

**Additive Manufacturing (AM) for Singapore's Maritime Industry:  
Joint Industry Programme (JIP) Phase 2 – Call for Proposals 2020**

**(Updated on 27 March with FAQs: Annex B)**

1. **Background:** Following the successful completion of JIP Phase 1 on the market feasibility of AM for Marine Parts, MPA, NAMIC and SSA are launching a Joint Industry Programme (JIP) Phase 2 on AM fabrication, testing, inspection, and certification of maritime and/or marine parts. The JIP Phase 1 report is available at [MPA's website](#). The details of JIP Phase 2 are outlined below. We would like to invite interested industry consortia to submit a proposal to participate in the JIP Phase 2.

Towards printing of these parts, there are a number of technical challenges that need to be addressed, such as in the area of materials, design, printing techniques, and post-processing. A case study in the aerospace sector demonstrated how Selective Laser Melting (SLM) process and topology optimization of part installed on Airbus A350 XWB has enabled 30% weight reduction, shortened production time from 70 days to 19 hours and eliminated the assembly process of 30 sub-components. More details can be found [here](#).

2. **Objective:** AM technology will play a critical role in achieving a more productive and sustainable maritime industry in the next 10 to 20 years. Material innovation and design innovation of marine parts will be important to deliver greater value. The JIP Phase 2 Call For Proposals 2020 therefore aims to bring together key industry players along the value chain to showcase the potential of AM technology for maritime and/or marine parts by printing and certifying parts, and installing them onboard vessels.
3. **Challenge Statement:**
  - a. The selected parts for JIP Phase 2 should require certain Technical Developmental Work (e.g. material change and/or redesign/ design optimisation for Additive Manufacturing).
  - b. Parts can fall into two categories – (1) Ship Spares, or (2) Ship Stores. If the selected part falls in the category of Ship Spares, it should ideally involve the Original Equipment Manufacturer<sup>1</sup> as well as marine insurance company.
  - c. In addition, if parts are selected from outside the list of 100 shortlisted parts from Phase 1<sup>2</sup>, applicant should justify the commercial viability and technical feasibility of the part for AM. These should be considered based on the specific use case and the needs of the end user.
4. **Project Scope and Expected Deliverables:**
  - a. Successful showcase of 3D-printed and qualified/certified part(s), including successful trial installation onboard an SRS-flagged vessel for a time period of between 3 to 6 months, to be further discussed upon submission of the proposal.

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<sup>1</sup> Without which, it may void warranty and raise issues should the machinery fail, resulting in damage, casualties and/or pollution. If OEMs are not involved, critical parts should be avoided for the JIP.

<sup>2</sup> Through the JIP Phase 1 Market Feasibility study, 100 commonly used parts were shortlisted based on technical feasibility and commercial viability, demonstrating strong business potential with AM technology. Please see the public report on MPA's website for the list of parts.

- b. The outcomes should include a comprehensive project report outlining the technical and business assessment.
  - i. The **technical assessment** consists of part selection methodology, fabrication strategy with AM, testing and inspection method, part qualification/certification strategy, product reliability tests, and installation/implementation plan.
  - ii. The **commercial viability** assessment includes the detailed breakdown of cost analysis and comparison between conventional manufacturing and AM method, and analysis of the potential impact to the procurement process.

5. **Eligibility and Proposal Requirements:**

a. **Composition:**

- i. Each industry consortia should minimally comprise an AM technology supplier/service bureau, classification society, and end-user(s) (e.g. ship owners/ship management companies). It would also be useful to involve OEMs, depending on the selected part(s), as well as marine insurance companies.
- ii. Each company can take the lead in maximum two (2) industry consortia or proposals, and participate in no more than three (3) industry consortia or proposals.
- iii. All the work should be conducted in Singapore. This includes the fabrication with AM, testing, inspection, and certification process.

b. **Main Applicant:**

- i. The main applicant could be the AM technology supplier, maritime company, or classification society that has a legal entity and presence in Singapore.

c. **The proposal (to be submitted in MPA's MINT Fund application form) should contain:**

- i. Project description (proprietary or confidential information must be clearly indicated in the proposal),
- ii. Selected parts/ methodology for parts selection, including the number of parts to be evaluated,
- iii. Fabrication strategy with AM, testing, inspection, certification, and product reliability tests,
- iv. Company profile and respective manpower participating in the industry consortia including details on the involvement and contribution,
- v. Cost breakdown consisting of two separate budget tables of AM fabrication and testing/inspection/certification,
- vi. Letter of Intent from end user on the trialing of AM parts on board their selected SRS-flagged ship,
- vii. Project risk assessment and mitigation plan, and
- viii. Technology innovation assessment and projected economic value-add (Annex A).

d. **Duration:** The project duration shall not be more than 14 months (including 3 – 6 months continuous trial onboard vessel).

e. **Submission:** Interested applicants shall submit the completed proposals to [mint@mpa.gov.sg](mailto:mint@mpa.gov.sg).

f. **Deadline:** The application deadline is **20 April 2020**, 1800 hours local time.

6. **Funding support:**

- a. Selected projects may be eligible for up to 50% of project grant from MINT fund for qualifying items. The grant amount will also take into consideration the number of parts that will be evaluated.

- b. More information on MPA's MINT Fund can be found on our website.

7. **Proposal Evaluation and Award Process:**

- a. The proposals will be evaluated by a joint project evaluation panel formed by MPA, NAMIC and SSA. Project proposals with clear strategies for implementing and/or integrating AM into the company's business would be preferred.
- b. The panel may seek additional information to elaborate or clarify areas described in the proposal during the review process.
- c. Shortlisted applicants will be notified by April and awarded by May.

8. **Project Monitoring and Review:**

- a. Each project will be assessed for progress every six (6) months to ensure the proposed milestones and deliverables are on-track. Successful applicants will be required to present the progress update and submit a progress report to the joint project review team comprising industry experts appointed by MPA, NAMIC and SSA.

9. Please direct further queries to:

- a. Jessica CHOW (MPA): [Jessica\\_CHOW@mpa.gov.sg](mailto:Jessica_CHOW@mpa.gov.sg)
- b. Albert Sutiono (NAMIC): [albertsutiono@ntu.edu.sg](mailto:albertsutiono@ntu.edu.sg)

**Annex A: Technology Innovation Assessment and Projected Economic Value-Adds (VA)**

***(\*) Please only include AM-related outcomes***

Technology Innovation and Projected VA (*)		Please indicate (X)	After project is completed		
			Year 1	Year 2	Year 3
<b>Jobs creation</b> <i>(Estimate the annual remuneration in S\$)</i>					
<b>Launch of new product/service</b> <i>(Estimate the additional gross revenues in S\$)</i>					
<b>Market expansion</b> <i>(Estimate the additional gross revenues in S\$)</i>					
<b>Cost Saving / Productivity Improvement</b> <i>(Estimate the annual financial gain (\$) from cost saving and productivity improvement)</i>					
<b>Investment in AM capex</b> <i>(Estimate the subsequent investment in AM capex such as equipment, facility, etc.)</i>					
<b>Technology Innovation</b> <i>(Elaborate the technical works such as investigate new material, perform design optimization, etc.)</i>					

## **Annex B: Frequently Asked Questions (updated on 26 March)**

### **Q1: What is the definition of ship spares and ship stores?**

Ship spares refers to spare parts of marine equipment. Some of these equipment affect ship safety and continued operations, and could lead to complex issues should the machinery fail. These are typically parts that are produced by Original Equipment Manufacturers, and depending on criticality, may require certain safety certification and warranties.

Ship stores are general parts and consumables used onboard ships. These generic items typically do not require certification or qualification by classification societies, and may not have OEMs.

### **Q2: Is there a specific budget cap?**

As this is a co-funded grant, consortium may wish to prioritise the quantity and diversity of parts to make good financial sense.

### **Q3: Selected projects may be eligible for up to 50% funding for qualifying items. Where should the remaining funding come from?**

MINT Fund can support up to 50% of manpower, equipment either engaged or acquired for the purposes of the project, and other operating expenditure incurred for the purposes of the project. The remaining costs should be borne by the consortium members.

### **Q4: Can the trial be conducted on a vessel that is not under the Singapore Registry of Ships (SRS)?**

For the purpose of this CFP, the trial installation of the 3D printed part should preferably be conducted onboard an SRS-flagged vessel.

### **Q5: Is there a maximum number of consortium members?**

There is no maximum number of consortium members, but it would be useful to detail the contributions and capabilities of each member in the project.

### **Q6: The developments of COVID-19 have impacted our business and our partners. Can we have an extension of the deadline?**

In view of the rapid developments of COVID-19 globally, we understand the concerns of industry partners in meeting the deadline for proposal submission, and will extend the deadline for another two weeks. The application deadline is now on **20 April 2020, 1800 hours local time**.