and shredding
- Ease of classifying for recycling



Key characteristics of eco-friendly products:

- Energy efficient
- Reduce greenhouse gas emission
- Reduce resource consumption
- Reduce hazardous and toxic substances
- Reduce ozone-depleting substances
- Reduce emissions to air and water
- Environmentally friendly packaging, e.g. biodegradable
- Increased recycled content
- Increase in usage of renewable resources, such as bio-based products
- Forest stewardship



Current global trends have seen nations shifting to circular economy. This alternative to a traditional linear economy means that the product manufacturing process will no longer be perceived from conception to disposal. Instead, circular economy is a close-looped regenerative system that maximises the value of resources during use before recovering and regenerating them at the end of their service life. This minimises resource input, waste, emission and energy leakage.

In other words, with a close-looped production process, the product's end-of-life will become virtually non-existent. Subsequently, there is an increase in efficiency of resource usage, and reduction in urban and industrial waste, making this an ideal way to attain a better balance between the three pillars of sustainability: economy, environment and society.

In Malaysia, SIRIM is paving the way in studying how to make products sustainable from cradle to cradle. "It is very important to design products that are energy-friendly, for example. At the end of the day, the products must be reusable or recyclable. It should no longer be open-looped," commented Mohd Shahrul.

“

Even when designing mobile phones, they take the brightness of the display screen into consideration, as that affects the energy usage.”

Technological Advancements

The advent of Industry 4.0 has introduced new technologies, which in turn have brought about new possibilities for eco-design capabilities. In fact, in some areas, additive manufacturing, which is one of the nine identified pillars of Industry 4.0, works in synergy with eco-design.

For one, additive manufacturing allows for more efficient and flexible use of materials and consequently, increases design possibilities. "With additive manufacturing, you can create shapes and forms that cannot be done with traditional methods," explained Mohd Shahrul.

The potential of Industry 4.0 applications to realise a more sustainable manufacturing process is there. The other pillars that define Industry 4.0, such as sensors and Internet of Things (IoT), are able to facilitate a more efficient production system, which could lead to optimised resources and processes, increased productivity and reduction in costs.



Designers who think of any ideas can come to SIRIM for help. We can help them realise their dreams. From idea generation right through to the manufacturing of the prototype and batch production, SIRIM has the platform to help them innovate."

Paving the Future with Innovation

As a trusted name in industrial research and development, SIRIM has the experience and expertise to assist industry players, including product designers, in the entire product manufacturing process from start to end. "Designers who think of any ideas can come to SIRIM for help. We can help them realise their dreams. From idea generation right through to the manufacturing of the prototype and batch production, SIRIM has the platform to help them innovate," enthused Mohd Shahrul.



With additive manufacturing, you can create shapes and forms that cannot be done with traditional methods."



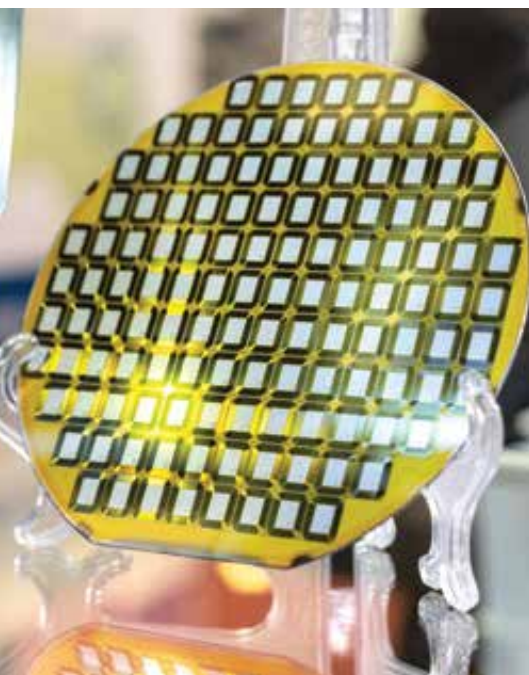
Defining Additive Manufacturing

While the more traditional method of subtractive manufacturing involves removing parts of a material to shape it into a desired product, additive manufacturing refers to the process of joining materials, layer upon layer, to create the product. The advantages of additive manufacturing include:

- Lower cost and material waste
- Reduced time to market
- Increased design flexibility
- Enhanced end-product quality



Compliance with Global Environmental Requirements



The Restriction of Hazardous Substances (RoHS) has a significant impact on the product design process. SIRIM's Environmental Technology Research Centre (ETRC), with the support of the Ministry of International Trade and Industry (MITI), has established the necessary facilities for RoHS-compliance testing, making it easier for product designers or manufacturers to ensure that the different materials and components they use are RoHS-compliant.



Did you know that the rate for waste generated from the latest gadgets has been growing more rapidly compared to the rate for common household waste? Technological innovations coupled with increasing consumer demand for the latest gadgets have led to more products being disposed of more frequently.

With the hazardous chemicals in these products being a health and environmental concern, it soon became apparent that some form of regulation would be required. The European Union (EU) took the lead with the Restriction of Hazardous Substances (RoHS) directive.

Introduced in 2006, the directive currently lists 10 restrictive hazardous substances that are regulated by the EU. These include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers, bis(2-Ethylhexyl) phthalate, benzyl butyl phthalate, dibutyl phthalate and diisobutyl phthalate.

RoHS essentially targets the design stage of the product lifecycle with an aim to decrease the product's environmental impact by minimising or eliminating the use of harmful materials.

Electrical and electronic products include household appliances, lighting equipment, electronic tools, IT & telecommunications equipment and control instruments

Global Impact

The introduction of RoHS has resulted in a significant ripple effect across the globe. Within the Asian region, countries like Singapore, China, India, Japan, South Korea and Vietnam have already followed suit with RoHS-like regulations; and Malaysia is not far behind.

The RoHS includes the entire value chain of the global electrical and electronics industry, beginning with the product design process. As such, RoHS compliance needs to be an integral part of the entire design and development process – from the conception to the development of the product. Among others, this involves sourcing for RoHS-compliant materials and developing new processes and technologies to accommodate the new designs.

In the electronics industry, for instance, lead used to be a primary material used for soldering. With the RoHS restriction on lead, electronics manufacturers are required to seek lead-free solder.

Subsequently, the line of responsibility trickles down to where and from whom the materials are sourced. To ensure a smooth production flow, even printed circuit board (PCB) designers will find it necessary to verify that the components used meet RoHS requirements.

This means that in addition to the assemblers or manufacturers of electrical and electronic products, suppliers of various components, parts and materials are also affected. In Malaysia, they include approximately 20,000 small and medium enterprises (SMEs), which are expected to adhere to RoHS requirements.

RoHS compliance is not only important from an environmental and health standpoint but also to ensure wider market acceptance for one's products. Many companies are not willing to compromise the progression of their business by not complying with RoHS. As such, it has become even more imperative that they are able to redesign their products accordingly to become RoHS-compliant.

Benefits of being RoHS Compliant

- Reduces toxicity and heavy metal poisoning to humans and the environment.
- Increases product reliability and efficiency with the stricter regulations which will lead to tighter process control, reduced defective products and increased product efficiency
- Confers competitive marketing advantage and bigger market share with increased consumer confidence and wider market acceptance

SIRIM – Your Partner for RoHS Compliance

Staffed with expert chemists and equipped with advanced instrumentation for RoHS-related electronic component testing, the Environmental Technology Research Centre's (ETRC) RoHS analytical laboratories at SIRIM offer a variety of stringent testing methods to determine if an electrical and electronic component or product is compliant with RoHS.

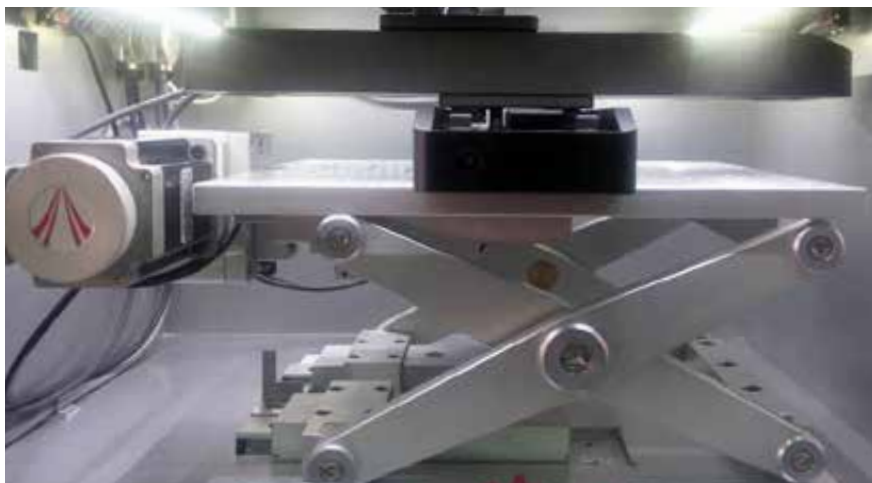
At the laboratories, each and every component, including rivets, screws, solders, wires, wire jackets and plating, is separated and tested individually to ensure that the restrictive substances contained in the components do not exceed the maximum level detailed in the RoHS.



Cutting-edge Testing Methods

The testing methods offered by SIRIM's ETRC include:

- X-Ray Fluorescence (XRF) spectroscopy screening for five substances, specifically lead (Pb), mercury (Hg), cadmium (Cd), total chromium (Cr) and bromine (Br) in uniform materials found in electrotechnical products. The XRF spectroscopy provides information on the total quantity of each element present in the sample but does not identify compounds or valence states of the elements
- Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), which is applied to determine the levels of cadmium, lead and chromium in electrotechnical products. It covers three types of matrices namely polymer or polymeric work pieces, metals and alloys and electronics. The ICP-OES provides the highest level of accuracy and precision for concentrations of lead, cadmium and chromium in the range of 10 mg/kg
- UV Spectroscopy, which utilises a colorimetric method to confirm the presence of hexavalent chromium
- Combustion Ion Chromatography (IC), which is an analytical technique used to screen the total bromine in homogeneous materials found in polymers and electronics. This method reduces the amount of testing and shortens the time required to determine if the screened product contains a higher value of a certain substance than permitted
- Gas Chromatography coupled with Mass Spectrometry (GC-MS), which is used to determine the phthalate plasticisers in polymers of electrotechnical products. The phthalate compounds are determined using soxhlet extraction of polymers with separation by the GC-MS qualitatively and quantitatively using selective ion monitoring



SIRIM is renowned in the industry for its testing capabilities. The RoHS testing facilities will enable companies to confidently demonstrate their compliance with the RoHS directive.

For more details on the ETRC's RoHS laboratories, kindly contact 03-5544 6591.

Educating the Nation on Industrial Design

Industrial design plays a significant role in contributing toward the success of the country's development. Assoc. Prof. Dr. Hj. Ruslan Abdul Rahim, the Dean of the Faculty of Art and Design at Universiti Teknologi MARA, elucidates on the importance of industrial design and how it goes beyond mere aesthetics.



Industrial design is much more than just about looks. It is a significant element that is ingrained in the entire product manufacturing process, and can be categorised into three major segments: product design, automotive design and furniture design. This broad scope reflects the prominent role that industrial design plays in the nation.

From the chair we sit on to the bed we sleep in, every product with which we come into contact involves industrial design. According to the Dean of Universiti Teknologi MARA's (UiTM) Faculty of Art and Design, Assoc. Prof. Dr. Hj. Ruslan Abdul Rahim, "Industrial design goes beyond aesthetics. It is about purposeful design. The look and feel of the item being designed is carefully researched and thought out."

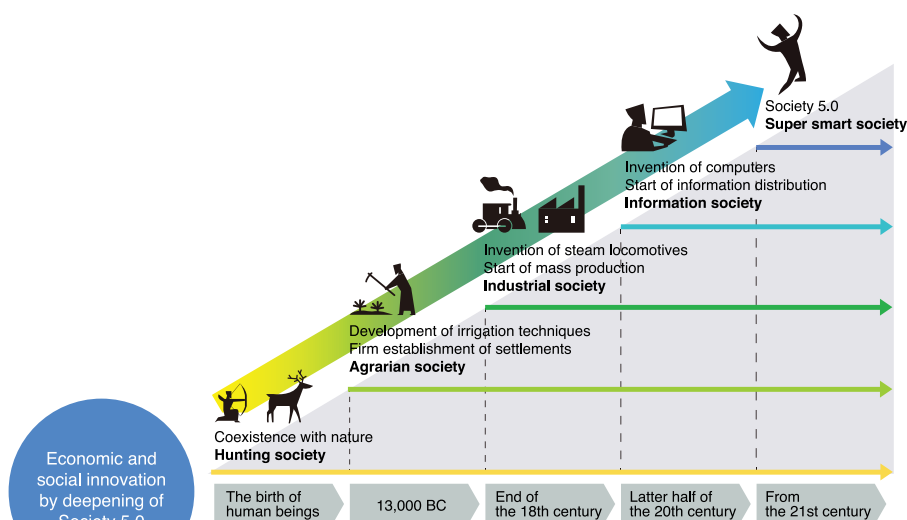
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Industrial design goes beyond aesthetics. It is about purposeful design. The look and feel of the item being designed is carefully researched and thought out.”

Subsequently, as the shapers of the design landscape, industrial designers play an important role. Dr. Ruslan has no doubt that Malaysia's industrial designers are more than capable to shoulder this responsibility. "As designers, we are very adaptive. Whatever you throw at designers, we'll catch it with our hands and make something happen from it," he quipped. With that in mind, he is confident that designers are up for the challenges of Industry 4.0 and even beyond that.

Case in point: the world is presently identified to be in the midst of Society 5.0 (this term was coined by the Japanese government in 2016 in its efforts to provide a thrust for high-tech digital and societal transformation), which involves the usage of technology for social betterment. In terms of transportation, for example, recent times have seen ride-sharing applications, such as Grab, taking over. This can be attributed in part to the work of designers and engineers.

The Evolution of Society



Source: Prepared based on materials from the Japan Business Federation (Keidanren)

Driven by Needs

As industrial design is closely connected to human beings, communities and society at large, trends would depend on what society needs. Dr. Ruslan expresses his concerns at merely following current trends, and instead proposes that Malaysia's industrial designers look into creating new trends that they can share with others to make the world better.

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We immerse ourselves in the industry to gain a deeper understanding of it on a more practical level; equipped with new teaching skills, we are then able to refresh our teaching content accordingly to ensure that our students are obtaining relevant knowledge and skills that can help them thrive upon graduation.”

“Rather than following trends, we are at a stage where we are mature enough to create trends, so why not?” he posited.

This is where academia can play a part in encouraging students and nurturing their capabilities. In recognising the necessity to strike a balance between theory and practice, UiTM's Faculty of Art and Design encourages its lecturers to participate in industrial attachment programmes that will allow them to update their skills and glean what is happening in the “real world”. “We immerse ourselves in the industry to gain a deeper understanding of it on a more practical level; equipped with new teaching skills, we are then able to refresh our teaching content accordingly to ensure that our students are obtaining relevant knowledge and skills that can help them thrive upon graduation,” said Dr. Ruslan.

For one, on top of the provision of core knowledge, universities will also have to prepare an environment that is conducive for nurturing their soft skills as part and parcel of their learning.

Cultivating Industry-ready Graduates

With their fingers on the pulse of the industry, the Faculty of Art and Design at UiTM has the necessary facilities and infrastructure in place to equip students with the proper knowledge and skills. The university's endeavours include:

- A digital “playground” with high bandwidth
- Introduction of iLearn – a classroom without walls concept where students can access their classes using mobile devices
- Online delivery of a certain percentage of lectures and assignments



Dr. Ruslan acknowledges that in addition to the rapidly transforming employment landscape, the student demographics have also changed; as such it is necessary for academia to keep updating their curricula.

“What I learnt decades ago is obviously very different from what is being taught today. Our current students – the millennials – have a very different exposure to technology, and we need to take that into account. Of course, feedback from industry will also determine how we design our curriculum,” he explained.



“Our main aim is for graduates to have a strong footing, so that they can, to a certain extent, be ready for industry,” he continued.

Proudly Malaysian

Despite the disruptive nature of the current environment, Dr. Ruslan sees plenty of potential for a career in industrial design. The Industry 4.0 phenomenon, for example, could be an opportunity for the emergence of new jobs. “In Industry 4.0, everything is automated; but you still need people to design, service and maintain these automated systems,” he said.

With the demand and awareness of industrial design on the rise, it is timely for Malaysia in particular to go global in this context. Dr. Ruslan is optimistic that industrial design in Malaysia has a bright future and envisions a ‘Malaysian design’ identity that will be recognised the world over.

“I aspire that one day, when you look at certain product designs, no matter where you are in the world, you’ll be able to say, ‘That’s a Malaysian design!’ We can stand shoulder-to-shoulder with other design giants. We have so much potential here, I think it’s a shame to keep it within our borders,” declared Dr. Ruslan.

“We are the masters of our own destiny. I want to encourage aspiring designers that you can determine your own destiny at the end of the day,” he concluded.



“

I aspire that one day, when you look at certain product designs, no matter where you are in the world, you’ll be able to say, ‘That’s a Malaysian design!’ We can stand shoulder-to-shoulder with other design giants. We have so much potential here, I think it’s a shame to keep it within our borders.”



Adding Value with Design

Veteran multidisciplinary designer Asri Ahmad agrees that Malaysia has an abundance of talent and resources to thrive in the industrial design landscape. “Instead of just manufacturing, we should be designing more as we have a vast amount of resources. This area is where we can improve – adding value to everything we export,” he urged, reiterating the point that industrial design can play a very important role in contributing to the nation’s Gross Domestic Product (GDP) and overall growth.

“

Instead of just manufacturing, we should be designing more as we have a vast amount of resources. This area is where we can improve – adding value to everything we export.”

We will lose out to cheaper labour countries like China or Vietnam if we stick to just commodity-based manufacturing such as Original Equipment Manufacturing (OEM) as part of the supply chain to larger foreign companies.

We are currently designing and producing for the Original Design Manufacturing (ODM) of other larger foreign brands, which is a fairly good opportunity for industrial designers. However, our long-term objective is to be able to design and manufacture our own brand of products (i.e. Original Brand Manufacturing or OBM).

Creating well-designed products for consumers is not an easy feat; to that extent, Asri suggests that an authority or body be established to centralise all industrial design-related stakeholders in ensuring that great designs can be translated into quality products and marketed to the public.

He is also enthusiastic that the advent of Industry 4.0 has brought about new innovations and opportunities, with the infrastructure already laid out. “It’s up to the manufacturers and retailers to utilise what has already been developed. Especially with the availability of instant feedback for manufactured products, the manufacturers are readily engaging with their consumers to improve their products. That is how new technologies can help industrial designers get immediate feedback and help the whole cycle of production.

“I see that SIRIM has the potential to further assist designers, particularly in optimising resources, while the Malaysia Design Council (MDC) can promote better awareness of the fact that good design translates to good business, and encourage the engagement of readily available local designers. Overall, it would be beneficial in boosting awareness,” he elaborated.

Asri Ahmad has over 30 years of design experience under his belt. He is currently a Co-founder of Rekanegara, a platform that brings together industry experts to empower designers through knowledge sharing. He is also a Design Consultant and Director of Rifaie Chua & Sethi Sdn Bhd, a strategic brand consultancy.

“

I see that SIRIM has the potential to further assist designers, particularly in optimising resources, while the Malaysia Design Council (MDC) can promote better awareness of the fact that good design translates to good business, and encourage the engagement of readily available local designers.”





Good Security Design for a Brighter Future

How can a brand be safeguarded from counterfeiters? Tajul Arifin Abd Karim from SIRIM's Packaging and Security Design Centre shares how security designs can help manufacturers protect their goods.

Oftentimes, unscrupulous people take advantage of established brands by making cheaper, subpar imitations of their goods, usually at the expense of the business and reputation of the brands. This rampant growth of the counterfeiting business has necessitated the incorporation of security design features in products.

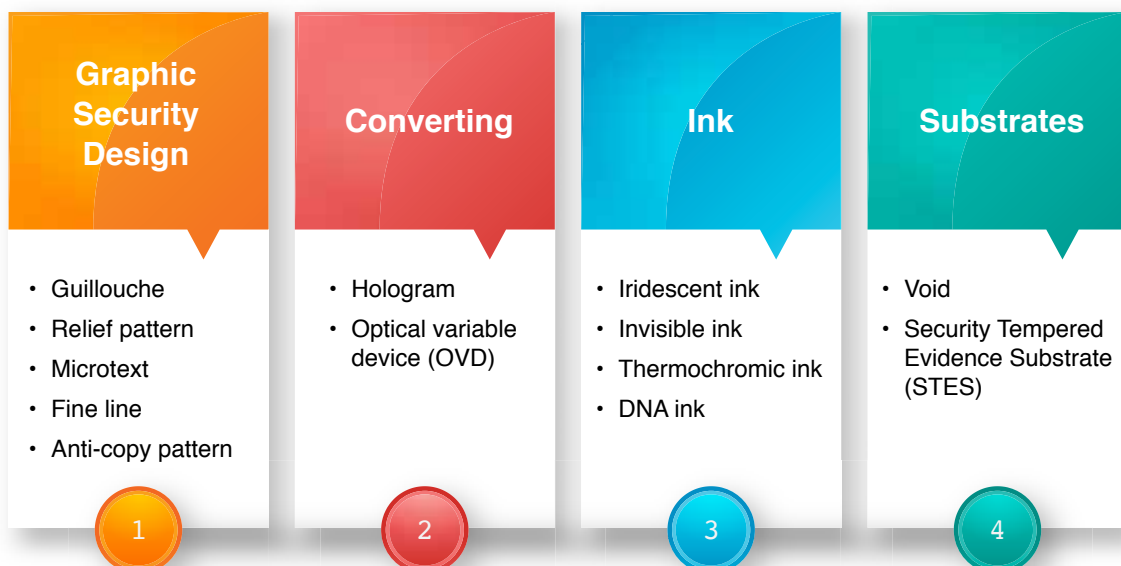
In addition to being a crucial component in the creation of banknotes, certificates and other important documents such as land grants, licences and passports, security design is also one of the elements of brand protection. Typically, highly defined print lines are used to create intricate designs that are difficult to duplicate and print.

According to Tajul Arifin Abd Karim, the Head of the Technology & Operations Department of SIRIM's Packaging and Security Design Centre (PSDC), "With normal graphic printing, the lines measure about one to two points and are printed on a 2,400dpi printer. The lines for security design, on the other hand, are as fine as 30 microns and use a 6,000dpi printer!"

"Security design employs mathematical calculations. We use special software that allows us to produce mechanical patterns, such as geometric, organic and relief patterns. It's all very controlled. The combination of machine and software makes it near impossible to reproduce the design."

"Security design employs mathematical calculations. We use special software that allows us to produce mechanical patterns, such as geometric, organic and relief patterns. It's all very controlled."

SECURITY DESIGN CATEGORIES



The security design elements can be segmented into three categories: Overt, Covert and Semi-covert. Generally the first level of security features, overt security design elements are visible to the naked eye, enabling instant authentication of products or the identity of documents via visual inspection. This allows users to validate the product or document quickly and easily at the point of inspection. An example is the hologram.

The covert technique offers a higher level of protection. The security features are not readily visible, and special equipment is needed to identify them. Therefore, covert security design elements are able to provide a higher level of protection. Examples include special liquids such as DNA ink or the usage of UV light to detect infrared (IR) and ultraviolet pigments. Covert techniques also encompass forensic capabilities utilising molecular markers and biological tracers, which can only be identified with special laboratory equipment.

The semi-covert technique is a combination of overt and covert techniques, employing a design that cannot be seen in its entirety without the use of special gadgets. Microtext – extremely small text – is an example of this. At a glance, it looks like just a line or design element, but the use of a magnifying glass or something similar will reveal that there is information contained within the design.

Safeguarding Your Interests

The benefits of incorporating security design in consumer goods are plenty. A brand is a valuable asset of any business, and should thus be protected. “Counterfeit issues can devalue the brand name and damage the business as they could shake consumers’ confidence in the product,” said Tajul.

By circumventing counterfeit issues, security design protects the brand name and reinforces its strength, paving the way for its growth as customers come to identify the products and business, and consequently refer these products or services to others. “Nowadays, a product cannot depend on aesthetic value alone. The incorporation of security design will enhance the product, making it more valuable and traceable,” explained Tajul.

Security design can be beneficial for consumers as well, as they will be assured of purchasing authentic goods of a certain quality.

In this era of smart technology, smart security design has also become a key security design offering. As its name suggests, smart security design combines security graphic design and technology to enable users to interact with it.

“The advancement of security design technologies is seeing us move toward the implementation of a tracking system that will reveal the source and/or ingredients of a product. Those who want to know more about the product can just scan it with a special application,” explained Tajul.

“

Nowadays, a product cannot depend on aesthetic value alone. The incorporation of security design will enhance the product, making it more valuable and traceable.”

Interactive Innovation

The evolution of smart security design can be traced back to the mid-1980s, during which “smart packaging” was introduced to describe package structures. A few years later, smart security design features were applied on packaging and defined to be “doing more than protection”. Researchers went on to coin the term “interactive” packaging to describe packaging, which was later shortened to “active” packaging. Today, this idea has been incorporated into the suite of security design solutions on offer and is also called “active security solutions”.





In a bid to propel the country's security design capabilities, the PSDC is currently collaborating with SIRIM's Industrial Centre of Innovation in Sensors to research and upgrade a tracking system and produce a QR security code.

"Normally, for this level of security, Radio Frequency Identification (RFID) is required, but this application is expensive in Malaysia. QR codes can typically be copied. We are trying to come up with a version that can protect – a combination of soft and hard copy," explained Tajul.

This technology is not easy to produce but Tajul is enthusiastic about its development thus far. "We began this endeavour in April and hope to have something tangible in a few months' time," he said.

Steadily Moving Forward

Malaysia is slightly lagging behind compared to our counterparts in the region, such as Thailand and Indonesia. Tajul attributes this to the fact that the country does not possess its own technological capabilities in this area. "We are using the technology from other countries, from the software to the substrates. For example, our RM1 and RM5 notes utilise technology from Australia. Indonesia has its own ink research and development facility, and it also produces paper and substrate. Presently, we don't have the capability to produce these ourselves."

Nevertheless, he is optimistic that the country will catch up. "Malaysians have the technological capabilities. Our usage of information technology is high, so I think that both brand owners and consumers are ready to adopt the future trends of security design."

Evolving toward Excellence

As part of SIRIM, the PSDC can trace its roots back to 1969. The centre initially embarked on printing labels for electrical products in 1993 before being appointed to work on a design project for Jabatan Telekom Malaysia in 1995. It expanded its capabilities further in 2006 when it began printing the Sijil Tinggi Agama Malaysia (STAM).

"We started with labels and moved on to certificates and licences, integrating security design features using the relevant software," said Tajul.

With Industry 4.0 knocking at our door, industries are rapidly changing. In preparation for the digital age, it is essential for the country to have a strong foundation in security design capabilities, including in software.



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The advancement of security design technologies is seeing us move toward the implementation of a tracking system that will reveal the source and/or ingredients of a product. Those who want to know more about the product can just scan it with a special application.”





Protecting Your Design

Your intellectual property is the cornerstone of your business. How can you safeguard it? SIRIM's Legal and IP Management Services Department offers some insights.

Product design is often a company's most valuable asset. After all, it is the distinguishing element that makes the product attractive and appealing in the eyes of the consumer and, thus, an important factor in their decision-making process. This is where legal protection of your intellectual property (IP) can be of benefit.

Product design is often a company's most valuable asset. After all, it is the distinguishing element that makes the product attractive and appealing in the eyes of the consumer and, thus, an important factor in their decision-making process. This is where legal protection of your intellectual property (IP) can be of benefit.

According to A Rahman Zuhri, the Head of Intellectual Property Services Section, Legal and IP Management Services Department, SIRIM, "IP is the product of human thought and mind, creativity and intellectual efforts, which was created to solve issues technically or as an artistic expression."

In Malaysia and most parts of the world, designs can be safeguarded legally via industrial design protection, among others. Industrial design refers to the aesthetic aspect of the product. This encompasses three-dimensional features like the shape and configuration of the product as well as two-dimensional features such as pattern and ornamentation. This aesthetic aspect needs to be visually apparent. Additionally, the product has to be reproducible through industrial means.

The Malaysian Industrial Design Act 1996 (Act 552) and its subsequent amendments provide protection by granting a monopoly right to the visual form of the mass-produced product or article. Nevertheless, it does not cover:

- a method or principle of construction; or
- features of shape or configuration of an article which:
 - i. are dictated solely by the function which an article has to perform (or must fit criteria), or
 - ii. are dependent upon the appearance of another article of which the article is intended by the author of the design to form an integral part (or must match criteria), or
 - iii. differ only in immaterial details or features.

This means that registered design protection will cover truly aesthetic and standalone designs. "In order to protect the methods or principles of construction, for example, patents might be more suitable as they cover a wider scope that includes the underlying technology used in a product regardless of the brand name or design," explained Rahman.

The World Intellectual Property Organization (WIPO) includes industrial property and copyright under IP protection, with the former including patents, industrial designs, trademarks, geographical indications, layout design of integrated circuits (electronic chips) and other types of IP directly related to industrial activities, and the latter encompassing works related to creative expression, such as literary works, films, music and artistic works.

A Sound Investment

With businesses and economies being driven by ideas and creations, it is very important that these are protected. Rahman cautions that without proper IP protection, it would be difficult for a company to enforce its rights over its designs. As such, to ensure that the industrial designs are sufficiently protected, proper industrial design registration is strongly advised.

"IP protection is a form of assurance. If your design is not protected, your creative outputs are not protected against manipulation by third parties. This means that others will be able to ride on your success and you won't be able to take any legal action against them," he said.

On the other side of the coin, it is also important for companies to respect other people's IP. "We always advise companies to do a thorough check to ensure that their products are not infringing the rights of others," he continued.

Apart from protection, IP protection can also be construed as a branding and marketing tool that helps the company distinguish itself in the marketplace. “If your product is IP-protected, consumers will know that it originated from you,” he explained. As an IP-protected product or idea cannot be duplicated by others, the company will be able to carve out a distinct identity and obtain a competitive edge.

In 2017, a total of 19,481 out of 41,093 trademark applications were made by local applicants. In terms of industrial design applications, 517 out of 1,814 applications were by local companies. This indicates that the country’s small and medium enterprises (SMEs) are aware of the importance of IP protection.

“However, the number of local industrial design applicants should be higher, as Malaysia is an active exporter of furniture, for example, where industrial design is the right protection scheme,” said Rahman.

First-of-its-kind Design

To register a design, it needs to be new. This means that the design must not be the same as a design:

- disclosed to the public anywhere in Malaysia or the world (worldwide newness); or
- applied/registered earlier in Malaysia.

It is therefore imperative that the design is not used, sold or published BEFORE the application for industrial design registration is filed; the design may be deemed invalid if it has been used or published before the date of application.

As the owner of a registered design, one has the exclusive right to manufacture, import, sell or hire out any product to which the design has been applied, or allow others to use the design under agreed terms.

Upon filing the application, the registration of the industrial design will be valid for five years. The registration period may be extended for a further four consecutive terms, bringing the maximum protection afforded to a registered product to 25 years.

Applications for design registration may be filed by the design owner or through a registered agent. The applicant is required to submit:

- a clear representation (or specimen) of the design, including a statement of novelty (the latter is not required for registration of wallpaper, lace or textile articles);
- the completed application form; and
- filing fees.

Enhancing Greater Creativity

IP is generally considered to be an evolving subject matter. Hence, what is applicable and protected currently may not be in the future. Rahman cites software and electronic programmes as an example. “Years ago, software and electronic programmes were only protected under copyright as they were considered creative expressions. Nowadays, however, they are also protectable under patents as they solve technical problems and can be found in many applications,” he said.

While the IP practices in Malaysia are on par with the rest of the world, SMEs in Malaysia do not seem to be taking full advantage of the benefits of IP protection or fully aware of the procedures and processes. Time and cost are often seen as main hindrances that keep them from filing for IP protection. “The entire process for trademark applications can take up to one and a half years from the time of filing, while patents take at least four years. Costs can also reach thousands of dollars, especially if you go through an IP agent,” explained Rahman.

As the official authority on IP in Malaysia, the Intellectual Property Corporation of Malaysia (MyIPO) plays a central role in encouraging innovation and promoting IP awareness. To do this, various workshops as well as training, educational and awareness programmes are held throughout the year, targeting SMEs as well as the general public. MyIPO is currently also encouraging self-filing among individuals, companies and organisations to help them minimise costs.

SIRIM works together with MyIPO in increasing awareness of the significance of IP protection and supporting the latter’s innovation-related activities. SIRIM also plays an advisory role in helping the public determine the most



suitable type of IP protection for their products and navigate the application process.

“The public will typically approach us to find out how to file an application or to conduct a search on whether a specific product is already registered or not,” shared Rahman.

As a central contact point for SMEs and industry, SIRIM is well positioned to provide a helping hand to interested parties. “SIRIM is always ready to help SMEs and other clients in dealing with their IP matters. Our collaboration with MyIPO and other stakeholders will also be beneficial to the SMEs. We can assist in going through the company’s proposal and advise them if it should be protected or not,” elaborated Rahman.

Ultimately, SIRIM’s goal is to empower SMEs to enable them to compete locally and internationally, where IP would feature prominently in their business transactions. “IP is the main economic driver anywhere in the world. It is the business of the future. SMEs should therefore take the opportunity to facilitate the growth of their business with their IP,” he asserted.





Exploring Sensor Technology in Industrial Design

With our world today being rife with technological advancements, the role of sensors is becoming more prevalent in our daily lives. *SIRIMLink* catches up with Hamidah Sidek, the Director of SIRIM's Industrial Centre of Innovation in Sensors, to find out more

Sensors are sophisticated devices that are able to detect, monitor and convert various physical parameters, such as temperature, humidity, speed and pressure, into signals that can be measured electrically and, subsequently, converted to be readable. As such, they can be used to control certain parameters to enhance the energy efficiency of products and optimise processes, for example.

With the current rise of the Internet of Things (IoT), devices with sensors are also now able to communicate with each other. In fact, smart sensors are key in developing IoT applications, particularly in the manufacturing industry. "In this context, sensors are instrumental in facilitating the modernisation and streamlining of analytics and

connectivity in IoT applications," explained Hamidah Sidek, Director of SIRIM's Industrial Centre of Innovation (IC-Innovation) in Sensors.

Through time, sensors are becoming smaller and more integrated. This has increased the versatility of the sensors and allowed designers to incorporate them across a wide range of applications. Besides IoT, current trends also see sensors being used in small-scale complete sensing systems, as well as power-savvy or self-powered, printed and flexible, biodegradable, low cost, wearable and self-healing technologies.

Among others, recent advances in sensor manufacturing have opened up new possibilities for the digital health ecosystem. Through the integration of sensors into accessories like garments,

hats, wristbands, socks, shoes and eyeglasses as well as devices like wristwatches, headphones and smartphones, the resultant wearable technology can be used to achieve a range of health outcomes. Sensors also allow us to control our surroundings, such as in dimming and brightening lights or touch-sensitive elevator buttons

Moving the Country Forward

With the proliferation of smart sensors, almost every aspect of the world can now be "smart", from smart buildings to smart cities and smart farming, to name a few. However, according to Hamidah, Malaysia still has much to do in order to keep abreast with the demands and development of sensors. "Our industries are still purchasing sensor technologies from other countries, instead of producing their own. This could have a detrimental effect on the nation and our economy," she said. She cites several factors that contribute to this. These include lack of knowledge and expertise, an inability to meet the competitive costs of sensors and inadequate facilities for fabricating and testing the sensors.

"Malaysian industries should be prepared to venture into sensor technology since it has become a significant component in many applications, especially with the advent of IoT and Industry 4.0," commented Hamidah. However, she acknowledges that it would be a huge investment for industries to venture into this area. This is where governmental support and incentives can play important parts in helping the industries grow.

A Dedicated Centre for Sensors

Noting the rapid rise in demand for sensors, SIRIM decided to expand on its existing capabilities to set up the IC-Innovation in Sensors recently. "Previously, SIRIM, under its Industrial Biotechnology Research Centre (IBRC), developed a biosensor probe used for the detection of ammonium, chronic kidney disease and uric acid. This was followed by the Electronic Section developing a portable reader to detect and measure its parameters. At the same time, research was also being conducted in solid state lighting (SSL) and Long Range (LoRA) technology at its Advanced Materials Research Centre (AMREC).

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This will benefit those from the manufacturing and education sectors, particularly. The former will be able to increase their productivity and improve product quality, while the latter will be able to expand their expertise and knowledge in advancing sensor technologies and their applications around the world.”



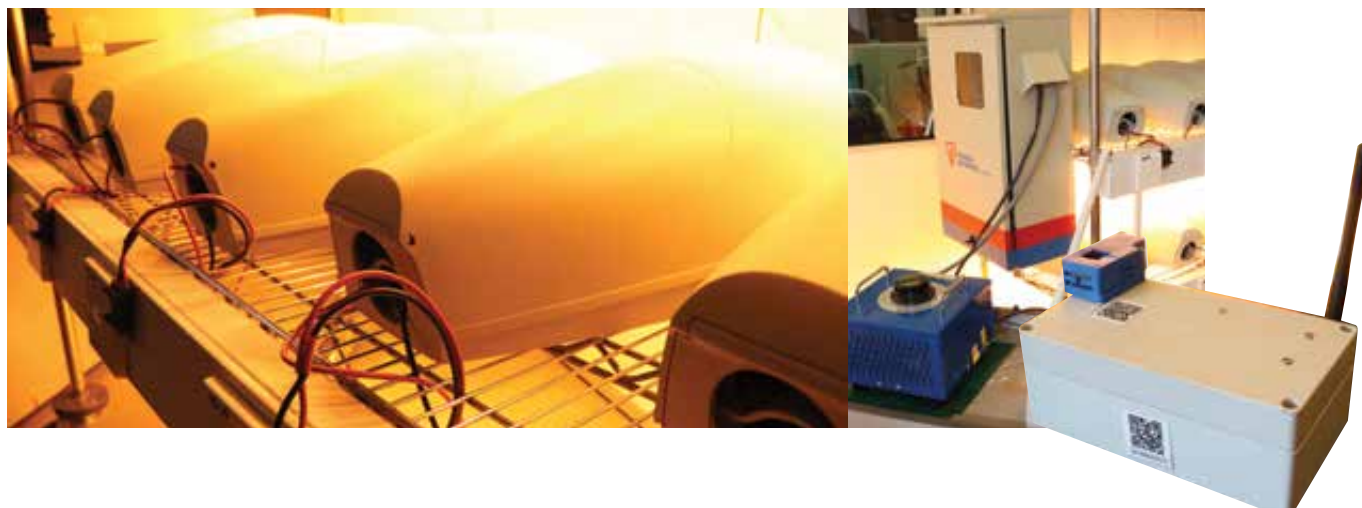
This spurred SIRIM to consolidate all its activities into one centre, focusing on sensors. And thus, the IC-Innovation in Sensors was conceived. Led by Hamidah, the centre utilises sensor technology to develop products, services and related applications in the areas of biosensors, photonics and integrated sensing systems.

Currently, the IC-Innovation in Sensors is in the process of developing biosensor probes for dengue detection using a microfluidic system, in addition to SSL, LoRA technology for aquaculture and agriculture, and IoT applications for street lighting and agriculture monitoring. Other new growth areas identified include an intelligent sensor network to support the smart industry, infrastructure and track & trace solutions, and smart packaging and labelling for product safety and security.

Among others, the centre will collaborate with industry players on relevant research work or help them obtain government research grants. It can also assist in forging research partnerships by linking local companies with overseas companies using technology localisation to meet specific application demands. “This will benefit those from the manufacturing and education sectors, particularly. The former will be able to increase their productivity and improve product quality, while the latter will be able to expand their expertise and knowledge in advancing sensor technologies

“

Malaysian industries should be prepared to venture into sensor technology since it has become a significant component in many applications, especially with the advent of IoT and Industry 4.0.”



A Rising Star

The increasing demand for sensor technology can be attributed to the:

- growing adoption of IoT
- advancements in consumer electronics
- progressive growth of sensor innovations
- wider usage of sensors in smartphones
- strong demand for sensors in automation, in line with Industry 4.0
- expansion of the automotive industry
- increase in demand for wearable technology

and their applications around the world,” said Hamidah.

To date, several companies have benefited from the services offered by the IC-Innovation in Sensors. One of these is Primelux Energy Sdn Bhd. The centre developed an IoT-based system, called the Light Alarm Triggering System (LATte), which measures the street light current and voltage and sends the data to the cloud server in real time continuously, facilitating the detection of street light failures. This eliminates the need for a patrolling team to monitor them, thus saving on manpower costs and reducing the risk of accidents occurring because of later response.

The centre also worked on the Kelulut Integrated Information System (KIIS), another IoT-based device that uses digital sensors to measure the temperature and humidity of stingless bee (Kelulut) hives in real time. This consistent and continuous monitoring of the hives will ensure that the colony stays productive, facilitating an increase in honey productivity and income for the bee keeper.



Integrating Connectivity

To ensure a smooth path of progress for the development of sensor technologies, better internet network infrastructure will allow for seamless data monitoring. As sensors are wirelessly connected, it is also imperative to ascertain that they are protected from network security threats.

As a recently established centre, the IC-Innovation in Sensors still has much to learn. “To expedite the learning curve, we would like to invite industries to collaborate with us in related projects that can benefit both parties,” said Hamidah.

Ultimately, SIRIM aims to develop sensors that are interconnected and able to be monitored and controlled remotely. To do this, the centre also looks forward to partnering with industries and universities to increase awareness on the significance of sensor technologies via training programmes.

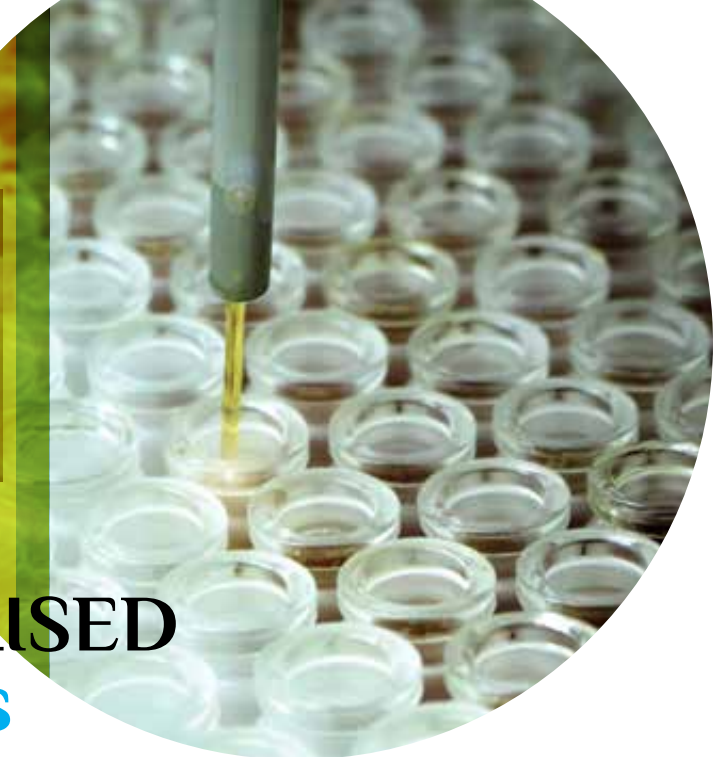
To find out how the IC-Innovation in Sensors can help you develop your capabilities in sensor technology, kindly contact 03-5544 5850.



A Helping Hand

Companies/People that have benefited with the help of the IC-Innovation in Sensors include:

Name of Company	Project
Primelux Energy Sdn Bhd	Light Alarm Triggering System (LATte) to monitor street lights
Beekeeping entrepreneurs	Kelulut Integrated Information System (KIIS) to monitor the hives of stingless bees
Tumpat Solution Sdn Bhd	RFID and sensor systems for smart manholes
Alion Nations Solutions Sdn Bhd, Impian Mentari Sdn Bhd, Des Electronic Sdn Bhd, Seaharvest Aquamarine (M) Sdn Bhd and Camsystem Sdn Bhd	Utilisation of sensors to ensure SSL/LED Innovation through Best Lighting Project Management Practice
Oversea Lighting & Electric Sdn Bhd	Smart LED Street Lighting System for Market Expansion using LoRA technology
Alion Nation Solutions Sdn Bhd	Enhancement of Underwater Fish Attracting LED Lamp (UFAL) for the aquaculture industry
Night market hawkers	Portable LED lighting system



Developing SMART & PERSONALISED Hair Care Solutions

The advent of Industry 4.0 has propagated the integration of Internet of Things, Cloud Storage, Data Analytics, Artificial Intelligence and bespoke products and services, among others. A local small and medium enterprise is tapping into these advances and trends to provide the ultimate solution for personalised hair care.

Most of us tend to favour certain hair products. But how do we know if these are truly the right match for us? Joe Thye, the Chief Executive Officer of T-Biomax Sdn Bhd (T-Biomax), a local manufacturer, has the answer.

T-Biomax is set to revolutionise the hair care industry with a first-in-the-world scalp/hair diagnostic, prescription and treatment system (BioTHIK®). The company is currently developing the prototype with technical assistance from SIRIM and funding from the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC). According to Thye, the device provides precise diagnoses, gets recommendations to prescribe exact treatment and preventive products, and provides effective treatments that cater to individual scalp and hair conditions.

"We find that when it comes to beauty and hair products, many people are influenced by brands, rather than what they actually need. Sometimes a person might even think that their hair is dry and look for shampoo for dry hair; but the dryness could be caused by blockage of oil in the scalp!" revealed Thye.

This issue is what led to the conception of BioTHIK®, an all-in-one scalp/hair diagnostic, prescription and treatment system. The Internet of Things (IoT)-enabled device scans the customer's scalp/hair under different magnifications to capture live images of hair pores, density and thickness. Scanned data are recorded and stored on a cloud system, making data retrieval and accessibility easy. Existing and new data are then analysed and processed by an Artificial Intelligence (AI) system. The AI algorithm subsequently prescribes the right treatment or preventive product (a biotechnology/biocompatible solution) to use. The device has Nanojet and Plasma applicators that release and penetrate the solution to treat the customer's scalp/hair. The entire

scanning, prescription and treatment process can be visualised by the customer via a Wi-Fi and cloud-enabled and connected tablet. Every customer is unique; so are the prescription and treatment.

Making First Impressions Count

Thye acknowledges that aesthetic design plays a very important role, perhaps more so in the beauty and hair care industry. "In our line of business, visually appealing design is at the front line. Customers tend to be influenced by the package design first. As such, there needs to be enough emphasis on the design aspect of the scalp/hair product and system."



Thye sees the potential of Malaysia in rising to the next level in this respect. "We have an abundance of unique local raw materials and resources, including local plants, herbs and talent, as well as a strategic location, to tap into the global marketplace," he enthused.

While inadequate resources or funding is often cited as a hurdle most small and medium enterprises (SMEs) face, he is optimistic that with the proper support from the government and related agencies, that can be overcome.

Fruitful Partnership

Thye credits SIRIM for helping him throughout the entire journey in making this a reality. "SIRIM has played an instrumental role every step of the way," he said.

A marketing team helped T-Biomax to identify and secure the funding support available from the government, while a product development team is assisting in transforming the conceptual design idea into reality. The device is digitally modelled in CAD software, analysed in CAE software and 3D-printed using Additive Manufacturing (AM) technology for form, fit and function tests prior to mould design and fabrication.

As the company is targeting both local and international markets, the design takes into consideration compliance with international standards (such as the Restriction of Hazardous Substances, or RoHS, directive), biosafety and biocompatibility and toxicity tests. The device is designed with modular concepts, taking shipping issues as well as easy maintenance and upgradeability into consideration.

Thye envisions for SIRIM, with its vast experience and expertise, to be an invaluable resource, particularly in helping SMEs get their foot in the door of the global marketplace. "It would be beneficial for SIRIM to aggressively provide consultancy and training courses to equip SMEs with the relevant skills needed. SIRIM would also be a great help in assisting these SMEs to execute their ideas," he continued.

He encourages other SMEs to take advantage of the help being offered, not just by SIRIM but also other agencies. "The SMEs can work closely with the relevant government agencies to find out how they can realise their ideas and enhance their products. By utilising the available resources, they can reach out to the world!" he declared.

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Innovation for Your Crowning Glory

T-Biomax Sdn. Bhd is a manufacturing and marketing company that specialised in hair care. The company has a Good Manufacturing Practice (GMP)-certified factory and varieties of hair care products, which are scientifically proven, holistic botanical-based solutions free from toxicity and harmful ingredients to cater for different scalp/ hair treatment and preventive solutions.

The company, with its BioTHIK®, the first-in-the-world scalp/hair diagnostic, prescription and treatment system, coupled with the botanical-based treatment and preventive products/solutions, owns four pending patents, two industrial designs, two biotechnology patents and seven trademarks.





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