

APPLICATION GUIDE FOR INDIVIDUAL RESEARCH GRANTS & YOUNG INDIVIDUAL RESEARCH GRANTS (MANUFACTURING, TRADE AND CONNECTIVITY DOMAIN)

OVERVIEW

1. Under the Research, Innovation and Enterprise (RIE) 2025, the Manufacturing, Trade and Connectivity (MTC) domain aims to strengthen Singapore's positioning as a manufacturing hub and a Global-Asia node for technology, innovation, and enterprise by further enhancing our manufacturing capabilities and cross-domain technologies that will seed growth in adjacent sectors. Details on the MTC domain's strategies and goals can be found at <http://www.nrf.gov.sg/rie2025-plan>.

2. The MTC **Individual Research Grants (IRG)** aims support novel and fresh R&D investigator-led ideas. Proposals are solicited through a ground-up mechanism across the research ecosystem. The IRG allows for submissions from either single Principal Investigators (PIs), or small PI teams¹. Meanwhile, the **Young Individual Research Grants (YIRG)** is a sub-category of grants aims at grooming young researchers² in conducting independent research. A*STAR has been appointed as the Implementing Agency for the MTC IRG and YIRG.

LAUNCH OF GRANT CALL

3. The 2021 MTC IRG and YIRG grant calls will open on **25 Jun 2021** and close on **06 Aug 2021, 11.59 pm (Singapore Standard Time)**. Results are expected to be announced by Jan 2022.

4. The grant calls are open to all locally funded public sector research performers including the Institutes of Higher Learning (including universities and polytechnics), A*STAR Research Institutes, and non-defense-related public sector agencies (e.g., Ministries, Statutory Boards). Industry and non-local research performers can participate as collaborators, but will not be eligible for any funding.

5. Proposals can focus on any research areas that fall under the MTC domain. Within the domain, twelve key industry sectors under three major groups have been identified for RIE2025 (refer to **Annex A**). These are:

- Manufacturing
 - Aerospace
 - Energy and Chemicals
 - Electronics
 - Precision Engineering
 - Marine and Offshore
 - Food Manufacturing
 - Biomedical Manufacturing
- Trade
 - Logistics
 - Wholesale Trade
- Connectivity

¹ PI teams may be formed between different institutions for IRG.

² "Young Researchers" are defined as researchers with up to 7 years of post-doctoral experience.

- Aviation
- Sea Transport
- Satellites

Cross-cutting technology areas have also been identified as essential enablers, which will undergird and support the key industry sectors. These are:

- Robotics and Automation;
- Digital Manufacturing;
- Additive Manufacturing Processes;
- Advanced Materials; and
- Supply Chain Management

6. Selection of successful proposals will be based on, but not limited to, the following evaluation criteria:

- a) PI's track record
- b) Intellectual/innovative merit;
- c) Competitive/comparative advantage; and
- d) Likelihood of success.

7. Notwithstanding the above criteria, the evaluation panel reserves the right to make a final decision based on other strategic considerations.

8. Each applicant is only allowed to submit one application as a Principal Investigator (PI) for either the IRG or the YIRG. Only one Lead PI is allowed per application. Applicants should not have any outstanding reports for all national grants currently or previously held.

ELIGIBILITY CRITERIA

9. Applicants are generally required to fulfil the following criteria **at the point of application**:

	IRG	YIRG
Max. funding quantum³	Typically up to \$1.2M per project (inclusive of 30% indirect costs) over 3 years. Applicants are advised to budget their projects prudently.	Typically up to \$325k per project (inclusive of 30% indirect costs) over 3 years. Applicants are advised to budget their projects prudently.
Age	Any age	Any age
Academic qualification	PhD	PhD (not more than 7 years post-PhD)
Employment	Holds a primary appointment of at least 75% in a local publicly funded institution and salaried by the institution.	
Past funding received	-	PI of an on-going MTC/AME IRG or MTC/AME YIRG project will not be eligible.
Mentorship support	Not required	Applicants are required to work with a mentor for guidance in their research. Applicants' current supervisor can be the mentor for the proposal but not a Team PI, Co-I or Collaborator. Applicants must indicate how the proposed area of work would be distinct from their current supervisors' existing research. Upon award, the Host Institution is required to provide written confirmation from either the Research Director or Head of Institution to describe the steps the institution will take to demonstrate its commitment to his/her career development. These include the provision of appropriate space and resources to carry out the proposed work. A copy of the Host Institution's support letter should be furnished.

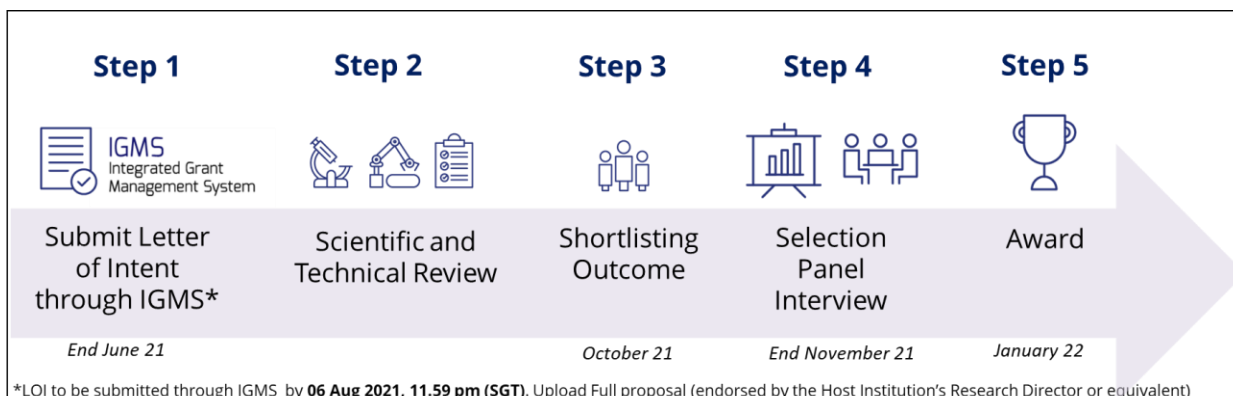
10. In addition to the above criteria, applicants should not have any outstanding report from previous A*STAR grants, NMRC grants, and other national grants.

REVIEW PROCESS

11. All proposals will be subject to scientific and technical review. Shortlisted applicants may be invited to present their proposals to a panel of reviewers. The entire review process is expected to take up to 6 months from the grant call closing date. As the decisions are final, we are unable to consider any appeals.

³ The funding supports eligible costs related to manpower, equipment, consumables and travel, subject to A*STAR's terms and conditions. It also supports indirect costs (IRC) capped at 30% of direct costs.

GRANT CALL TIMELINE



12. Indicative Timeline:

Stage 1: Proposal Submission	
Opening of grant call on IGMS	25-Jun-21
Deadline for submission on IGMS	6-Aug-21
Shortlisting Outcome	October 2021
Stage 2: Presentation (For shortlisted applicants only)	
Deadline for submission of presentation deck	End October 2021
Presentation to Review Panel	End November 2021
Grant Award	January 2022

APPLICATION PROCESS

13. All applications should be submitted through the Integrated Grant Management System (IGMS) system (<https://researchgrant.gov.sg>) by **06 Aug 2021, 11.59 pm (Singapore Standard Time)**. Late and incomplete submissions will not be accepted.

14. The following completed documents (using the requisite template) should be uploaded to the relevant sections in IGMS:

a) Full proposal

15. Each proposal must be endorsed by the Host Institution's Research Director or equivalent prior to submission. This is to ensure that there is organisational support for the PI to participate in the grant call.

16. For any clarification, please contact the Implementing Agency, A*STAR, at IRG_AME@hq.a-star.edu.sg.

MTC R&D FOCUS AREAS

Under the Research, Innovation and Enterprise (RIE) 2025, the Manufacturing, Trade and Connectivity (MTC) domain aims to strengthen Singapore's positioning as a manufacturing hub and a Global-Asia node for technology, innovation, and enterprise by further enhancing our manufacturing capabilities and cross-domain technologies that will seed growth in adjacent sectors. MTC IRG YIRG proposals should be aligned to one or more of the MTC R&D focus areas¹ listed in the table below.

Type	RIE2025 MTC Sector	What it covers
Manufacturing Vertical	Aerospace	• Aircraft manufacturing and Aircraft maintenance, repair and operations (MRO). ○ Digitalisation (including Data Analytics & Artificial Intelligence) ○ Industry 4.0 Technologies (including Robotics and Automation, Industrial IoT) ○ Advanced Material Development (including NDI/NDT) ○ Modelling and Simulation ○ Additive Manufacturing for aerospace applications ○ Urban Air Mobility and Traffic Management ○ Autonomous Systems (including pilotless flights) ○ Electrification <i>Note: Air traffic control, ground ops, etc are under Aviation.</i>
Manufacturing Vertical	Energy & Chemicals	• Specialty chemicals • Advanced materials e.g. polymers, polymer matrix composites (refer to Advanced Materials Horizontal description for distinction). • Enablers such as AI/ML, modelling & simulation, life cycle assessment
Manufacturing Vertical	Electronics	• Heterogeneous Integration • Power Electronics • MEMS • 6G RF technology and beyond • Electronics for Edge AI
Manufacturing Vertical	Precision Engineering	• Additive manufacturing, with a focus on applications in manufacturing • Lasers & Optics: ○ Flat optics ○ Imaging systems, metrology and sensors ○ Laser and fibre optics ○ Functional coatings
Manufacturing Vertical	Marine & Offshore	• Next-Gen Intelligent Vessels (incl. robotics and autonomous vehicles) • Next-Gen Intelligent Platforms and Marine Robotics (e.g. Offshore platforms, monitoring, inspection, maintenance and Platform-shore communications)

¹ List updated as of June 2021.

Manufacturing Vertical	Food Manufacturing	• Health, Nutrition and Wellness for Asian Consumers (e.g. Food formulations, Flavours and textures) • Food Safety, Regulatory & Consumer Behaviour Sciences • Process R&D on large scale processing of raw materials into food (e.g. scale-up production of protein products)
Manufacturing Vertical	Biomedical Manufacturing	• Biopharmaceutical manufacturing (manufacturing of small molecules, biologics and emerging modalities) ○ Small molecules/Biologics ▪ Advanced Process Technologies ▪ Digitalisation and Automation ▪ Single-Use Technology (SUT) and modular bioprocessing technologies ▪ Active ingredient to product interface for small molecules manufacture ▪ Biocatalysis ▪ Process Technologies ▪ Automation/Sensing Technologies ▪ Agile Manufacturing ○ Emerging Modalities ▪ Manufacturing and development technologies • Medtech manufacturing ○ Additive manufacturing, Bio-fabrication and 3D printing for MedTech applications ○ Sensor development, miniaturisation and manufacturing for medical applications ○ Development of AI-based model for diagnosis, risk stratification, simulation of <i>in vivo</i> conditions and other medical applications ○ Advanced materials development and manufacturing for medical devices
Trade Vertical	Logistics	• Digital twinning of logistics operations (e.g. warehouse performance, warehouse design, autonomous operations) • Predictive maintenance and remote assistance of logistic fleets • Systems integration and asset optimisation • Data analytics, robotics and IoT for warehouse and transport operations
Trade Vertical	Wholesale Trade	• Digital marketplaces and platforms • Sustainable technologies for supply chain and trade platforms (e.g. packaging and tracking, blockchain, carbon footprint tracking) • Smart contracts, fraud detection • Traceability of transactions, documents and goods
Connectivity Vertical	Aviation	• Air Traffic Management (ATM) ○ Future ATM Systems ○ Future Airspace concepts of operations (CONOPs) ○ AI for decision support systems ○ Enhanced Big Data Analytics ○ Digitalised Aerodrome Operations • Air Transport (non-ATM)

		Post-COVID-19 passenger air travel design (airport and airplanes) ○ Airport productivity, efficiency and resilience: ▪ Robotics, automation ▪ Autonomous vehicles ▪ IoT sensors for airport operations ▪ Lightning warning system
Connectivity Vertical	Sea Transport	• Next Generation port ○ Automated terminal operations ○ Orchestrated operations and smart maintenance ○ Smart port services • Smart Shipping ○ Smart fleet operations ○ Maritime Autonomous Surface Ships (MASS) ready ports ○ Human machine interface for MASS ○ Smart Harbour Craft Operations
Connectivity Vertical	Satellite	• Satellites for Air Traffic Management (ATM) • Satellites for Vessel Traffic Management • Earth Observation satellites ○ Environmental monitoring Weather & climate change monitoring • Small Satellites • Space Cybersecurity
Horizontal	Advanced Materials	• Sustainable/alternative materials discovery • Advanced materials processing and manufacturing techniques • Materials characterisation techniques <i>Note: The Energy & Chemicals vertical will cover R&D on the actual material properties itself.</i>
Horizontal	Advanced Manufacturing	• Combination of Additive and Hybrid manufacturing processes that can be applied to different sectors (e.g. large format additive manufacturing). • New materials for additive manufacturing. • Manufacturing process planning methods & high mix low volume methods.
Horizontal	Digital Manufacturing	• Making factories adaptive and flexible • Making factories highly resilient through high-connectivity, within the factory and externally along the supply chain and partners
Horizontal	Robotics and Automation	• Human robot interaction • Systems capabilities • Navigation & perception • Assistive robotics • Universal end effector robotics • Flexible/reconfigurable robotics • Data driven robotics • Multi-robot systems

		• Trusted robotics
Horizontal	Supply Chain Management	• Digital Twin of end-to-end Supply Chain: ○ Real time performance monitoring ○ Supply Chain Network and operations optimisation ○ Autonomous supply chain • AI/ML/Data analytics for supply chain management