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2025/26 Ottonel Popesco Student Challenge by PEMA

2025/26 Topic:

Innovative ways to increase the operational cycle times of Ship to Shore container cranes

In this document:

PEMA

1. Challenge and Project

Ship-to-Shore (STS) container cranes are a critical component of modern container terminals and play a key role in overall vessel turnaround time. As vessel sizes continue to increase and terminal capacity is pushed to its limits, improving the operational cycle time of STS cranes has become a key challenge for ports and terminal operators worldwide.

Despite continuous incremental improvements in crane design, automation, and control systems, STS crane cycle times remain constrained by factors such as hoisting speeds, trolley travel, crane operator workload, interactions with landside equipment, twistlock handling, safety requirements, and variability in container-handling operations.

This year's PEMA Student Challenge invites participant teams to explore innovative ways to increase the operational cycle times of Ship to Shore container cranes, with the aim of improving terminal productivity, reducing vessel berthing time, and enhancing overall supply chain efficiency.

Teams are encouraged to look beyond conventional solutions and consider new concepts in crane design, automation, digitalisation, operational strategies, human–machine interaction, and terminal system integration. Proposals may include modifications to existing STS cranes, entirely new crane concepts, or complementary technologies and processes that directly or indirectly reduce crane cycle times.

Solutions may focus on seaside or landside operations, or on their interaction, provided that the primary objective is a measurable improvement in STS crane operational performance.

The project study should consider the following approach

1. Analysis of current STS crane operations, including typical cycle time components (hoisting, trolley travel, gantry movement, positioning, and dwell times).
2. Identification of key bottlenecks and constraints that limit crane cycle time performance, such as mechanical limits, operational practices, safety margins, or system interfaces.
3. Assessment of existing technologies and practices currently used to improve STS crane productivity, including automation, remote operation, and advanced control systems.
4. Development of innovative concepts to increase operational cycle times. These may include, but are not limited to:
   - New or modified crane mechanical designs
   - Advanced automation, AI, or decision-support systems
   - Novel operator assistance or human–machine interface solutions
   - Changes to operating procedures or work organisation
   - Improved interaction with terminal transport equipment and yard systems
5. Evaluation of the operational impact of the proposed solution, including estimated cycle time reduction or throughput increase.
6. Assessment of economic viability, considering investment costs, operational savings, and potential return on investment for terminal operators.
7. Assessment of safety and sustainability impacts, including effects on operational safety, energy consumption, emissions, and overall terminal sustainability.

Competition Intent

The intent of the competition is to challenge participants to rethink how STS cranes operate within container terminals and to propose futuristic, innovative, and potentially radical concepts that could redefine crane productivity in the coming decades.

Proposals must be supported by relevant scientific, technical, and operational data. Creativity, feasibility, and measurable performance improvement will be key metrics in the evaluation process.

In the first stage, teams are requested to submit a PDF (A4/8 pages max), of their proposed solution to info@pema.org before the deadline Friday 10th April 2026.

Please see below for the full timeline of events.

2. How To Enter

1. Form a team of students from your university - MSc, BSc or diploma students. You as a team formulate an answer to address the challenge given above. You do the work on the challenge as a team. You can invite one university staff member to provide you with advice. Ensure that you have submitted your team sheet before the initial deadline.
2. **By Friday 10th April 2026, 16:00 CET**: Submit a PDF copy – A4 and no more than 8 pages – on your proposed solution and completed team sheet.
3. **By 13th April: Finalists will be notified** and provided with a full briefing and allocated a date - week commencing 27th April – to make a detailed presentation to the judging panel via Teams or equivalent media. 30 minutes will be reserved for each presentation (including 5 minutes for questions).
4. A panel of experts will judge your solution based on the following criteria:
   - Innovation potential of the ideas presented.
   - The practicability of the solution – could your ideas be implemented in the real world?
   - Academic value of the ideas presented.

3. Winner Information

The winning team will be announced in due course following the presentation from all finalists

The winning team prize is €2000 (shared between teammates), plus certificates for the winning team and runners-up. There will also be publicity via PEMA website and social media channels, plus other media coverage.

We look forward to your participation in the 2025/26 PEMA Student Challenge.

For questions please contact the PEMA Student Challenge Coordinator:
Caroline Doyle on **info@pema.org**

4. Rules Of Participation

1. The PEMA Student Challenge competition is open to teams from any university globally.
2. Teams must consist of 3 - 4 participants.
3. All participating students must be aged 18 or over.
4. All participating students must be studying towards an undergraduate or postgraduate degree.
5. All team members must attend the same university but can be studying different subjects.
6. Multiple teams from the same university can enter if they compete as independent teams and there is no overlap of work.
7. Each team is required to nominate their team captain who will act as the primary delegate for PEMA Student Challenge communications.
8. Teams are permitted to have a sponsored lecturer who can act as a consultant but are not allowed to contribute to the production of the report and presentation.
9. All presentations must be written in English.
10. By signing up, students confirm their participation in the competition and agreement of the Rules of Participation.
11. By submitting a proposal teams agree to their work being published under the Student Challenge page on the PEMA website.
12. All presentations must be in Microsoft Powerpoint format, slide ratio (16:9).
13. The teams who qualify for the final stage of the competition agree to the use of their names and images in any PEMA publicity material.
14. The team captain of the winning team will need to provide bank details to transfer the prize money.
15. It is the responsibility of the team captain of the winning team to disseminate the prize money equally among teammates.

The prize is as follows:

16. €2,000 (split between team members, exposure on PEMA website and social media channels and the possibility of their solution being published in a relevant publication.

Questions on plagiarism, or any other queries must be directed to the PEMA Student Challenge Coordinator: Caroline Doyle on **info@pema.org**

5. Frequently Asked Questions

1. What is the Ottonel Popesco Student Challenge by PEMA?

The Ottonel Popesco Student Challenge by PEMA is an annual competition run by the Port Equipment Manufacturers Association and is open to students studying any relevant degree from universities globally. In the first stage of the competition, teams (comprised of 3 - 4 students) are invited to submit a proposal, providing their solution to the Student Challenge Question. The question itself constructs a fictional scenario within which there is a real-world operational issue that the Students must solve. The theme of the challenge is always topical focusing on current challenges facing the industry today.

The winning team receives a prize of €2,000 to be shared between team members, the possibility of their solution being published in a relevant publication.

2. Who can participate?

Participation in the Ottonel Popesco Student Challenge by PEMA is open to any team of students currently studying towards an Undergraduate or Postgraduate degree. The competition is open to universities globally and students must be aged 18 or over.

3. How many students can be in a team?

Teams must comprise 3 - 4 students, one of whom must be a 'Team Captain' who will act as the main contact for the Student Challenge communications.

4. Can more than one team from the same university participate?

Multiple teams from the same university can participate, so long as they compete independently of each other and there is no overlap of work. Team mates can be studying different degrees but must attend the same university to compete.

5. How can I participate?

To submit a team for the Student Challenge 2025/26, fill out our online submission form at **pema.org/ottonel-popesco-student-challenge**

6. Who do I contact if I have additional questions?

For any questions or queries relating to the Ottonel Popesco Student Challenge by PEMA, please contact PEMA Student Challenge Coordinator, Caroline Doyle on **info@pema.org**

7. What is PEMA?

Founded in 2004, the Port Equipment Manufacturers Association, PEMA, provides a forum and public voice for the global port equipment and technology sectors. The Association has seen strong growth in recent years, and now has more than 120 member companies representing all facets of the industry, including crane, equipment and component manufacturers, automation, software and technology providers, consultants and other experts.