

*An Innovative
Lifting Device
Competition for
Secondary
School Students*

*Department of Architecture and Civil Engineering
City University of Hong Kong*

2022



香港城市大學
City University of Hong Kong

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This document is composed to provide relevant information for “**An Innovative Lifting Device Competition for Secondary School Students**” organised in 2022 by the Department of Architecture and Civil Engineering, City University of Hong Kong.

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Copyright Declaration

Students involved in this competition have given their consent to CityU to present their competition-related materials (including the device, images, submitted documents) in websites with public access and in institutional activities like exhibitions and demonstrations.

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1. Introduction

- 1.1 The Department of Architecture and Civil Engineering (ACE Department) of the City University of Hong Kong offers undergraduate programmes that cover most professional disciplines of the construction industry. These programmes include civil/structural engineering, architectural engineering (building services engineering) and surveying.
- 1.2 The ACE Department encourages its students to integrate what they have learnt and put them into practice in innovative ways. Its students have the opportunity to work with students of other disciplines on simulated projects so that they are more ready to practice in the construction industry upon graduation.
- 1.3 From time to time, the ACE Department organise competitions and other events for secondary school students to promote their interest and understanding on the various professional disciplines of the construction industry.
- 1.4 As it has always been a challenge to lift materials, prefabricated units, tools and equipment effectively and efficiently in construction sites, an innovative lifting device competition is being organised by the ACE Department for secondary school students. It provides an excellent opportunity for secondary school students to come together to design and build a functional device that is both economic, aesthetically pleasing and environmental-friendly.
- 1.5 An organising team of academic and supporting staff (Organiser) of the ACE Department is set up to organise the competition.
- 1.6 Arrangements, details and announcements of the competition are available at the webpage https://www.cityu.edu.hk/ace/Upcoming_open_events

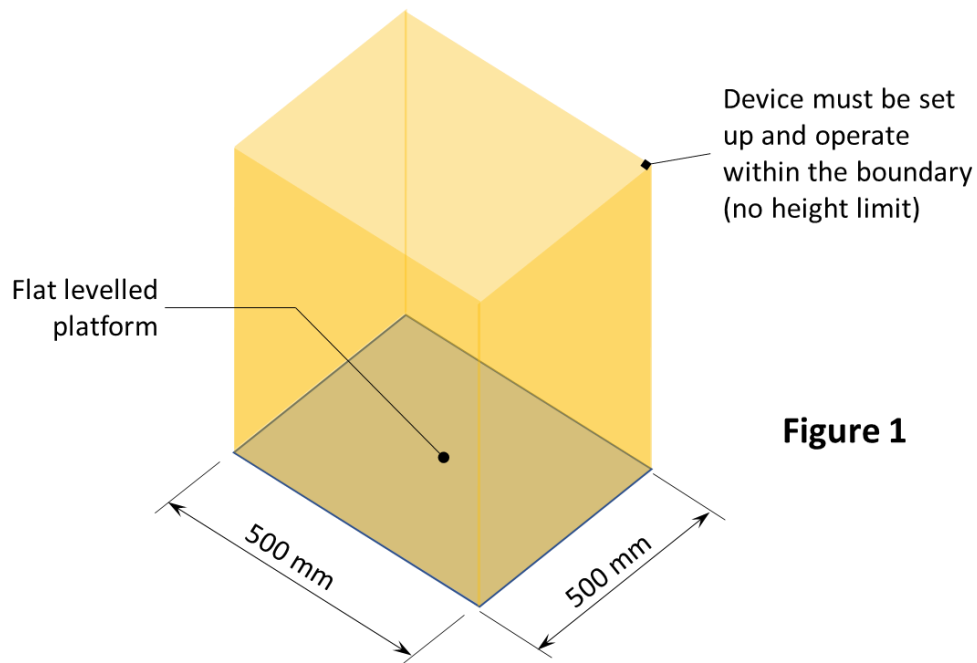
2. The Challenge

- 2.1 It has always been a challenge to lift materials, prefabricated units, tools and equipment effectively and efficiently in construction sites. There are several types of cranes or lifting devices of various characteristics and capacities to suit different site situation.
- 2.2 To help secondary school students appreciate this, a competition is organised for them to design and build a lifting device (Device) through teamwork.
- 2.3 The challenge of the competition (Challenge) is for each participating team (Team) to provide an innovative Device that can lift up a 330 ml can of soft drink by 200mm within one minute. The Device should be light, aesthetically pleasing and environmental-friendly.
- 2.4 Each Team has to prove that the Device can meet the Challenge by the actual lifting of a can of soft drink at the Competition Day.
- 2.5 The Challenge for each Team also includes the preparation of a document that helps readers to understand the design as well as the quantity and cost of the materials used for building the Device.

3. Rules and Requirements

- 3.1 Design of the Device
 - 3.1.1 Any material, mechanical system and energy source can be used for the Device.
 - 3.1.2 The Device is composed of its own structural frame and decorations (if any), the lifting mechanism that also includes the facility to hook the can of soft drink, and the energy source. All these components (except the can of soft drink) build up the total weight of the Device.

- 3.1.3 The Device should be able to stand on top of a flat levelled platform of 500mm x 500mm (to be provided at the Competition Day) without any fixing connection.
- 3.1.4 No part of the Device and the can of soft drink can go beyond the 500mm x 500mm envelope on plan during the lifting operation (see Figure 1).



- 3.1.5 The Device cannot be assisted by power of any form outside the boundary.

3.2 Documentation of the design and materials used

- 3.2.1 An explanation of the design of the Device and a detailed account of the quantity and cost of the material used in the construction and operation of the Device shall be provided in a document and submitted to the Organiser by email before the deadline as in 6.5.
- 3.2.2 The design of the Device shall cover how the Device supports its own weight and the weight of the can of soft drink, the considerations in choosing the materials for building the Device, the mechanism for the lifting, and the energy source to power up the mechanism.

- 3.2.3 All materials used for the Device involve cost. The detailed account should include the quantity of all materials used and their associated cost. Please note that glues and adhesives, tapes, electric wires, solder welds, batteries, and any others (except those provided by the Organiser) inside the 500mm x 500mm boundary during the lifting operation are also included.
- 3.2.4 The document should have four one-sided A4 pages in Microsoft Word format. The text, diagram(s) and/or table(s) can be arranged in any format, but the main text should be in “12-pt Times New Roman” font. Only English language can be used. Documents not conforming with the requirements will not be accepted.
- 3.2.5 The Team’s name and number should be indicated at the top right-hand corner of each page of the document.

3.3 At the Competition Day

- 3.3.1 Teams shall report to the competition venue by 2:00pm the latest.
- 3.3.2 Each Team can bring in its Device in whole or in parts. The Device should be the one as described in the submitted document.
- 3.3.3 Each Team will be provided with one square platform of 500mm x 500mm and a 330ml can of soft drink (weighing about 360 grams) by 2:15pm. No power supply, tools, stationeries and other materials will be provided.
- 3.3.4 By 2:45pm, all Teams should finish assembling and setting up the Device on the provided platform. The Device should be free standing on the platform, ie. not fixed to the platform by any connection.
- 3.3.5 The competition shall start at 3:00pm. Each Team will be invited one by one to do the lifting.

- 3.3.6 At a Team's turn, its members can start the lifting upon getting a signal from the Organiser. Once the lifting operation starts, no one can touch any part of the Device and the can of soft drink until the Challenge is completed or failed. There should not be any physical or wireless connection with the Device outside the 500mm x 500mm boundary.
- 3.3.7 The provided can of soft drink should initially be in contact with the levelled platform. Once the lifting operation starts, it should be lifted up 200mm within one minute for the Team to complete the Challenge. The 200mm will be measured from the levelled platform to the lowest point of the can (see Figure 2). Each Team can have up to a maximum of three trials within 5 minutes to complete the Challenge.

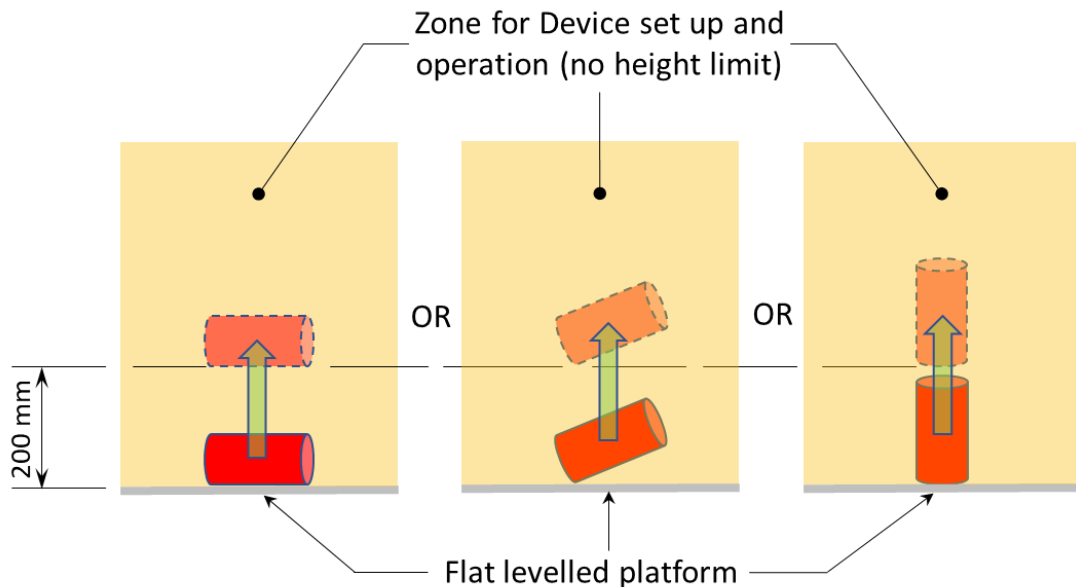


Figure 2

- 3.3.8 Once the Challenge is completed, the total weight of the Device as in 3.1.2 will be checked by the Organiser and recorded in a record sheet.
- 3.3.9 The Team Leader shall sign the record sheet of its Team to complete the competition process.

3.3.10 Any complaint arising should be raised to the Organiser immediately. Complaints will be considered and the outcome as decided by the Organiser will be final.

4. Competition Team

4.1 A competition team is a Team that has been properly registered with the Organiser through submitting a completed Registration Form (Appendix A) by email and receiving email confirmation from the Organiser. The first 20 teams that completed the registration process will enter the competition. Each Team will be assigned a Team number.

4.2 Any 3 to 5 full-time students by October 2022 from the same or different secondary schools, or equivalent, in the Hong Kong Special Administrative Region can form a Team.

4.3 For each Team, one of the members shall be the Team Leader who shall be the sole representative of the Team to communicate with the Organiser.

4.4 Once a Team is registered, there shall be no change in its members and Team Leader unless there is strong valid reason(s) acceptable to the Organiser.

4.5 The Team shall determine itself on how the work can be shared among its members.

5. Guidance and Support

5.1 All the relevant details and notes of the competition are contained in this document. There is an online Briefing Session to be held on 27 June 2022 to explain the contents of this document. Interested students and their potential Advisor as in 5.3 are welcome to join the Briefing Session before submitting the Registration Form.

- 5.2 Each and every Team shall provide itself at own expense with all the materials, tools and equipment that are needed for the competition. However, Teams that can complete the Challenge will receive prize as in 7.6 or other awards.
- 5.3 Each Team has the option of inviting ONE teacher or any other person as its Advisor who can advise the Team any time during the preparation work and at the Competition Day.
- 5.4 The Advisor cannot involve in the actual design and construction of the Device. He/she has to complete the Advisor Declaration Form (Appendix B) which has to be submitted together with the Team's Registration Form as in 4.1. Once registered, a Team cannot change its Advisor unless there is strong valid reason(s) acceptable to the Organiser.
- 5.5 The Advisor can also attend the Competition Day. He/she can advise the Team verbally, but cannot involve in the actual setting up and operation of the Device.

6. Key Dates

- 6.1 Please note the following key dates:

27 June 2022	Briefing Session
16 July 2022	Deadline of submitting Registration Forms
24 September 2022	Last day of making inquiries to Organiser
30 September 2022	Deadline of submitting explanation of the design and the detailed account of material quantity and cost of the lifting device
8 October 2022	Competition Day
22 October 2022	Presentation of awards

- 6.2 As in 5.1, a Briefing Session of the competition will be held on 27 June 2022, 6:30pm to 7:00pm, via Zoom. Please complete and submit the form at <https://forms.gle/d4wDDFnqYKS5Usfa9>, and the Zoom link will be emailed to you.

- 6.3 All Registration Forms of the competition (Appendix A), together with the Advisor Declaration Form (Appendix B) if there is any, should be submitted before 5:00pm of 16 July 2022 by email to the Organiser at acedept@cityu.edu.hk. Late submissions will not be acceptable.
- 6.4 Teams can make inquiries to the Organiser by email through the Team Leader on or before 24 September 2022. Apart from answering the Teams that made the inquiries, some of the questions and answers may be displayed at the webpage https://www.cityu.edu.hk/ace/Upcoming_open_events under the competition's FAQ section.
- 6.5 Explanation of the design and detailed account of material cost of the Device should be submitted before 5:00pm of 30 September 2022. Teams not submitting before the deadline will be considered as withdrawal from the competition.
- 6.6 The Competition Day on 8 October 2022 will be conducted at the campus of the City University of Hong Kong. Exact location will be announced later.
- 6.7 Awards of the competition will be presented in the afternoon of 22 October 2022 at the campus of the City University of Hong Kong. Exact location will be announced later. The awarding Teams and their members can only receive the award(s) in person unless there is strong valid reason(s) acceptable to the Organiser.
- 6.8 Depending on the development of the Covid-19 pandemic situation, these key dates and the venue of the Competition Day and the presentation of awards may change. The Organiser will make formal announcement at the webpage https://www.cityu.edu.hk/ace/Upcoming_open_events and notify Teams if there is any change.

7. Awards and prizes

- 7.1 Only Teams that can successfully complete the Challenge of lifting the can of soft drink in accordance with the rules and requirements will be entitled to awards and prizes.

7.2 The Team with the lightest device will be the Champion. It will be awarded with a trophy and HK\$5,000 worth of shopping coupons. Each member of the Team will be presented with a certificate.

The Team with the second lightest device will be the 1st runner-up. It will be awarded with a trophy and HK\$3,000 worth of shopping coupons. Each member of the Team will be presented with a certificate.

The Team with the third lightest device will be the 2nd runner-up. It will be awarded with a trophy and HK\$2,000 worth of shopping coupons. Each member of the Team will be presented with a certificate.

7.3 One special award of HK\$1,000 worth of shopping coupons will be presented to the Team with the most elegant device. Each member of the Team will be presented with a certificate. The Team receiving this award may or may not have received other award(s).

7.4 Another special award of HK\$1,000 worth of shopping coupons will be presented to the Team with the most environmental-friendly device. Each member of the Team will be presented with a certificate. The Team receiving this award may or may not have received other award(s).

7.5 A further special award of HK\$1,000 worth of shopping coupons will be presented to the Team with the most detailed and well-presented account of material quantity and cost. Each member of the Team will be presented with a certificate. The Team receiving this award may or may not have received other award(s).

7.6 Teams that completed the Challenge successfully but have not received any awards in 7.2, 7.3, 7.4 and 7.5 will receive a prize of HK\$500 worth of shopping coupons per Team. Each member of the Team will be presented with a certificate.

8. Inquiry

- 8.1 All inquiries of the competition shall be made by email to the Organiser at acedept@cityu.edu.hk.
- 8.2 Once a Team is successfully registered, all subsequent inquiries should be made by the Team Leader to the Organiser by email. Inquiries made by other team members or the Advisor will not be entertained.

Appendix A: Registration Form

Proposed name of the Team: _____

Name of Team Leader: _____ ID number: _____

School: _____ Form: _____

Mobile number: _____ Email: _____

Corresponding address: _____

Name of student: _____ ID number: _____

School: _____ Form: _____

Mobile number: _____ Email: _____

Name of student: _____ ID number: _____

School: _____ Form: _____

Mobile number: _____ Email: _____

Name of student (optional): _____ ID number: _____

School: _____ Form: _____

Mobile number: _____ Email: _____

Name of student (optional): _____ ID number: _____

School: _____ Form: _____

Mobile number: _____ Email: _____

Name of Advisor (if any): _____

- Notes:**
1. The names in this form will be used to print certificates (if the Team has any award)
 2. ID number is the number of HKID card or passport bearing the student's name to be checked at the Competition Day.
 3. The Form of the student refers to the level of study by October 2022

Appendix B: Advisor Declaration Form

(to be submitted together with Appendix A)

Advisor name: _____

Rank and Organisation: _____

Mobile number: _____ Email: _____

Dear Organiser of the Lifting Device Competition 2022,

I hereby undertake to advise students of the Team _____
in the preparation for the competition, and I will not involve in the actual
design, construction and operation of the Device.

Signature

Date