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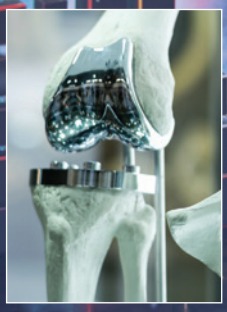
12th Malaysia Plan 2021 - 2025
VOL 3



Elevating Malaysia's Socioeconomic Status

The world has been steadily moving into endemicity, heralding cautious optimism for a time of recovery and the resumption of daily life. In Malaysia, international borders have reopened and restrictions have loosened. After more than two years of being at a virtual standstill, it is time to move forward. Nevertheless, global uncertainties are constantly placing new obstacles on our path.

The times may be challenging, but SIRIM is raring and ready to help the nation progress. With the invaluable support of the Ministry of International Trade and Industry (MITI), we are in the thick of facilitating the socioeconomic growth of the country via special projects under the 12th Malaysia Plan (12MP), particularly in key growth areas such as the aerospace, automotive and medical device industries. With our expertise in research and development, standards, training, testing and measurement and calibrations, we are well-equipped to face present and future challenges as we consistently reinforce our strategic programmes, infrastructure and capabilities.

We therefore invite the country's industry players to take advantage of our myriad offerings. Together, we can rise above any quagmires we might encounter to reach our aspiration of achieving high-income nation status.

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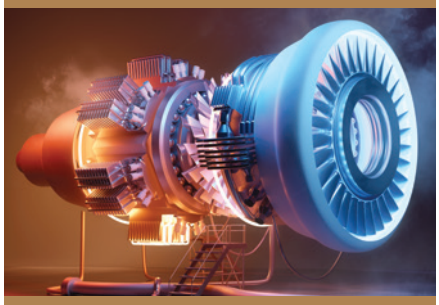


INSIGHTS FROM THE INDUSTRY PLAYERS

A session with

DR. K. JAMUNA THEVI

Senior Researcher, Industrial Centre of Innovation (IC-I) in Biomedical, SIRIM Industrial Research

The medical devices industry has been identified as a growth sub-sector in the 12th Malaysia Plan. Subsequently, a proper manufacturing ecosystem is essential to support its expansion.

Supporting the Expansion of the Medical Device Sector

When the COVID-19 pandemic erupted, the global medical device market was disrupted, along with a halted supply chain and increased demand for crucial medical devices. Faced with severe equipment shortages, countries around the world began to rely on domestic manufacturers to fulfil demands.

With the onset of the pandemic, a local company, Epsilon Medical Devices Sdn Bhd, commenced manufacturing facemasks, diverging from its main business of producing catheters. "This example demonstrates how the country attempted to overcome trade constraints by producing disposable medical devices locally to meet the demands faster," said Dr. K. Jamuna Thevi, Senior Researcher at the Industrial Centre of Innovation (IC-I) in Biomedical, SIRIM Industrial Research.

Malaysia is currently the Asia Pacific region's medical device hub, with over 200 medical device businesses active in the ecosystem. However, a majority of its products, including high-value added products like total knee or hip replacement implants, bioceramic coated implants, bone regenerative implants, dental fillers and antimicrobial coatings, are still being imported. In order to tap into the potential of this industry, a comprehensive support ecosystem that allows for the expansion of its capabilities needs to be cultivated.

In upholding its role to nurture the growth of local industries and support the agenda of the government laid out in the 12th Malaysia Plan (12MP), SIRIM has the experience and expertise to help local manufacturers to improve their competitiveness with the provision of supporting services, such as testing, inspection and certification, training, calibration and measurement as well as enhancing their innovation and technological capabilities.

To serve the country's medical device companies, SIRIM received funding under the 12MP to upgrade its testing and product development facilities. These include:

1. Testing facility for medical devices and pharmaceutical items that are extractable and leachable at the Industrial Biotechnology Research Centre (IBRC) in Shah Alam.
2. Ethylene oxide sterilisation facility at SIRIM Permatang Pauh.
3. Electromagnetic compatibility and radio frequency compatibility of electronic medical devices facility at SIRIM QAS International Sdn Bhd.
4. An incubator to develop bio modelling products through polymer 3D printers at SIRIM Bukit Jalill.

One of SIRIM's key goals is to hasten product accreditation among local medical device producers, who currently rely on overseas testing facilities. For example, medical devices must be evaluated in Good Laboratory Practice (GLP)-compliant and ISO 17025-accredited facilities.

Medical Devices Manufactured in Malaysia

- Gloves
- Implantable devices
- Orthopaedic devices
- Imaging equipment
- Rubber-based products like gloves
- Plastic-based products like catheters & tubes

"SIRIM's IBRC is one of a few laboratories that are able to offer certifications in Malaysia. Currently, IBRC is pursuing accreditation for testing extractable and leachable medical devices," Dr. Jamuna explained.

Going Local

In 2021, SIRIM launched a Medical Device Innovation Centre (MDIC) to drive innovations locally. Located at the Kulim Hi-Tech Park in Kedah, the centre facilitates collaboration among a wide range of partners, including medical device manufacturers, government ministries and agencies, global manufacturing innovation centres, research institutes and academia.

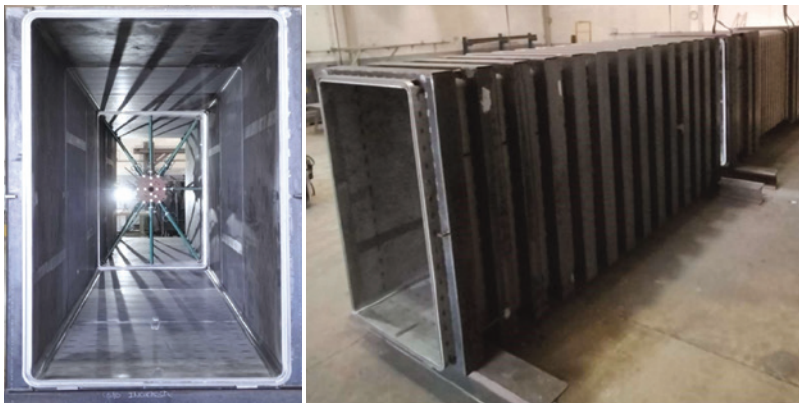
"We need to develop accredited facilities locally so that we can control our cash flow," Dr. Jamuna explained.

The ethylene oxide sterilisation facility being built in SIRIM Permatang Pauh, for example, will benefit local small and medium enterprises (SMEs). The facility will encompass six pallet chambers, thus allowing smaller medical device manufacturers with low-volume products to have a more cost-competitive option.

"In contrast, commercial providers typically have 10 to 64 pallet chambers. SMEs that go to these commercial providers may just require four to six pallets, but will still have to pay for 10 pallet chambers," Dr. Jamuna remarked.

She also emphasised the importance of establishing the radio frequency and electromagnetic compatibility testing facilities for evaluating medical products such as the Telepresence mobile robot, hospital bed, dental chair, patient monitors, surgical table, ultrasound scanner, pharmaceutical refrigerator and robot arms rehabilitation system. This will assist the electro medical device industry in researching and developing products that meet national and international mandatory requirements.

"What we're buying is a chamber that can test all of the electronic devices that are compatible with its electromagnetic environment to ensure that the devices do not emit levels of electromagnetic energy that cause electromagnetic interference in other devices in the vicinity. For example, any disturbance can be fatal for patients using a ventilator, so we must test the compatibility of the device to ensure that it is safe to use. The same goes for electronic devices in hospital operating rooms as well as magnetic resonance imaging (MRI), computer tomography (CT) Scan, X-ray and other such machines that may have magnetic interference," she explained.



Ethylene Oxide Sterilisation and Vacuum Aeration Chamber fabrication

Project Progress To Date

At the time of the interview, upgrades to SIRIM's facilities are still ongoing. Among others:

- Due to renovation delays caused by the pandemic, the necessary equipment is expected to arrive at SIRIM Permatang Pauh by 2023
- The polymer 3D printers have produced numerous orthotics and prosthetics for hospitals & orthotic or prosthetic companies
- A GLP-compliant and ISO 17025-accredited lab facility is now ready for testing extractable and leachable in medical devices at IBRC

Aside from facility development, investments in research and development (R&D) in Asian countries, including Malaysia, remain very low. "The country is currently at 1.44% gross domestic expenditure in R&D value, but our aim is to reach 3.5% by 2030," she added.

She cited a collaborative effort with a local medical device company looking to explore coating materials as an example. "When catheters with no hydrophilic coatings are used, patients tend to experience pain due to the friction. Hydrophilic coatings are applied on catheters and supplied with a saline water package that works as a lubricant, making it simpler to apply in patients. We do not create this coating locally due to a lack of R&D investment," she noted.

To facilitate better R&D, SIRIM is approaching businesses for collaboration and encouraging them to apply for projects that enable the manufacturing of more high-value added products in Malaysia.

"We hope that more SMEs will be interested in participating in R&D endeavours and take advantage of our infrastructure and expertise. We are just a phone call away for consultation and collaboration," Dr. Jamuna concluded.

For more information, Dr. Jamuna can be contacted at
jamuna@sirim.my or
https://biomed.sirimir.my/mdic

A session with

MOHAMED IZAT MOHD EZWAN

Senior Researcher, Industrial Centre of Innovation (IC-I) in Advanced Material, SIRIM Industrial Research

Plastic is a ubiquitous material that is very much a part of our daily lives. However, plastic pollution can disrupt the world's natural balance, causing harm to our wildlife, our environment and our health. Biodegradable plastics will make a better choice.

Biodegradable Plastics for a Better World

Malaysia, as a petroleum-producing country, is a major producer of plastics. In 2018, the country's plastic consumption accounted for approximately RM51 billion, or 4.7% of the country's gross domestic product (GDP). It was also the third-highest emitter of riverine plastic waste into the ocean in 2019.

A study published in *Medical News Today* in 2018 emphasised the critical importance of addressing plastic waste issues. It revealed that microplastics were discovered for the first time in human blood. Scientists believe these can cause DNA damage.

"As microplastics accumulate in our ocean, they are consumed by fish and other sea life before making their way into the human body. Furthermore, being ranked third in terms of plastic emission is not a good sign; we have to take more serious measures. We want to address, not only environmental issues, but also those that have an impact on the human body," said Mohamed Izat Mohd Ezwan, Senior Researcher at Industrial Centre of Innovation (IC-I) in Advanced Material, SIRIM Industrial Research.

Tackling the Issue

A proposal was made by SIRIM in 2020 to tackle the plastic waste issue by switching to biodegradable plastics and improving recycling strategies.

"Malaysia is currently ranked 16th in terms of mismanaged plastic waste. Number one is China, and number two is India. These are justified since the more population there is, the more plastic waste can be expected. On the other hand, waste such as toothbrushes takes up to 500 years to disintegrate. Can we wait 500 years to make sure our environment is safe? We need to find long-term solutions to address this," urged Mohamed Izat.

The majority of plastic pollutants are single-use and petrochemical-based plastics. Currently, there are two widely accepted solutions for reducing global plastic waste. One is to switch to biodegradable plastics, while the other is to improve recycling strategies.

Under the 12th Malaysia Plan (12MP), SIRIM Industrial Research is leading the development and testing of innovative biodegradable plastics projects, with the first phase being implemented in 2021. The main goal of the project is to provide companies with the resources they need to conduct product development.

Lifecycle of Plastics

Plastic bag – 20 years
Coffee cup – 30 years
Plastic straw – 200 years
6-pack plastic ring –400 years
Plastic water bottle – 450 years
Coffee pad – 500 years
Plastic cup –450 years
Disposable diaper – 500 years
Plastic tootbrush – 500 years

Microplastics found in human blood can cause

DNA damage

www.medicalnewstoday.com/articles/could-microplastics-in-human-blood-pose-a-health-risk

> "Some solutions, such as banning single-use plastics or charging money for them, are actually short-term goals. We would, therefore, like to look into developing biodegradable plastics to help Malaysia become more environmentally friendly."

"Some solutions, such as banning single-use plastics or charging money for them, are actually short-term goals. We would, therefore, like to look into developing biodegradable plastics to help Malaysia become more environmentally friendly," Mohamed Izat explained.

A Better Alternative

While fossil-based plastics can take up to 20 years to degrade, biodegradable plastics are able to disintegrate faster. Typically, biodegradable plastics begin to disintegrate after a few uses, transforming into smaller plastics and subsequently microplastics, eventually becoming fertiliser in the soil. As they are plant-based, this increases opportunities for creating a circular economy that is renewable through the re-planting of new feedstock. This makes them a better resource compared to petroleum-based plastics that will be depleted over time.

To encourage more production of biodegradable plastics as well as introducing more efficient ways to recycle, SIRIM is currently acquiring five different processing machines to support its project.

"There have been delays in receiving the equipment due to the pandemic, which halted the supply chain. Nevertheless, some of them have arrived and are already operational," said Mohamed Izat.

It is hoped that the processing equipment will be able to facilitate the endeavours of local companies in the development and production of their own biodegradable products.

These machines include:

1. Compounding pelletisation lab-line: To transform plastic pellets into biodegradable pellets. As biodegradable plastics are not as strong as petroleum-based plastics, companies will be able to experiment with different materials to compound and strengthen the product.

2. Multilayer blown film lab-line: To manufacture items such as single-use plastic film, thick plastic bags and compostable plastic bags. Companies can conduct their testing using SIRIM's equipment before going into mass production.

3. Plastic recycling lab-line: To recycle the plastic for new uses. Plastic recycling is another important environmental initiative because not all products are biodegradable.

4. Thermoforming extrusion lab: For the production of cups, bowls and dishes.

5. Plastic-injection moulding lab-line: Companies will have more options for biodegradable cutlery and recycled plastics.

Benefits of Biodegradable Plastics

- Eco-friendly solution
- Reduce carbon footprint
- Create renewable feedstock
- Promote circular economy through recycling/renewable sources

"Our project focuses more on the development process. We welcome companies to take advantage of our facilities to develop the types of biodegradable plastics that are appropriate for their needs," Mohamed Izat explained.

"Our project focuses more on the development process. We welcome companies to take advantage of our facilities to develop the types of biodegradable plastics that are appropriate for their needs."

This collaboration can benefit the companies in several ways. For starters, they can avoid the disruption and downtime that would occur if they decided to develop the formulation for eco-friendly plastics at their facility. Secondly, they can benefit from expert guidance on regulations and specialised skill sets in the biodegradable or recycling processes. They will also be prepared to meet high standards and strict market entry regulations.

"We are excited to facilitate the development process, but the companies will have to be at the helm, as each company has its own goals and markets to enter. At the same time, we can also provide technical assistance and testing," said Mohamed Izat.

SIRIM Industrial Research's testing activities are focused on biodegradable processes. "This process usually takes six months, but we try to shorten the time to determine the biodegradable properties through other testing means. For example, we have two UV degradation chambers. This allows us to obtain the initial results faster," he added.

"It's important to raise awareness, because no matter how good we are at producing biodegradable products or recycling, our efforts won't go far if society continues to throw trash everywhere."

This project is a good initiative and solid starting point for us. After all, it is better to start something than do nothing. As a result, we are here to encourage industry players to do their part."

UV Degradation Chamber

SIRIM is also attempting to conduct rapid testing for biodegradable plastics, with promising results. This test measures the water contact angle on the surface of the plastic using Contact Angle-Tensiometer equipment. As the biodegradable plastic degrades, it alters the angle of the water. There is currently no procedure or standard for this. Nevertheless, the results from this procedure will serve as the foundation for the development of standards in the future.

Mohamed Izat believes that people need to be more aware of the global plastic waste problem. "It's important to raise awareness, because no matter how good we are at producing biodegradable products or recycling, our efforts won't go far if society continues to throw trash everywhere. Single-use plastics are widely utilised, especially because they are easily obtained in this country. In fact, it's already become ingrained in our culture, for example, at the night market.

"This project is a good initiative and solid starting point for us. After all, it is better to start something than do nothing. As a result, we are here to encourage industry players to do their part," he noted.

To find out more about biodegradable plastics and SIRIM's offerings in this area, please contact
izat@sirim.my or
Call 04-401 7110

A session with

ZAKARIA MOHAMAD NOR

Head of Mechanical, Electrical and Automotive Section, SIRIM QAS International Sdn Bhd

AS9100
Aerospace Manufacturing

AS9110
Maintenance, Repair & Operations (MRO)

AS9120
Distribution

AS series of standards for aerospace was developed by the

International Aerospace Quality Group
IAQG, registered in Belgium

As Malaysia ramps up its focus on aerospace in line with the 12th Malaysia Plan, all local players within the aerospace supply chain will stand to benefit from being up to date with the necessary industry certifications.

Scale to Greater Heights with Aerospace Certifications

The aerospace industry is highly regulated with an array of standards for industry players to follow. Among these are the AS9100, AS9110 and AS9120. In general, AS9100 refers to aerospace manufacturing, AS9110 involves the Maintenance, Repair and Operations (MRO) of parts, and AS9120 encompasses the distribution segment.

This AS series of standards for aerospace was developed by the International Aerospace Quality Group (IAQG), a non-profit association registered in Belgium, which sets the quality benchmarks within the global supply chain of the aerospace industry.

According to Zakaria Mohamad Nor, the Head of Mechanical, Electrical and Automotive Section at SIRIM QAS International Sdn Bhd (SIRIM QAS International), adhering to the standards set out by the IAQG will be beneficial for all the service providers in the industry.

"To have a single standard for the aerospace industry is vital for all the players along the aerospace value chain – from supplier to customer. Following the same standard is important for obtaining recognition and meeting the requirements of the global marketplace. Because international standards exist in the aerospace industry, our local players need to be prepared to adopt them so that they can be a part of this international group and expand their business," he said.

At a Glance

- Malaysia's aerospace hubs are located in Kuala Lumpur, Kedah, Selangor & Malacca
- Key clients for Maintenance, Repair & Services (MRO) and aero-manufacturing include Boeing & Airbus
- Some of the well-known local companies include the Composites Technology Research Malaysia (CTRM) in Malacca and Aerospace Composite Malaysia in Bukit Kayu Hitam, Kedah
- The government has allocated funds to encourage more local and existing players to join the supply chain

Furthermore, adherence to international standards makes transnational adaptations easier. For example, similar to AS standards, Europe has EN1900 and Japan has JISQ9100, all of which can be deemed to be equal in value. As such, a company that follows the AS standards will also have an easier time penetrating the European and Japanese markets.

Major Revenues

for Malaysia's Aerospace Industry

49% **Maintenance, Repair & Overhaul (MRO) Services**

Manufacturing of Aerostructures & Engine Components 47%

Malaysia's Aerospace Exports in 2019

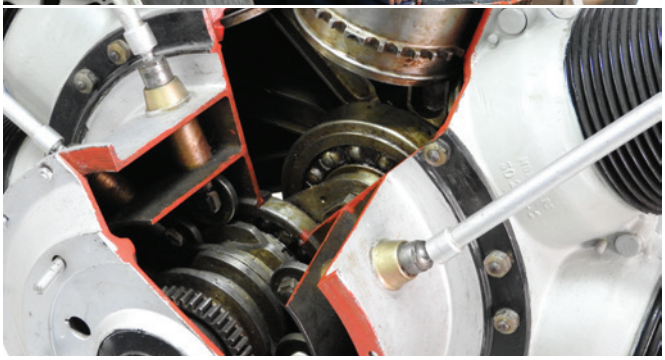
RM 8.8bil

The Majority of Malaysia's Aerospace Exports comprise

Aircrafts
Parts & Components

e.g. Wings, Empennages & Fuselages

"To have a single standard for the aerospace industry is vital for all the players along the aerospace value chain – from supplier to customer. Following the same standard is important for obtaining recognition and meeting the requirements of the global marketplace. Because international standards exist in the aerospace industry, our local players need to be prepared to adopt them so that they can be a part of this international group and expand their business."



Raising Malaysia's Profile in the Region

Malaysia's aerospace sector has been expanding significantly with the implementation of the Malaysian Aerospace Industry Blueprint (MAIB) 2030 that aims to elevate the country to the forefront of Southeast Asia. The blueprint directs the industry's long-term planning. Consequently, the Malaysian government has provided major assistance since the MAIB was introduced, particularly in the last 10 years. This includes institutional efforts like the establishment of the National Aerospace Industry Coordinating Office (NAICO), which ensures the coherence and coordination of projects under the MAIB 2030 and the Aerospace Industry Framework of the 12th Malaysia Plan (12MP).

> "As part of the 12MP, besides offering the AS9100 certification this year, we are targeting to provide certification services for AS9110 in 2023 and AS9120 in 2024."

SIRIM QAS International has been actively involved in assisting small and medium enterprises (SMEs) in the aerospace industry to get certified since 2018. It is currently adding the AS9100, AS9110 and AS9120 to its scope of offerings, with the AS9100 being rolled out in stages this year. "As part of the 12MP, besides offering the AS9100 certification this year, we are targeting to provide certification services for AS9110 in 2023 and AS9120 in 2024," Zakaria said.

Fortifying SMEs

To widen access for local players to the global market, obtaining quality standards is now a critical step for every business to showcase the efficiency of their operations and the safety and reliability of their products. With SIRIM QAS International's extensive experience in testing and certification, it is able to play a significant role in propelling SMEs forward in this field while ensuring that Malaysia's aerospace industry meets worldwide standards.

There are presently over a hundred local players who are involved in the aerospace industry in Malaysia. The Ministry of International Trade and Industry (MITI) is targeting to engage at least 150 of them in an awareness initiative for their benefit.

The Ministry of International Trade and Industry (MITI) is targeting to engage at least

150 **in an**

awareness initiative

for their benefit

SIRIM QAS International

mandated by

NAICO

to raise awareness among industry players about the need for standards as part of the 12MP initiatives via a pilot programme

"It is costly to develop a system, more so for a small company. There are many steps involved, including sourcing for training for the different phases of systems development, the implementation process, auditing and meeting the necessary requirements. At SIRIM QAS International, we are prepared to help facilitate this," said Zakaria.

SIRIM QAS International was mandated by NAICO to raise awareness among industry players about the need for standards as part of the 12MP initiatives via a pilot programme. "Seminars, which we introduced in 2018, are part of this programme. During the lockdown due to the COVID-19 pandemic, we turned to webinars with the goal of getting at least 15 SMEs to join our government-funded pilot programme," Zakaria stated.

The purpose of this pilot programme is to encourage SMEs to develop a proper system so that they are able to compete with other suppliers and be recognised in the supply chain for Boeing and Airbus. Funding for training and consultancy is provided by MITI under the 12MP. The participants of the pilot programme will go through the standard training requirements to become competent in building and implementing a proper system, as well as getting certified.

"We train them as part of our awareness programme while our sister company, SIRIM STS Sdn Bhd, provides training and consultation. We were able to recruit six companies to participate in the programme from July to December this year. After this, we will have four modules to go through before they are ready for the next certification," Zakaria explained, before revealing that SIRIM QAS International's goal is to train 15 companies and lead them to accreditation by the year 2025.

Stringent Process

There are three main steps involved in the certification process. The first part involves the development of a system. This will include people, time, money and resources to research standards and design a system. The people must familiarise themselves with the requirements at SIRIM's training facilities. Because learning occurs in groups, it is also an excellent opportunity for participants to network and learn from other companies, which may have comparable processes since they have similar products, machines and facilities.

The second process is focused on implementation and self-assessment. "When it comes to a specific product, the trainer/consultant will meet them at the factory so that they can understand the process," said Zakaria.

The system needs to be in place for around one to two months before an internal audit is conducted to ensure proper implementation. A review is then done

3 main steps
in the certification process

1. Development of the system — *3 months*
2. Implementation and self-assessment — *2 months*
3. Audit and Interview before the issuance of certificate by SIRIM QAS International — *1 month*

> "It is important that we are able to get the industry ready so that they are able to comply with international recognition standards."

before the company proceeds to the third and final step, which is the third-party certification by SIRIM QAS International.

It usually takes a small company about six months in total to put everything in place. The development phase usually lasts three months, and the implementation phase can go on for two months, while the certification phase will take one month.

However, not everything is always smooth-sailing. "For example, some SMEs may only have 15 to 20 employees. If an employee leaves midway through the process, their replacement would have to be taught what to do and, as such, the process will have to be restarted," Zakaria explained.

The actual certification process is divided into two stages. First, an audit of the documentation is performed. Second, interviews are conducted with workers, operators and the management to ensure that the system is properly in place and standard compliance is met. Once all this is completed, the certificate is issued. The certificate is valid for three years.

"Once the system is developed and implemented, it has to be maintained. We will return every 12 months to examine the maintenance of the system. After the third year, we will then head back for the company's recertification," shared Zakaria.

A Competitive Edge in Certifications

In addition to being appointed by IAQG, SIRIM QAS International is accredited by the United Kingdom Accreditation Service (UKAS). To obtain accreditation, SIRIM QAS International had to meet IAQG requirements, which include setting up the system, training auditors for the aerospace industry and ensuring that all of SIRIM QAS International's participants in the competence assessment fulfil the requirements.

In getting ready to offer the certification, the SIRIM QAS International team was also required to attend IAQG training, which was conducted by IAQG-certified trainers from India.

"The cost to attend the training in Malaysia is RM15,000 against RM50,000 per person if we were to send our team overseas," Zakaria commented. Subsequently, further training for AS9100 and AS9120 will be required, but these can be completed online. The online training will cost them US$700 per employee if they pass with an 80% or higher.

To date, SIRIM QAS International is the only certifying body in Malaysia that provides the AS9100 certification. "There may be foreign certifying bodies, such as those headquartered in Germany, France, the Netherlands, the US or the UK, with offices in Malaysia, but they do not have auditors here. In view of that, the travel costs for auditors from these countries to come over are high, with a three-day audit costing roughly RM100,000. At SIRIM QAS International, we have trained and experienced auditors with local knowledge. Furthermore, engaging local auditors also means lower costs for the SMEs," he continued.

At the moment, awareness about the importance of standards among local industry players is still not very high. While SIRIM QAS International already has plans in the pipeline to expand its certification programmes for the convenience of companies involved in the aerospace industry, more initiatives to promote awareness of certifications and its offerings, especially via social media, need to be taken.

For further info on the AS9100, AS9110 and AS9120 certifications, Zakaria can be contacted at
zakaria@sirim.my or
Whatsapp 019-263 9904

"It is important that we are able to get the industry ready so that they are able to comply with international recognition standards," Zakaria concluded.

A session with
AMIRSHAH KAMARUDIN
(Programme Lead Consultant)
Principal Consultant,
Management Systems Standard Section, Training, Standards & Consultancy Department,
SIRIM STS Sdn Bhd

Currently the second largest in Southeast Asia, the Malaysian aerospace industry is on track to becoming the top player in the region. Consequently, local industry players will need to reinforce their strengths and capabilities to ensure that they are able to fully seize the opportunities of this thriving sector.

Helping Local Players to Fly High

Malaysia is set to become the No. 1 aerospace nation in Southeast Asia by 2030. The country's aerospace industry is already the second largest in the region, attracting 104.7 million in investments and RM13.84 billion in total revenue in 2021. Annually, the industry supplies 27,500 skilled workers and has been identified as one of the key elements in Malaysia's bid to become a developed nation.

It is, therefore, essential for all aerospace industry players to be ready and able to take on the challenges of this highly regulated industry to realise the potentials that it yields. One way to do so is to keep updated on the latest certifications in the industry.

No.1 Aerospace Nation in Southeast Asia by 2030

The country's aerospace industry
2nd largest in the region **attracting**
104.7 million
in investments
RM13.84 billion
in total revenue in 2021

The AS9100 Revision D (2016) was rolled out in recent years to align with the latest incarnation of the ISO 9001 certification. In view of this, SIRIM STS Sdn Bhd (SIRIM STS) has been entrusted with providing training to local industry players to obtain a better understanding of the requirements of the certification.

Acing the Aerospace Industry

There are numerous benefits for aerospace industry players to get certified. These include:

- Elevation of brand name and corporate image
- Demonstration of commitment to quality
- Enhancement of statutory & regulatory requirement awareness
- Support of government policies for national and public interest
- Acquisition of third party monitoring on quality services
- Heightened customer confidence
- Reduction in operational costs

Delivering Excellence

The AS9100 encompasses requirements for companies in aviation, space and defence in developing a Quality Management System (QMS). Revision D focuses on delivering value to customers, incorporating QMS criteria in the company's business operations to ensure the generation of consistently high-quality items for the aerospace sector. This upgrade includes modifications to various areas, such as product safety, counterfeit parts prevention, risk management, human factors and configuration management.

To date,

six companies

have benefited from the training course and are enthusiastic about progressing on to ensure their adherence to the latest revision

1 **Ikramatic Systems Sdn Bhd**

2 **Epic Aero Sdn Bhd**

3 **Mont Aero Sdn Bhd**

Insights from Industry Players

AS9100 is a widely used quality management system for the aerospace sector. In preparation for its latest iteration, the AS9100 Revision D (2016), companies are undergoing a training programme conducted by SIRIM STS, which utilises government funding under the 12th Malaysia Plan (12MP) to assist the National Aerospace Industry Corporation Malaysia (NAICO) in providing training to local industry players. The programme encompasses four workshops that are to be completed within a period of four months.

Ikramatic Systems Sdn Bhd

ANUAR AHMAD
Project Manager

Ikramatic Systems Sdn Bhd is a Malaysian company based at the Glenmarie Industrial Park in Shah Alam, Selangor, which specialises in simulation system design and development for the aerospace and defence industries. It is currently developing shooting simulators for the defence industry. The company's project manager, Anuar Ahmad, was one of the participants at the second workshop.

"Right now we are developing the manuals based on the training requirements and guidelines provided by the consultant, who is highly experienced in quality systems. I am confident that our company will be ready for an audit later.

"We have potential customers overseas, and this requires our company to be certified by and follow the guidelines of the aerospace quality management system. With this programme, we feel motivated and encouraged to start preparing for AS9100. We are very satisfied with the guidance and consultation provided by SIRIM STS," shared Anuar.

He explained that the funding from the government and SIRIM's involvement helped the company to kick off the certification process, which could not be done previously due to budget constraints. "Once we become certified with AS9100, we will be able to get more opportunities from the overseas markets. Customers, on the other hand, will have more confidence in our product's quality," he concluded.

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Epic Aero Sdn Bhd

MOHD KURNIAWAN SRI SUTRISNO
Head of Quality & Safety

Epic Aero Sdn Bhd was established in 2016 and is a pioneer in aviation non-destructive testing (NDT) in the country. It is the first independent aerospace NDT company to obtain the Civil Approval of Malaysia CAAM d1 rating. Mohd Kurniawan Sri Sutrisno, the company's Head of Quality & Safety, believes that the grant provided to undergo the training and certification with SIRIM will alleviate the company's image in the aerospace industry.

According to him, "The programme meets our expectations as it covers the objectives of AS9100 and how it should be implemented. What I like best about the programme is the interaction between companies. As a bonus, the training provider was very energetic and helpful."

Furthermore, as the programme equips participants with details on the latest version of AS9100, Mohd Kurniawan sees this as an opportunity for the company to revisit the standards of implementing ISO 9001, and make the necessary updates to accommodate new changes and other requirements, which were not previously included.

"Certification is crucial in the aerospace industry because it involves various authorities and layers of industry players. Having the proper certifications helps to solidifies trust in the service and/or product provided by the company," he said.

1st Independent Aerospace NDT Company to obtain the Civil Approval of Malaysia CAAM d1 Rating

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Mont Aero Sdn Bhd

NUR FASHIHAH AINUN MAHAMAD LAZI
Project and Development Engineer

Aims to become one of the start-up players in the Aerospace Ecosystem

Mont Aero Sdn Bhd was established in 2018 as an electrical, security and surveillance service provider and systems integrator. Among its services are advanced customisation in design, engineering and integration as requested by clients. Its facility is located at Kerteh Biopolymer Park, Terengganu. Nur Fashihah Ainun Mahamad Lazi, the Project and Development Engineer, explains that the company aims to connect its expertise to the aerospace industry and become one of the start-up players in the aerospace ecosystem.

"One of the reasons why we joined the pilot programme is because AS9100 is a compulsory standard for aerospace manufacturing. For us to venture into and thrive in the industry, we need to ensure that our company is up to the necessary standards," she said.

As a start-up, the company finds the opportunity to become certified with SIRIM's pilot programme to be highly valuable, as training and certification are costly processes.

When asked about the modules, Nur Fashihah commented, "The course contents are nicely arranged, which help us to understand the standards easier. SIRIM's trainers also provide us with detailed training and guidance to get through all the documentation processes and help us to understand more about the standards. All the concepts are explained clearly, and we can communicate and connect well in class.

"We started with zero knowledge on these standards, so this programme has been instrumental in helping us to gain a better understanding. It also helps us to see the advantages of obtaining ISO and AS certifications. This will help us to achieve the accreditations and certificates properly and get our process to work in an orderly manner."

> "One of the reasons why we joined the pilot programme is because AS9100 is a compulsory standard for aerospace manufacturing. For us to venture into and thrive in the industry, we need to ensure that our company is up to the necessary standards."

Solid Foundation

A seminar was held on 24 March 2022 in Shah Alam, where 20 aerospace industry participants were introduced to the importance of standard AS9100 Revision D and how to value the aerospace standard in terms of quality management system.

"This pilot training programme will assist the company in developing its processes and procedures in the aerospace industry," said Amirshah Kamarudin, the programme's Lead Consultant.

SIRIM STS's pilot training programme comprises four modules:

Module 1

Foundation 10-day training

- Introduction to AS9100
- Risk management
- FMEA (Failure Mode & Effect Analysis)
- APQP (Advanced Product Quality Planning) & PPAP (Production Part Approval Process)
- First Article Inspection
- Internal audit training

Module 2

Document development 8-day training

- Development of quality manual & policy
- Business process mapping
- Aerospace-related documents

Module 3

Document development

- Document review and implementation
- 1-2 days of consultation at the company's premises to overlook its system

Module 4

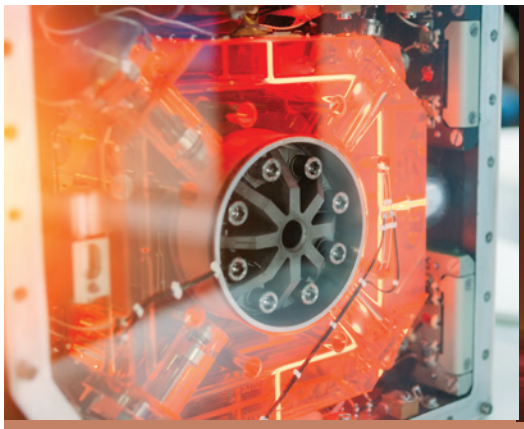
Internal & pre-compliance audit

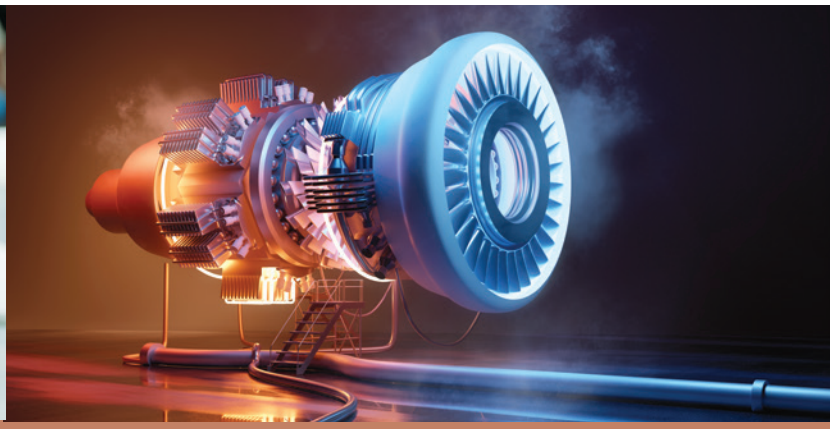
- Internal audit execution & management review meeting
- Pre-Compliance audit

The pilot programme, which officially commenced in June this year, is slated to be completed by the end of December 2022 for the first six participating organisations.

An Industry Leader in Training

SIRIM STS has long been recognised as a one-stop resource for training, standardisation and advisory services. Its services include the establishment of SIRIM standards and human capital resource upgrades. SIRIM STS also serves the WTO as the national enquiry point on technical trade barriers and provides knowledge support through its technical library.





> "We are currently in the process of completing the training and have already begun the documentation process. By the end of this year, we hope to have 10 small and medium enterprises (SMEs) trained on consultation documents and certified with SIRIM QAS International. Each company is allowed to send three members, and we urge that the participants remain consistent throughout the modules."

"We are currently in the process of completing the training and have already begun the documentation process. By the end of this year, we hope to have 10 small and medium enterprises (SMEs) trained on consultation documents and certified with SIRIM QAS International. Each company is allowed to send three members, and we urge that the participants remain consistent throughout the modules," shared Amirshah.

For each module, face-to-face training is held to assist organisations with their documentation. This includes sharing templates on the creation of the procedure and process flow.

Amirshah is assisted by four team members to ensure that the respective companies are ultimately able to meet the certification goals. "The companies we select understand that by participating in this programme, the training and consultation will eventually lead to the final audit and certification," he noted.

There are two main criteria that prospective companies need to meet. To begin with, the company must already be ISO 9001:2015 certified. Secondly, the top management of the companies are required to commit fully by signing a commitment declaration to provide the necessary support to their teams, including allowing them to participate fully in the training from the beginning until the end.

"A Whatsapp group among the participants has been set up to track their progress. We also have a Whatsapp group for 12MP committee to oversee the work," said Amirshah.

2 main criteria

prospective companies need to meet

The company must already be

ISO 9001:2015

Certified

Top management of the companies are required to commit by signing a

Commitment Declaration

to support and allow full participation in the training

For further info on the aerospace training programme, Amirshah can be contacted at
amirshah@sirim.my or
Whatsapp 019-263 9904

A session with

ABD HALIM YACOB
Head of Packaging Design Section, Packaging and Security Design Centre, SIRIM

"With SI packaging, we are able to resolve the issues of counterfeiting, and help with the quality, safety and genuineness of the product."

In elevating the wellbeing of Malaysia, efforts to enhance the socioeconomic development of the country, increase incomes and reduce food wastage are essential. Smart and intelligent packaging is a step in the right direction.

Packing A Punch with Smart & Intelligent Packaging

Smart and Intelligent (SI) Packaging is an umbrella term for several types of innovative packaging that include embedded sensor technology. It is used for a variety of products, typically food, beverage and pharmaceutical products, to extend shelf life, monitor freshness, improve quality, confirm authenticity, traceability and anti-counterfeiting, and enhance product and customer safety. Although it is still in its early stages of development in Malaysia, SI packaging is already making a significant impact on how packaging will evolve in the future and expected to witness positive industry growth. In fact, the global market for SI packaging is expected to reach US$26.7 billion by 2024.

A Malaysian company that took the leap into SI packaging has been reaping its rewards since. Che Mah & Sons is a company that specialises in traditional massage oils, and the business approached SIRIM to address counterfeiting issues. SIRIM's solution was to embed security ink and security features in the packaging. To date, SIRIM continues to provide SI packaging services to the company, whose monthly sales have increased to RM500,000, with exports to Brunei.

However, not many businesses in Malaysia are prepared to adapt to SI packaging to fulfil the expectations of Industry 4.0. The high initial cost of switching from commercial packaging and limitation in technology adoption and investment are the primary reasons for such resistance.

According to Abd Halim Yacob, Head of Packaging Design Section at the Packaging and Security Design Centre, SIRIM, "A recent survey that we conducted shows that industry readiness to recognise the benefits of SI packaging remains rather low. Only 10% of businesses are prepared to invest in this area."

Due to rising customer experience expectations and product complexity, commercial packaging is no longer adequate. Its function is limited to keeping a product free of contamination, tampering or damage.

Meanwhile, counterfeit products are flooding the marketplace. Besides that, customers nowadays require more information beyond the trademark, brand and ingredients. Furthermore, there are other concerns such as product safety and short shelf life, freshness issues and nutrient disparities.

This is where the strength of SI packaging comes in. It includes all sorts of technologies intended to achieve more than mere packaging "With SI packaging, we are able to resolve the issues of counterfeiting, and help with the quality, safety and genuineness of the product," said Abd Halim.

Fruitful Endeavours

One of the primary advantages of SI packaging is that it saves money by decreasing food waste. "For example, fruit supply from the Federal Agricultural Marketing Authority (FAMA) is worth RM291 million for fruits such as guava, mangoes and papayas. Distributors lose 7.4% of these due to the fruits' short shelf life, which can be decreased with active packaging," Abd Halim noted.

Several projects that use track-and-trace technologies have shown to be beneficial. Among them is tracking the growth of orchard and tree fruits. There is also a security printing project for a durian estate, where the sticker is attached to each durian tree branch to identify the grade and type of the fruit. "We will also be collaborating closely with industry nutritionists and scientists to control and increase the shelf life of the fruits," Abd Halim added.

Because of its significance, SIRIM has been charged under the 12th Malaysia Plan (12MP) with increasing the use of SI packaging. The programme, which started in 2021, is now in its second year.

In the initial stage, SIRIM prioritised the purchase of equipment to establish an SI Hub at the Packaging and Security Design Centre, located at the SIRIM headquarters in Shah Alam, Selangor. SIRIM also provides designs, materials and software to help entrepreneurs to develop SI packaging.

Packaging development, specifically for all the active parts in the packaging, such smart sensors, smart indicators and active sensors, is being conducted this year. "The oxygen sachet developed by SIRIM, for example, is organic-based and not harmful even if it's included in the packaging," said Abd Halim.

Additionally, SIRIM's staff members were given training on SI packaging industry development and administration. Various organisations were also trained using differing modules.

In 2023, SIRIM will concentrate on the creation of a track-and-trace digital platform and increasing public knowledge on the importance and benefits of SI packaging.

Benefits of SI Packaging

- Authenticates product
- Reduces counterfeit cases
- Track & trace technology based on real time
- Protects the health & safety of consumers
- Increases production productivity & performance through the development of an effective system
- Analyses and controls the environment inside or outside the package to inform the manufacturer, retailer or consumer on the product's condition at any given time

> "On the plastic packaging, we will use Near Field Communication (NFC) technology or thermochromic ink. The NFC tags can be used to provide customers with more information about the product and links to social media to align with current trends."

Abd Halim shares an example of a current collaboration. "On the plastic packaging, we will use Near Field Communication (NFC) technology or thermochromic ink. The NFC tags can be used to provide customers with more information about the product and links to social media to align with current trends."

More importantly, SI packaging will be able to safeguard the health and safety of consumers, particularly when it comes to food and pharmaceutical products.

For more information on SI packaging and how it can help your business, please contact:
abdhalim@sirim.my or
Contact 03-5544 5924

A session with

MOHD FAUZI ISMAIL
Chief Executive Officer, National Precision Tooling Sdn Bhd

A Full Model Change (FMC) will encompass an investment of

RM500mil to RM1bil

each time

While the tools, dies and moulds (TDM) sector is not new in Malaysia, its role in the advancement of the 12th Malaysia Plan is instrumental. Industry players are therefore encouraged to take advantage of the programmes offered by SIRIM to move the industry and nation forward.

Driving the Nation's TDM Industry Forward

The Tools, Dies and Moulds (TDM) sector plays an important role in Malaysia's automobile industry. The country has been ramping up its capabilities in this area for decades, particularly with the materialising of its premier national vehicle project, Perusahaan Otomobil Nasional (Proton), in the mid-1980s.

Typically, for a new car model to be introduced to the market, a significant sum of money is involved. A Full Model Change (FMC), for example, will encompass an investment of RM500 million to RM1 billion each time. As a major player in the automotive industry, the growth potential of TDM is there.

National Precision Tooling Sdn Bhd (NPT), a wholly owned company of SIRIM, is the key collaborator in the creation of the Bumiputera Automotive Tool, Dies and Moulds (TDM) Industry Project.

"To date, there have been two incarnations of the programme, namely TDM 1.0 and TDM 2.0. NPT's role across the TDM programmes is to increase Bumiputra participation in the local manufacturing industry, reduce imports and provide access to the export market," said Mohd Fauzi Ismail, Chief Executive Officer, National Precision Tooling Sdn Bhd.

Fuelling Transformation

The objectives of the Bumiputera Automotive Tool, Dies and Moulds (TDM) Industry project are:

- Increase capabilities and capacity development
- Enhance the Bumiputra automotive TDM industry clusters

In order to increase the participation of local industry players in the TDM business, numerous development programmes have been introduced, including:

- Equipment Acquisition Programme (EAP)
- Human Capital Development (HCD) programme
- Technical Assistance Expert Attachment Programme (TA-EP)

Boosting the Local TDM Industry

Initially, in the early 1980s, only 15% of the TDM process for the automotive industry was done locally, with the remaining 85% done overseas. Malaysia was essentially only involved in the automobile assembly, while the car body, plastic bumper and instrument panel were manufactured overseas at their respective TDM facilities.

"In Malaysia, even though we have elevated our capabilities tremendously through the years, we are still dependent on imports for certain aspects (big moulds & dies) because we don't have the complete ecosystem readily available. We need to change this. We cannot rely on imports forever. As such, it is necessary for us to strengthen and upgrade our local capabilities," said Mohd Fauzi.

The establishment of NPT was intended to achieve this goal, thus paving the way for the TDM industry to service, not just the national cars, but also other locally assembled vehicles. This necessitated the availability of a pool of competent local talent who have the resources to enhance their skills through adequate training.

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> "Apart from design capabilities, SIRIM has tooling capabilities, including various dedicated machines such as computer numerical control, CNC milling, lathe, wire-cut and electric discharge machines."

TDM 1.0
which commenced in 2009, used
RM50mil
of the alloted RM80 million funds

Beneficiaries received partial funding for equipment (50%) and human capital development (80%)

> "The emphasis of TDM 1.0 is on upgrading the beneficiary companies to become direct or approved suppliers to original equipment manufacturers (OEM)."

"They need to be capable of undertaking engineering, particularly design work and mould fabrication, for whatever you want to produce," added Mohd Fauzi.

SIRIM's capabilities to serve the local sector have progressively grown over the years, including people, facilities and equipment. In the mid-1980s, SIRIM was involved with the Japan International Cooperation Agency (JICA) programme, focusing on technology transfer in TDM, particularly design capabilities in die making, plastic mould making and casting technology.

"Apart from design capabilities, SIRIM has tooling capabilities, including various dedicated machines such as computer numerical control, CNC milling, lathe, wire-cut and electric discharge machines," said Mohd Fauzi.

Solid Start

TDM 1.0, which commenced in 2009, used RM50 million of the allotted RM80 million funds. Beneficiaries received partial funding for equipment (50%) and human capital development (80%). While some of the projects have been completed, there are others that are still in the works.

"The emphasis of TDM 1.0 is on upgrading the beneficiary companies to become direct or approved suppliers to original equipment manufacturers (OEM)," said Mohd Fauzi.

Reaping the Benefits

A study by NPT revealed that TDM 1.0 has yielded the following benefits for participating companies:

- 21% revenue growth
- 84% job creation
- 210 skilled labours
- 38 new customers (16 overseas & 22 locals)

According to him, the government accepted the plan to continue the project (TDM 2.0) under the 12th Malaysia Plan (12MP), this time with an extended scope beyond automotive. In April, SIRIM signed a Memorandum of Agreement with the Ministry of International Trade and Industry (MITI) to implement TDM 2.0 from 2022 to 2024.

"With the transition to TDM 2.0, the project will also focus on aerospace, rail and medical devices, in addition to automotive. The decision to broaden the scope outside automotive will benefit more local companies. What's more, currently, TDM in automotive is very competitive, particularly in terms of pricing, and as a result, some of our local companies have withdrawn into other industries," explained Mohd Fauzi.

TDM in aerospace, for example, is a high-value employment with few competitors. For similar reasons, other businesses are also venturing into rail. In terms of medical devices, Malaysia presently manufactures low-end products as opposed to emerging tools like CT scanners and 3D printers. As such, the potential for further progress in these areas is there. This new focus fits well with the nation's development direction as it increases the construction of railways and enhances its prowess in medical technologies.

Those participating in the TDM 2.0 programme can expect assistance with coaching, design software and equipment acquisition.

In the first instance, the participating company will be granted approximately RM120,000 for coaching and certification. This is fully funded, as opposed to the partially funded TDM 1.0.

"The project will assist them in improving their capacity and capability," said Mohd Fauzi. Training will encompass talent enhancement, for example, as well as software training via coaching. Furthermore, SIRIM will provide certification training, such as the International Automotive Task Force (IATF) certification, IATF 16949, AS 9100, ISO 13485 and ISO/DIS 22163, which are required in the automotive, aerospace, medical devices and rail industries respectively.

"A company may need to improve its design capabilities. Thus, they are given equipment in the form of a grant. During the TDM 1.0, they were also entitled to have experts on site to provide the necessary technical training to improve competence," stated Mohd Fauzi.

In terms of design software, NPT will purchase Computer Aided Design, Manufacturing and Analysis (CAD/CAM/CAE) software, specifically Catia and SolidWorks software, and share these facilities with the programme participants using floating licenses.

A maximum of RM1 million is provided to each company for equipment acquisition. This is a 70-30 arrangement, with the

In April, SIRIM signed a memorandum of understanding with the Ministry of International Trade and Industry (MITI) to implement

TDM 2.0 from 2022 to 2024

TDM 2.0 Progress

2022 June — **Invitation for participation blasted via print & digital media**

Briefing for interested participants — **JUNE 21-28**

55 APPLICATIONS RECEIVED

ASSESSMENT period — **Criteria: Bumiputra company, Years of operation, Strong financial performance**

28 COMPANIES SELECTED

JULY 2022 APPLICATION CLOSED

was conducted by SIRIM STS Sdn Bhd in October 2022 to determine the sort of training they require — **Analysis STUDY**

OCT - NOV 2022 — **Evaluating Proposals for equipment (Equipment Acquisition Programme) from nine beneficiary companies**

Inspiring Excellence

The IATF certification was developed by the International Automotive Task Force, and is a mandatory industry requirement that aligns quality management systems across the world.

fund paying 70% and the company paying the remaining 30%. "A company can purchase equipment at over RM1 million, for example, but SIRIM will cap the funding provided to 70% of RM1 million. On the other hand, you will be able to get 70% funding for equipment purchased at RM1 million or less," Mohd Fauzi explained.

The primary goal for the TDM 2.0 programme is to certify all participating companies to various international standards with the aim of 80% of them becoming approved OEM suppliers or obtaining Tier 1 status.

"We also want to assess the companies' talents, manpower and production, among other things. These are the fundamental criteria of our agreement. We will recommend the type of equipment required for each respective company's expansion. We are currently in the analysis phase, and plan to use RM4-5 million of the funding by the end of the year," said Mohd Fauzi. The remaining funds will be utilised in 2023 and 2024 to conduct an impact analysis.

All-rounded Support

"We don't just provide them the grant; we also provide opportunities, business outlooks and government support, in addition to helping them to meet their specific company needs. Essentially, they must bridge the gap between their current skills and what is required," said Mohd Fauzi.

Furthermore, members of the SIRIM committee come from the Malaysian Industry-Government Group for High Technology (MIGHT), MITI, Unit Peneraju Agenda Bumiputera (Teraju), Perusahaan Otomobil Kedua (Perodua), the German-Malaysian Institute (GMI), Proton, Malaysia Aerospace Industry Association, Malaysia Rail Industry Corporation (MARIC) and Persatuan Pengilang-Pengilang Peranti Perubatan Malaysia (PERANTIM). As a result, participants will have access to a competent team of industry representatives, who can lead, mentor and guide them throughout this programme.

> "We don't just provide them the grant; we also provide opportunities, business outlooks and government support, in addition to helping them to meet their specific company needs. Essentially, they must bridge the gap between their current skills and what is required."

Mohd Fauzi remarks that the mandate will carry beyond 2024, with SIRIM continuing to help local businesses with skilled manpower, full facility and design capabilities.

"We also intend to collaborate with international partners. For the coming year, we are looking at working with Japan and Germany for coaching and certification-building," he said.

He hopes that TDM 2.0 will increase engagement with government agencies, OEMs, and financial institutions, as well as collaborative efforts with overseas partners in Germany, Japan and China. "Ultimately, we want SIRIM to be the centre of excellence in TDM," he concluded.

> "With the transition to TDM 2.0, the project will also focus on aerospace, rail and medical devices, in addition to automotive. The decision to broaden the scope outside automotive will benefit more local companies. What's more, currently, TDM in automotive is very competitive, particularly in terms of pricing, and as a result, some of our local companies have withdrawn into other industries."

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We want SIRIM to be the

Centre of Excellence in TDM

For more information, Mohd Fauzi can be contacted at
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Contact 03-5544 6038

A session with

DR. ARSHAD SELAMAT
Senior Metrologist, National Metrology Institute of Malaysia

The Electrical & Electronic (E&E) industry is projected to contribute

RM120 bil

to Malaysia's GDP and generate

RM495 bil

in export earnings by 2025

NMIM, a signatory of the

CIPM MRA

International Committee of Weights and Measures Mutual Redcognition Arrangement, which provides the country

Global Recognition

and facilitates trading among member countries

The Electrical & Electronic industry has been identified as a key economic driver in the 12th Malaysia Plan. A comprehensive supporting ecosystem will provide a strong foundation for the industry to play its part in moving the nation's economy forward.

Charging Ahead Confidently

The Electrical & Electronic (E&E) industry is projected to contribute RM120 billion to Malaysia's gross domestic product (GDP) and generate RM495 billion in export earnings by 2025[1]. In boosting the industry, radio frequency (RF) and microwave (MW) measurement capabilities are an essential part of the supporting ecosystem.

For one, RF and MW measurement plays an important role, particularly when it comes to trading in the international arena. Malaysia, via the National Metrology Institute of Malaysia (NMIM), is a signatory of the International Committee of Weights and Measures Mutual Recognition Arrangement (CIPM MRA), which provides the country global recognition and facilitates trading among member countries. These include the majority of the European countries and developed nations.

With no trade barriers, the investment potential of Malaysia's E&E industry increases exponentially, along with the ability of local industry players to export parts, components and devices to a wider market.

Furthermore, NMIM is an active participant of international activities such as the International Laboratory Comparison under the Asia-Pacific Metrology Programme (APMP), which is coordinated by the International Bureau of Weights and Measures (BIPM). This underpins the country's position on par with other developed countries.

According to Dr. Arshad Selamat, a Senior Metrologist at NMIM, many investors who are interested in a specific country will look at the measurement system and number of calibration and measurement capabilities (CMCs) available.

"The more CMCs a country has, the better its investment potential. Singapore, for example, may be a small country, but it has nearly 400 CMCs. In other countries like South Korea and Japan, their CMCs number in the thousands!" he said.

Defining Radio Frequency

RF refers to the oscillation rate of electromagnetic energy, and is measured in the unit of Hertz (Hz). One Hz equals one cycle per second, and the frequency range is around 3 kilohertz (kHz) to 300 gigahertz (GHz). RFs are grouped into several bands to form a frequency spectrum. This frequency spectrum is required for government functions and missions, as well as commercial services. Examples for government services include the radar system for national defence, weather & environment services and aviation communication. RF applications for commercial services, on the other hand, include broadcast satellite TV, cellular network technology, biomedical and healthcare applications.

These frequency bands are typically government-regulated in most countries. In Malaysia, the Malaysian Communications and Multimedia Commission (MCMC) is in charge of regulating the frequency spectrum.

Reinforcing Malaysia's RF and MW Measurement Capabilities

The primary standard for RF and MW measurements developed at NMIM plays an important role in supporting the E&E industry, especially in RF fields that require accurate and precise measurements. In fact, the establishment of primary standards are critical in disseminating the traceability of RF Power measurement throughout the country based on the International System of Units.

"RF and MW applications do not escape the measurement process. There will be questions about safety, health and other aspects. For example, if a signal source at a specific frequency point is utilised to inject a 5 dBm RF power, how certain are you that the output signal is also 5 dBm? It might be 4.5 or 7 dBm. Should this happen, it could harm some of the system's components since it is outside of its limits or specifications. Therefore, the standard device must go through the whole process, including testing, calibration and certification," explained Dr. Arshad.

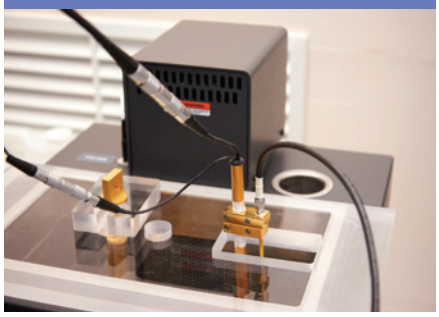
He cites 5th generation mobile network (5G) as another example that requires RF measurement capabilities. "5G technology is expanding rapidly. Operating at a higher frequency compared to 4G networks, this technology has brought forth numerous queries and concerns on its frequency band and function. Measurement is required to address these issues. For example, service providers in the 5G industry would need to know the frequency band that 5G operates in as well as safety concerns, while employees need to have standard devices to test or calibrate their products to ensure they meet the necessary safety requirements," he said. "Without metrology, you cannot build, manufacture, discover, design or operate reliably!"

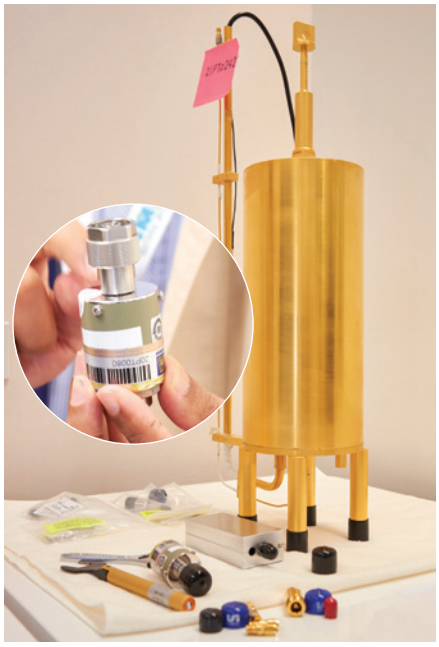
NMIM offers calibration services for RF and MW frequency ranges from 10 MHz to 18 GHz with parameters that include RF Power, Absolute Power, Attenuation and Reflection Coefficient. Among the equipment that NMIM typically receives for this purpose are Power Sensors, Thermistor Mounts, Attenuators, RF Cables, Signal Generators, Spectrum Analysers, Calibrators and Power Meters.

Additionally, NMIM also provides training in RF and MW field, with participants that include both local and international industry players.

Malaysia's capacities to support the E&E business are growing more robust in comparison to global standards. Nevertheless, Dr. Arshad states that NMIM's capabilities can be expanded further with the establishment of new measurement systems, thereby creating new parameters.

> "The more CMCs a country has, the better its investment potential. Singapore, for example, may be a small country, but it has nearly 400 CMCs. In other countries like South Korea and Japan, their CMCs number in the thousands!"





"With additional parameters or capabilities, Malaysian industry players will no longer be required to send their physical standards overseas. This has the potential to reduce the flow of RM currency abroad. At the same time, the presence of these new parameters will be able to attract new investors into Malaysia, thereby boosting the country's economy," he shared.

The recent development of a Microcalorimeter System demonstrates NMIM's ability to advance even farther. This system not only serves the RF and MW industries in Malaysia, but is also aimed at generating more CMCs to entice more multinational companies to invest in the country.

Beginning in 2020, the system was developed in three phases:

- Phase 1: 10MHz–18GHz — 2020
- Phase 2: 19GHz–50GHz — 2021
- Phase 3: 9kHz–10MHz — 2022

The standard device must go through the whole process, including

Testing, Calibration & Certification

> "Without metrology, you cannot build, manufacture, discover, design or operate reliably!"

NMIM plans to add

2 parameters in 2023

and

4 parameters in 2025

> "With additional parameters or capabilities, Malaysian industry players will no longer be required to send their physical standards overseas. This has the potential to reduce the flow of RM currency abroad. At the same time, the presence of these new parameters will be able to attract new investors into Malaysia, thereby boosting the country's economy."

Reinforcing RF Capabilities

Since its founding more than 40 years ago, NMIM has been steadily growing stronger and expanding its scope of services. With more parameters and the ability to benchmark results to standards, NMIM is able to continue providing services that are on par with those provided by other countries at a far lower price.

Subsequently, NMIM aims to establish more parameters to keep the country on the right track in line with technical growth and allow it to compete with developed countries. Dr. Arshad revealed that in coming years, NMIM plans to add two more new parameters in 2023 and four more in 2025, as well as developing other parameters such as antenna and noise during the 14th Malaysia Plan as a long-term target.

Venturing into New Horizons

NMIM anticipates expanding its capabilities within the next few years to include:

- RF (9 kHz – 50 GHz)
- Offers for primary and secondary services

Progressing Beyond

In addition to the E&E industry, metrology is also essential in other areas such as the mechanical and chemical sectors. Moving forward, NMIM hopes to focus on material measurement in the long term.

"Material parameters are essential to this endeavour as they provide the electrical or magnetic characteristics to replicate certain communication products, such as antennae," shared Dr. Arshad, who is looking to explore the properties of substrates due to their wide availability in both the local and global marketplace.

> "Material parameters are essential to this endeavour as they provide the electrical or magnetic characteristics to replicate certain communication products, such as antennae."

NMIM is constantly expanding its scope of services provided to agencies/government departments, educational institutions and industries in order to ensure that individuals, organisations and agencies can make precise measurements that are traceable.

As the world continues evolving, so too will the science of metrology, which has been around since ancient times. "Ultimately, the presence of metrology in our lives ensures safety, harmony and comfort," he added.

E&E industry players looking to pursue measurement and calibration services in RF and MW capacities, as well as other industry players who are interested in finding more about NMIM's full scope of services, may contact Dr. Arshad at 03-87781600/1652 or arshads@sirim.my for further details.

Evolution of NMIM

1978 Established Metrology Unit

1980 Name changed to National Metrology Centre (MNC)

2000 Name changed to National Metrology Laboratory (NML), also known as NML-SIRIM, fully operating at the SIRIM headquarters in Shah Alam, Selangor

2004 Moved to Sepang, Selangor

2015 Name rebranded to National Metrology Institute of Malaysia (NMIM)

> "Ultimately, the presence of metrology in our lives ensures safety, harmony and comfort."

For more information, Dr. Arshad can be contacted at
arshads@sirim.my or
Contact 03-877 8160/1652

[1] *https://www.mida.gov.my/mida-news/ee-industry-to-contribute-rm120-bln-to-gdp-generate-rm495-bln-in-export-revenue-by-2025/*

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