

Promoting Application of Electron Accelerator and Radiation Processing in Malaysia.

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Malaysian Nuclear Agency

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INTERNATIONAL CONFERENCE ON

ACCELERATORS FOR RESEARCH AND SUSTAINABLE DEVELOPMENT

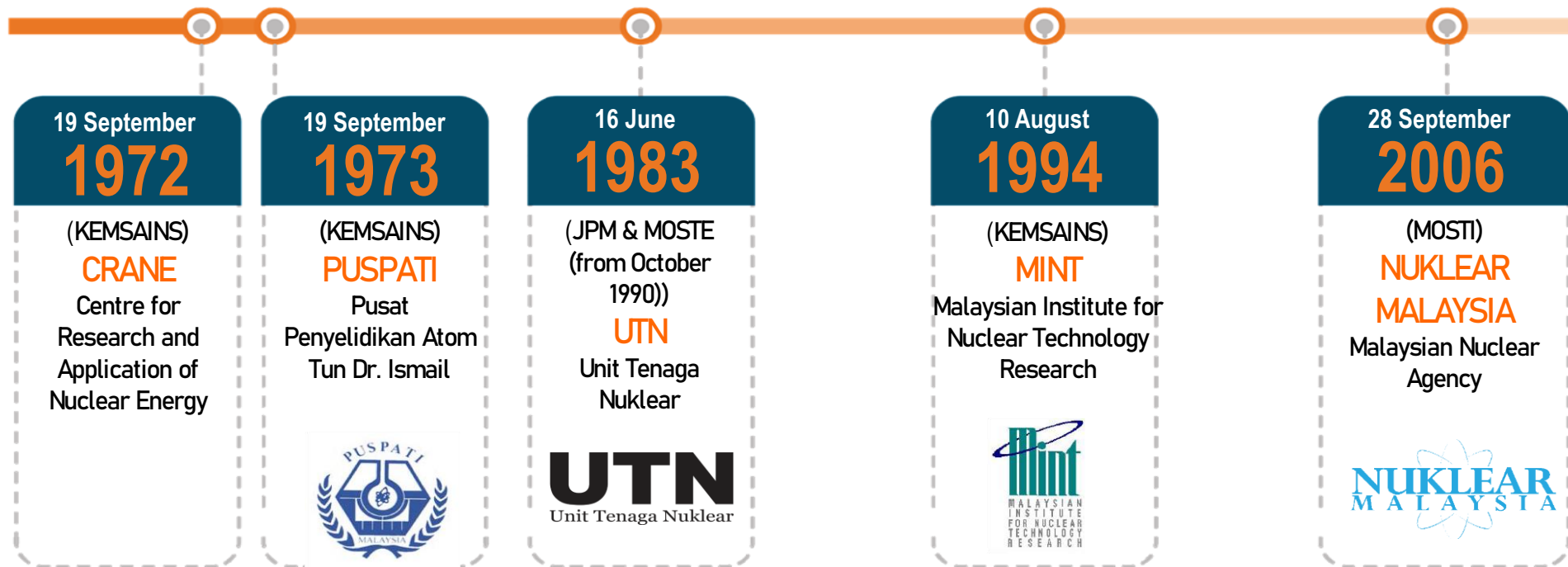
From good practices towards socioeconomic impact



23–27 May 2022

IAEA Headquarters, Vienna, Austria

About : Malaysian Nuclear Agency



VISION

Leading R&D&C&I in nuclear science and technology for national sustainable development

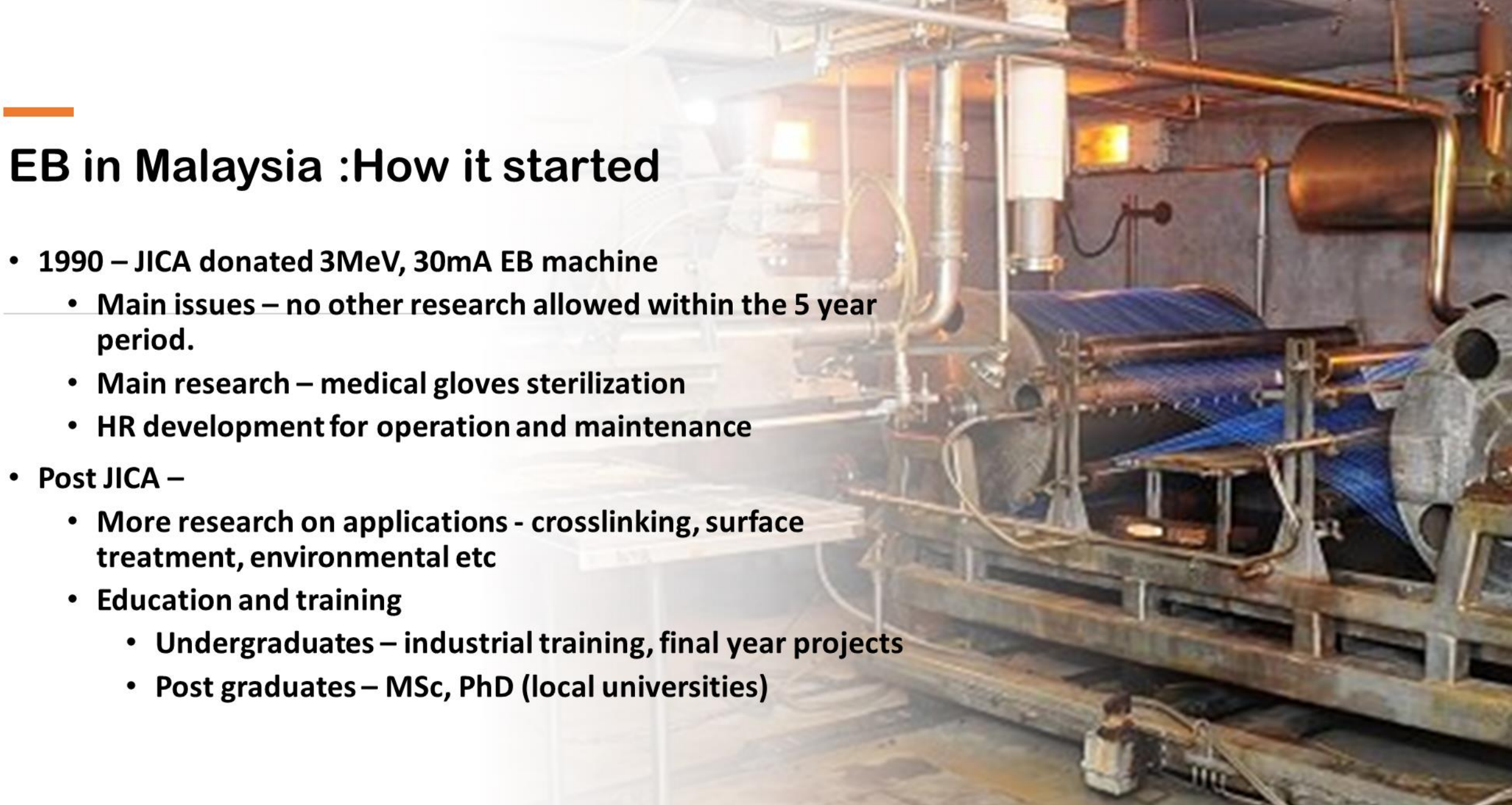
MISSION

Creating wealth, generating new knowledge and accelerating economic growth & societal well-being through nuclear science and technology towards shared prosperity



EB in Malaysia :How it started

- 1990 – JICA donated 3MeV, 30mA EB machine
 - Main issues – no other research allowed within the 5 year period.
 - Main research – medical gloves sterilization
 - HR development for operation and maintenance
- Post JICA –
 - More research on applications - crosslinking, surface treatment, environmental etc
 - Education and training
 - Undergraduates – industrial training, final year projects
 - Post graduates – MSc, PhD (local universities)



Supporting Laboratory

- *Dedicated laboratory to support work on radiation modification of polymer, polymer blend and composites, radiation curing and synthesis, and radiation grafting and conservation technology.*
- *QC lab including dosimetry*



EB irradiation – Industrial response

POTENTIAL USERS:

Glove industries – remain using gamma sterilization or ETO
Medical devices manufacturer
Automotive vendors/supplier – wire & cable, heat shrinkable tube
Semi conductor wafer
Cosmetic/ skin care products
Pharmaceutical ingredients



	Company	Activity
1	Cryovac (M) Sdn Bhd	Heat shrink film (packaging)
2	Malaysian Nuclear Agency	Multipurpose irradiation for tubal and flat products
3	SK Polymer Technology	Shrink film
4	Sumitomo Electric Interconnect Products	Wire and cable
5	Continental Sime Tyre	Tyre
6	Meditop Corporation	Medical devices sterilization
7	Electron Beam Malaysia Sdn. Bhd (owned by STERIS)	Commercial irradiation facility
8	Cyprium Wire Technology (LATEST 2021)	Wire and cable



Success Stories

- International recognition
- Innovation and invention awards
- Education and training
 - More than 100 students graduated in MSc and PhD
 - Approximately 20 undergraduate interns per year
- Commercialization and consultation
 - ISO 9001 certified irradiation service
 - Consultation on product irradiation design
 - Consultation on EB facility construction (facility design, machine selection and verification, QC and licensing requirement)
 - Operation and maintenance – expertise has been extended to X-ray scanner
- Appointed by Ministry of Science as Grant Facilitating Agency for Accelerator Applications Research Program





IAEA COLLABORATING CENTRE 2019-2023

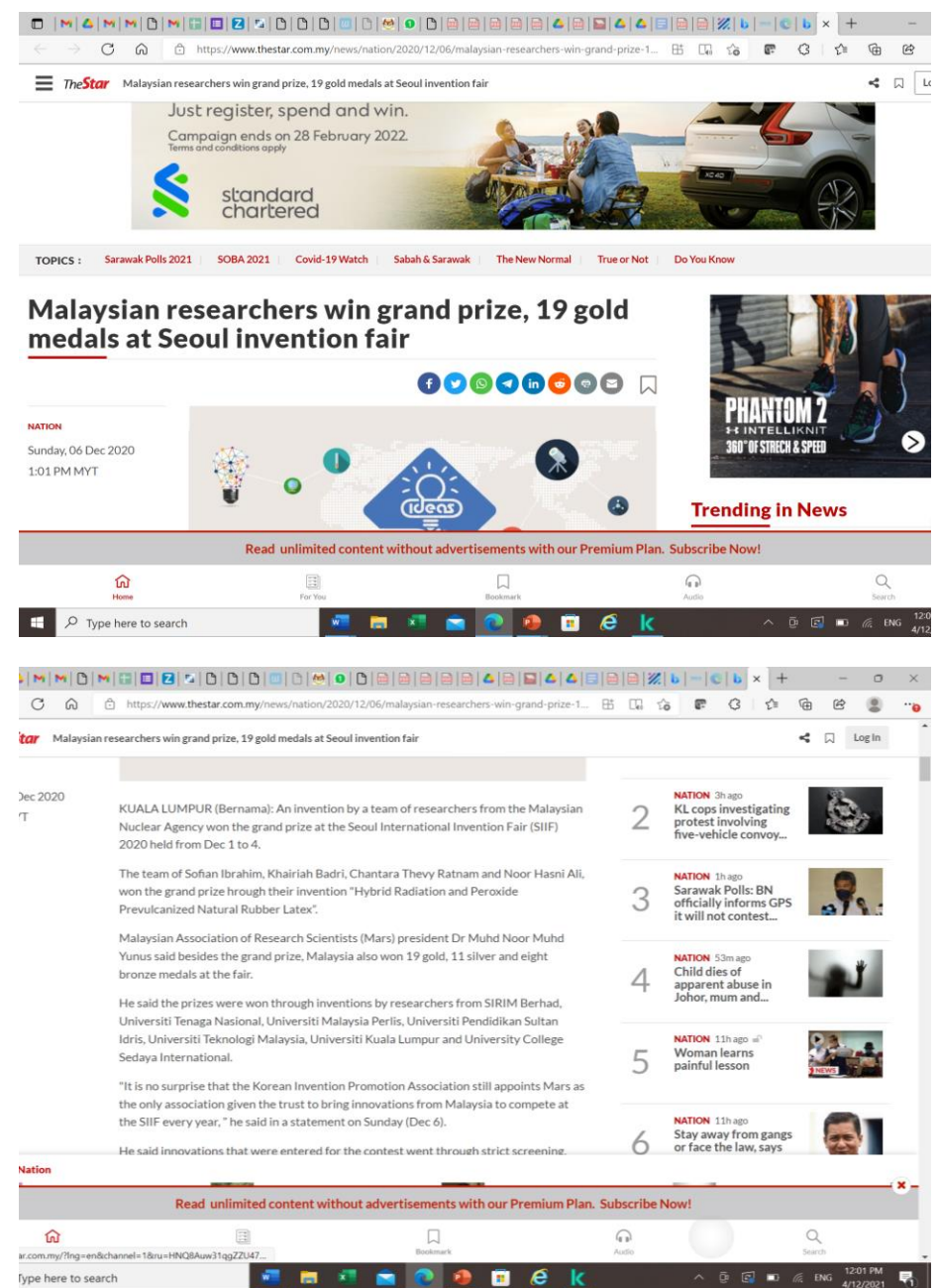


Gamma
GreenHouse Facility

Advanced
Non-Destructive
Testing Facility

Radiation
Processing
of Polymers Facility







LATEST PROJECTS



KEMENTERIAN SAINS,
TEKNOLOGI DAN INOVASI
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

STRATEGIC RESEARCH FUND PROGRAM:

Accelerator Application: Radiation Processing

RM 10.1M

Development of Energy Efficient Light Weight Industrialized Building System Components Utilizing Radiation Processed Upcycled Plastic Waste and Kenaf Commodity

Upcycling of Microplastics In Electron Beam Functionalised Carbon Nano-material Production For Antimicrobial and NORM Barrier Construction Coating

Development of Radiation Crosslinked Low-Smoke Halogen-Free Flame Retardant Cables for Automotive and Construction Industry

Development of Hygiene Paper Using Electron Beam Irradiation for Medical Laboratory and Clean Room applications



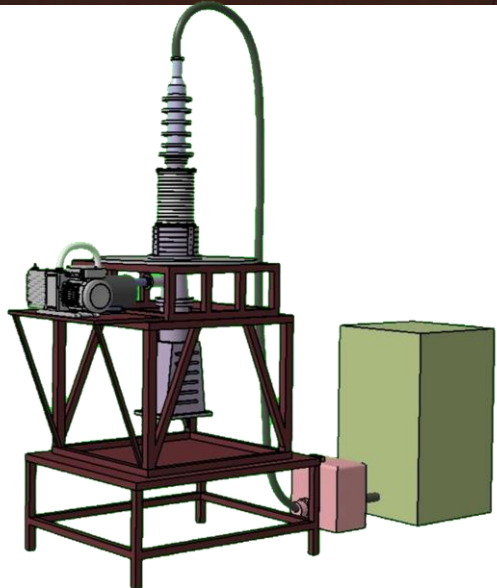
SPECIAL NOTES SRF PROJECTS

- All projects are in collaboration interested commercial entities and designed for upscaling towards commercialization (this is inline with *“TC Regional Project RAS0080 - Promoting Self-Reliance and Sustainability of National Nuclear Institutions”*)
- Funding also comes from commercial partners (in kind/monetary)
- Projects 1 and 2 supports NUTEC Plastic initiative (plastic recycling)
- Nuklear Malaysia is also running community projects on recovery and recycling of plastics waste from sea (Sabah region)



Competency building in Accelerator Design

- Design and development of low energy electron beam accelerator.



140 keV, few micro
Amp
Using disused x-ray
power supply and
scrap materials

200 keV 30mA
80% locally
fabricated
Local fabricator
involvement



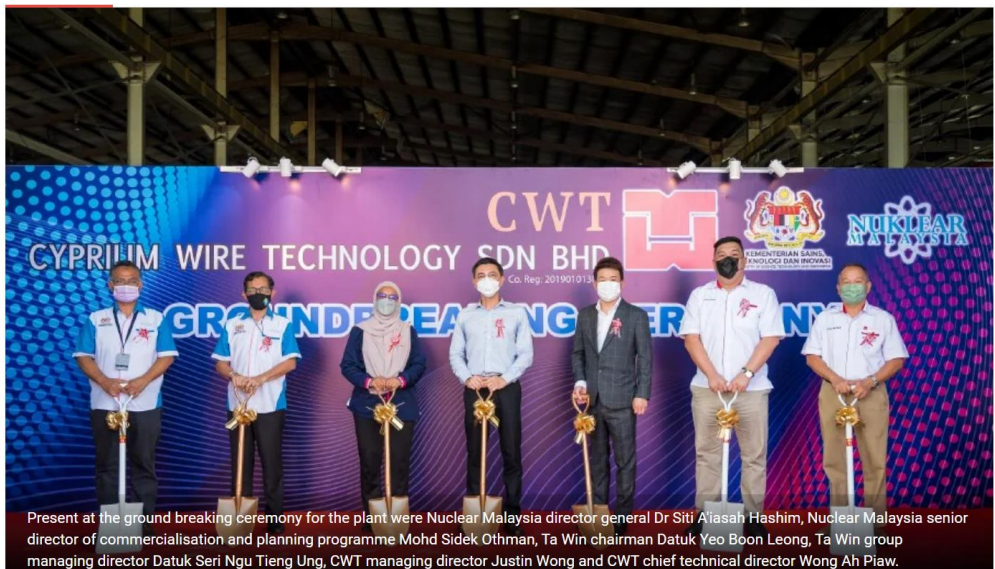
OUTCOME of COMPETENCY BUILDING

- Recognition by the Royal Malaysian Custom Dept.
 - Appointed as technical experts for Final Acceptance Test of new cargo scanners for the department (installed at various point of entries in the country)
- Appointed as consultant for new EB facility for wire and cable irradiation
 - Cyprium Wire Technology Sdn. Bhd
- Identified local manufacturers for component fabrication



3 minute read

Ta Win starts building Malaysia's first privately-owned electron beam irradiation plant



Present at the ground breaking ceremony for the plant were Nuclear Malaysia director general Dr Siti A'iasah Hashim, Nuclear Malaysia senior director of commercialisation and planning programme Mohd Sidek Othman, Ta Win chairman Datuk Yeo Boon Leong, Ta Win group managing director Datuk Seri Ngu Tieng Ung, CWT managing director Justin Wong and CWT chief technical director Wong Ah Piaw.

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Siti A'iasah said the new irradiation facility will earmark Malaysia's step forward to increase local production of high value products through high technology, especially in the wire and cable industry.

"More importantly, it will be able to support and cater to the electric vehicle industry's need for efficient and quality cabling.

"The technology involved in this project is environmentally-friendly and thus, is in line with the government's pledge towards making Malaysia cleaner and greener," she said.

STATUS:

Infrastructure – 90% completed

Machine – delayed (lockdown in China) – new target in July



ISSUES and CHALLENGES

- High investment on irradiation facility
 - Maintenance and spare parts
- Limited funding
- Lack of government push in radiation technology acceptance
- Human resources



WAY FORWARD

- Implementation of National Nuclear Technology Policy 2021-2030
 - Highlight on accelerator technology as tool for material development and manufacturing
 - Promoting higher energy accelerator (10MeV) among stakeholders and technology benefactors (state government, private investors etc)
 - Strengthen human resource



CONCLUSION

- Electron beam accelerator is an important tool to enhance product value for certain manufacturing industry (eg automotive, semiconductor)
- Nuklear Malaysia's investment on multipurpose eb irradiation facility is slowly gaining acceptance by local industries
- Nuklear Malaysia is currently sustaining its facility through collaboration with industries and government support.





Acknowledgements :

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IAEA

WiN (Malaysia)



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