

Advance research.
Spark innovation.



Container Coning and Deconing Research Grant Call Briefing 2026

23 January 2026



Agenda



Challenges

While cranes and vehicles are automated, container coning/deconing remains manual.

Challenges:

1. Hazardous working conditions
2. Labour-intensive operations
3. Safety
4. Aging workforce
5. Recruitment difficulties

Goal: Full-scale automation for port operations

Purpose:

1. Enhance safety
2. Long-term sustainability
3. Meet Singapore's 2040s goals of 65 million TEUs

Automation of wharf-side coning and deconing

Viability due to convergence of:

1. Mature Embodied AI (EAI) for perception and dexterity
2. Robust hardware, sensing, and connectivity stack
3. Strong economic drivers (labour costs, safety risks)
4. Proven technologies from automated logistics

Problem Statement

Current EAI solutions are promising, but not reliable or scalable enough for live operations

Grant focus:

- Accelerate the deployment of robotic solutions for coning and deconing.
- Specific component breakthroughs rather than full-system prototypes.
- Technical targets:
 1. High-Speed Manipulation: Robotic systems capable of a coning/deconing cycle time of ≤ 30 seconds under wharf-side conditions.
 2. Precision Perception: Detection models capable of identifying 40+ fitting types with 95% accuracy, including the identification of defective or non-standard components.

Grant Call

Aims:

- Targeted R&D to adapt and deploy a specialized robotic solution within PSA and the broader sector.
- Specific component breakthroughs, rather than full-system prototypes.
- Enables technologies (i.e. Advanced materials, multimodal perception, and data-driven training) to bridge technical gaps in coning/deconing.
- Align with industry needs.

Technical targets:

1. High-Speed Manipulation: Robotic systems capable of a coning/deconing cycle time of ≤ 30 seconds under wharf-side conditions.
2. Precision Perception: Detection models capable of identifying 40+ fitting types with 95% accuracy, including the identification of defective or non-standard components.

Project Scope and Details

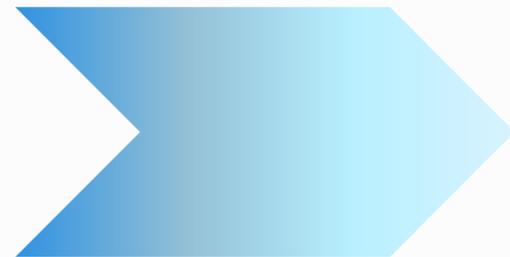
Details:

- Proposals should build on prior SMI work to improve system robustness and technology readiness.
- Application period: 12 January to 10 April 26.
- Timeline requirements:
 - a. Maximum project duration: 24 months
 - b. Detailed milestones
 - c. Regular progress reporting
 - d. Key technical reviews

Project Scope and Details



TRACK A: HARDWARE DEVELOPMENT



TRACK B: SOFTWARE DEVELOPMENT

Track A: Hardware Development

Focus: Enhancing the physical durability and dexterity of robotic components in harsh port environments.

R&D Scope:

- Research and test robotic arms and end-effectors for long-life, force-adaptive manipulation.
- Address environmental hardening, wear engineering, and contact mechanics for corner casting constraints.
- Evaluate and build upon PSA's curated robotic designs to bridge industry-readiness gaps.
- Conduct material research on anti-slip surfaces for corroded/dirty fittings.

Integration & Support:

- Ensure compatibility with PSA's curated robotic designs which include co-developed with PSA industry partners (Annex B), and support teleoperation for demonstrations.
- Provide comprehensive training materials and knowledge transfer for end-users.

Key Deliverables:

- Validation: Lab-validated testing plans ready for transition to field trials.
- Performance Metrics: Quantifiable improvements in mechanical durability, slip resistance, and manipulation stability.

Track B: Software Development

Focus: Advancing AI models and synthetic data to improve recognition, decision-making, and manipulation.

R&D Scope:

- Identification: Multimodal AI (Vision-Tactile-Language-Action) to identify twist lock types and failure modes.
- Grasping: Models to predict optimal grip force, torque sequences, and grasp positions.
- Synthetic Data: Generation of wharf-side video scenarios (varied lighting, crane angles, extreme corrosion) for AI training.
- Task Planning: Action-annotated videos for long-horizon planning and dexterous manipulation.

Integration & Support:

- Ensure interoperability with open-source EAI models, simulation environments, and data pipelines.
- Provide technology translation plans (e.g., PoC with PSA-curated partners)

Key Deliverables:

- Accuracy: Lab-validated models showing significant improvements in action grounding and failure prediction.
- Efficiency: Methodologies that meaningfully reduce the volume of real-world data collection required.

Eligibility & Collaboration

Mandatory Collaboration

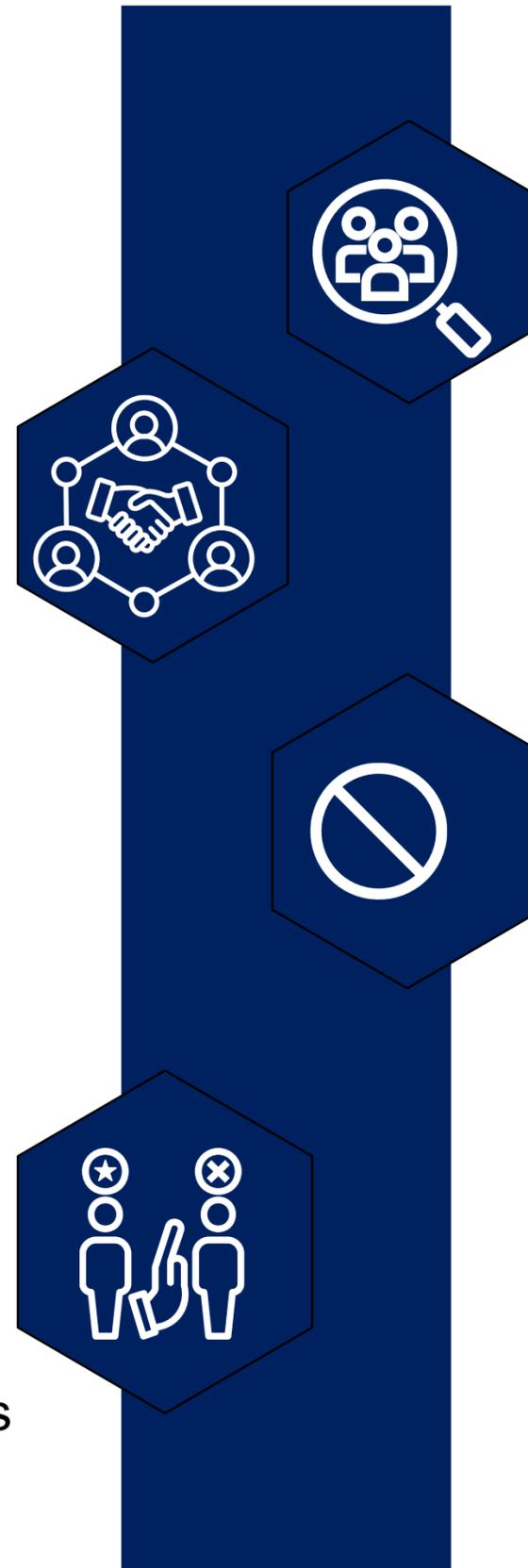
Requirement: Proposals MUST feature collaboration with port operators and technology providers and the identified Industry Partners listed in Annex B

Exclusions

Full system builds or end-to-end autonomous prototypes;

Hardware integration specifically for wharf trials

Start-ups focusing solely on the end-to-end workflow rather than component breakthroughs



Who

Open to all Singapore-based Institutes of Higher Learning (IHLs) and Research Institutes (RIs)

The PI must be based in Singapore, and all research shall be conducted in Singapore

No Double Funding

Ineligible: Proposals already funded by other government agencies

Action: Applicants must declare all existing funding sources and concurrent applications

Pending Status: Proposals currently under evaluation by other funding bodies will NOT be considered until a final decision is reached

Submission Requirements

The Document Package:

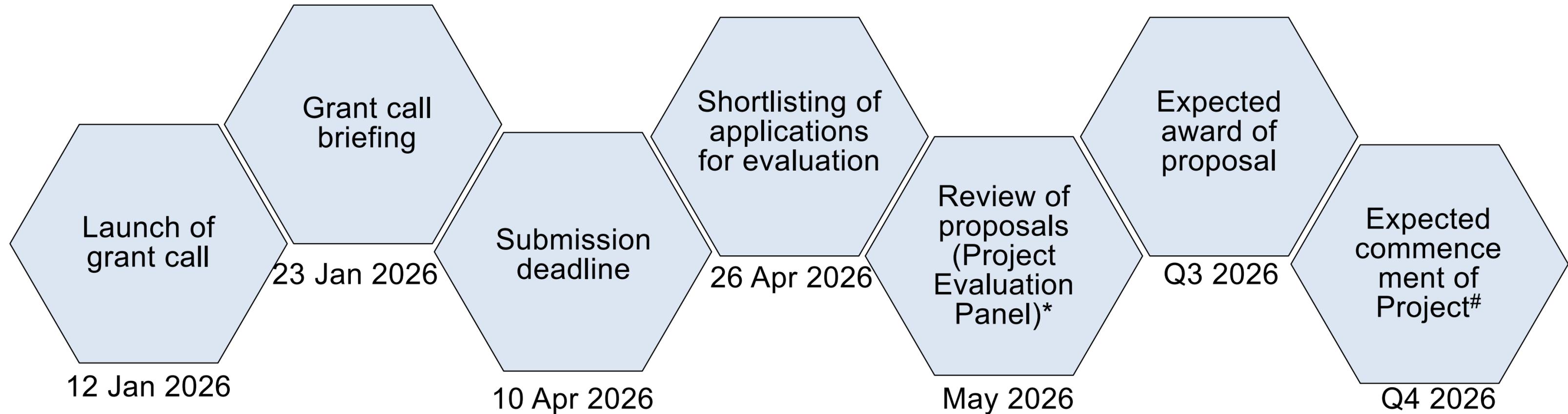
- Annex D (Application Form): Must be in English. Comprehensive & Concise case for support.
- Annex E (Presentation Deck): Concise and direct. Additional references can be annexed.
- Annex F (Budget Excel): Detailed breakdown of costs.

Note: Clearly mark any Privileged/Confidential Information within these documents.

Grounds for Rejection:

- 1.NO Endorsement: Lacks electronic endorsement from the Host Institution's Director of Research.
- 2.Incomplete Data: Missing/inaccurate fields or non-compliance with Annex C.
- 3.No Revisions: Once submitted, no changes are permitted. Submit right the first time.
- 4.Policy Breach: Misalignment with scope or Eligibility/No Double Funding rules .

Key Timelines



*The PEP reviewers may seek additional information to elaborate or clarify areas in the application during the review process

#Projects shall commence within 1 month of award

Funding Support

- Indirect Research Cost (IRC) may be claimed up to 30% of the approved qualifying cost.
- Total funding support includes IRC and approved qualifying direct costs of the R&D project.
- This Call for Proposals offers funding support of up to S\$2 million per project inclusive of indirect costs for a period up to 24 months.
- All costs and expenses incurred by the applicant in preparing or submitting the application shall be borne entirely by the applicant.

Contact Details

All applications before 14 Feb 26 2359H can be submitted to both email addresses below, while applications after 14 Feb 2359H can be submitted on the RGP/ IGMS portal with the following details*:

- Subject head “SMI Grant Call”
- Track A/B
- Host Institute
- PI Name
- i.e. “SMI Grant Call_Track A_NTU_Prof Jane Tan”

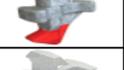
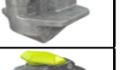
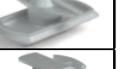
**RGP/ IGMS portal will only be available for submissions after 14 Feb 26 2359H, subjected to further changes. For applications before 14 Feb 26 2359H, please submit via email to SMI*



Contact Details:

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List of container cones/twistlocks

S/N	On Deck						Under Hatch					
	SAT	Weight (kg)	Photo	FAT	Weight (kg)	Photo	Midlocks	Weight (kg)	Photo	Cones	Weight (kg)	Photo
1	MACGREGOR C5AM-DF	6.1		SECTL-FA/L	5.7		GERMAN LASHING ML-2	4.8		MACGREGOR C12C	3.2	
2	MACGREGOR CV20	5.2		SECTL-FA/LG	5.9		MACGRGOR AFC-1L	5.2		MACGREGOR SDL-1	2.1	
3	GERMAN LASHING T-2.3C	5.9		SECTL-FA/SL	4.9		SEC-TL-ML	4.9		GERMAN LASHING S1.47	3.8	
4	SECTL-A/L	4.9		TAIYO FA-8	6.5		MACGREGOR C19A	5.2		MACGREGOR SDL-4	3.7	
5	GERMAN LASHING T-2.3D	5.3		GERMAN LASHING SL-1	5		MECB5.1-12	4.3		MACGREGOR C16A	4.1	
6	TAIYO EM-1	7.2		MACGREGOR C8A	8.3					GERMAN LASHING SC-1	1.3	
7	MACGREGOR CV16	4.5								TAIYO M-1ST	2.7	
8	MACGREGOR CV-20G	6								GERMAN LASHING 1.43	3.3	
9	CSSC F6	6+								SEC IS-1T	3.6	
10	BOEN T6-1	5.7								TAIYO M-1NFS	2.1	
11	Macgregor CV15 series	6								SEC IS-1T/LF	1.4	
12	SCLASH TL-6	6								SEC IS/IT/L	2.5	
13	TAIYO NA-7	6.9								MACGREGOR C18A	3.5	
14	GLS BD-J1	4.9								MEC-B4.2-10	1.5	
15	ILS IF-56	5.4								MEC-B4.2-18	2.5	
16	ISS RS1807	4+								MEC-B4.2-18-28	3.1	
17	SECTL-A/L (another varian	4.5										
18	SECTL-GA/L	5.4										
19	TAIYO NA-3J	7.2										
20	TECCI-45-1	5.2										
21	Macgregor R1205B	-										
22	SECTL- A GL/LR	-										

PSA Sharing



Thank you

Q&A

