

2019 國研盃智慧機械競賽

(ASME Taiwan SPDC) 簡章



壹、前言：

美國機械工程師學會 (ASME) 成立於 1880 年，學會為一非營利事業組織，致力於促進工程科學界的技術合作、知識共享以及技能發展，並提升工程師在學會中的重要性。學生競賽 (Student Design Competition, SDC) 共分成兩個層級，分別為區域賽和總決賽，優勝者可以代表參加下一層級的比賽，本次 ASME SPDC 競賽屬於台灣分會自行依比賽規則舉辦的榮譽賽，成績優勝隊伍可獲得獎金並參加美國 ASME 區域賽。若在區域賽競賽中再次獲得佳績，則可受邀參加 IMECE 會議中的全球總決賽 (International Mechanical Engineering Congress & Exposition)，與來自全球各區的優勝隊伍一較高下。

貳、競賽宗旨：

1. 提供培養專業機械工程師、領導人的技術平台。
2. 創造國際間工程技術分享與交流。
3. 提供參賽學生認識美國機械工程師學會的機會。

參、辦理單位：

主辦單位：美國機械工程師學會 台灣分會

國家實驗研究院儀器科技研究中心



承辦單位：美國機械工程師學會 臺灣大學學生分會

美國機械工程師學會 清華大學學生分會

美國機械工程師學會 交通大學學生分會

美國機械工程師學會 中山大學學生分會

肆、競賽時間與地點：

時間：2019 年 3 月 16 日(星期六)(詳細時程安排會公布於 FB 粉絲專頁上)

地點：國立臺灣大學 工學院綜合大樓

(如遇不可抗拒之因素，主辦單位得更改競賽時間與地點)

主辦單位提供參賽者午餐，請於報名時一併填寫欲訂購的份數。

注意：我們將於 3/2 (六) 當天開放設計競賽隊伍可以到現場進行測試及調整，詳細開放時間會再另外公布。

伍、競賽項目：

國內賽包含二種項目：

1. Student Design Competition 學生設計競賽：

2019 年 SPDC 設計競賽題目為 The Pick-and-Place Race

請依照題目設計出作品進行參賽。詳細規則請參照附錄一或 ASME 官方網站(第 1 條不適用於本榮譽賽)。

注意：依 ASME 過去數年慣例，競賽規則會隨參賽者反應而時有修訂，請參賽隊伍主動注意總部規則修正，並請隨時密切注意 ASME 官方的 Q&A，Q&A 之問答亦屬於比賽之規則，相關資訊可由此獲得：
<https://www.asme.org/events/competitions/student-design-competition>

2. Old Guard Oral Presentation Competition 演講競賽：

演講題目不限，機械相關即可，全程以英文演講和問答。詳細資訊請參照附錄二或 ASME 官方網站。比賽評審重點在大學生個人對機械相關議題的分析與分享能力或是個人在學期間研究成果的發表，並不是英文能力的鑑定。

陸、參賽資格：

國內大專院校全職在學學生(非研究生)，在職進修學生及教師不受理報名。學生設計競賽可跨院校混合組隊，每組最多 4 人。演講競賽則限以個人為單位參賽。
(學生設計競賽須有一人為 ASME 會員；演講競賽參賽者須為 ASME 會員)

柒、參賽方法：

參賽者可自行選擇欲報名參加之項目，並於國內賽之前完成作品或簡報，在國內賽當日前往比賽地點進行競賽。優勝隊伍或個人可獲得獎金以及 ASME 台灣分會所頒發的證書。

捌、競賽流程：

學生設計競賽：

競賽當天開放場地試用，正式開始前 30 分鐘停止試用比賽場地，以利主辦單位進行場地最後確認。當天會場備有準備區，參賽選手可以在準備區做最後的調整測試工作，並在開始前 10 分鐘收回各隊的遠端控制器，交回時請參賽者自行關閉電源，之後依序取回進行比賽，順序將以抽籤方式決定，詳細競賽流程將於當天宣布或以行前通知方式告知。

演講競賽：

競賽現場提供電腦與投影機，參賽者僅需自備內含簡報檔之隨身碟或光碟。

玖、評分標準：

由美國機械工程師學會台灣分會邀請學業界專家組成評審團，並按照美國機械工程師學會頒佈之評分標準進行評分。各項競賽的評分準則請見附錄。

注意：參加設計競賽之隊伍，須於進行任務前向評審委員說明相關設計理念及動力裝置等(約 3 分鐘)，再進行任務。

拾、競賽獎項與獎金：

獎項和獎金原則上依下方設定品項頒發，實際頒發獎項得因參賽隊伍數目和比賽成績狀況從缺。

一、學生設計競賽：

第一名：50,000 元

第二名：20,000 元

佳作：10,000 元 (一名)

評審團設計獎：15,000 元 (一名，評審團依據團隊作品之設計，擇優選取評審團特別獎項)，得與上述獎項合併領取。

評審團技術獎：15,000 元 (一名，評審團依據團隊作品之技術，擇優選取評審團特別獎項)，得與上述獎項合併領取。

注意：第一名之隊伍之判定，評審委員有決定是否為從缺之最終決定權。

二、演講競賽：

第一名：10,000 元

第二名：5,000 元

拾壹、冠軍隊伍晉級競賽規定：

本次 ASME SPDC 競賽屬於國內賽，成績優勝隊伍可獲得獎金。由於 ASME 組織重整，區域行政層級已廢除，因此晉級方式會不同於往年先晉級亞太賽再晉級世界賽，確切競賽晉級方式請詳見 ASME 總部官方網站。

拾貳、報名辦法：

報名時間：即日起至 2019 年 2 月 25 日截止。

報名方式：網路報名，詳細報名方式，詳見附錄三

保證金：一隊 1000 元整，需準時報到，並全程參與活動，在頒獎結束後，退還全額保證金 1000 元。

拾參、聯絡資訊：

ASME 學生競賽 (SPDC) 國內賽 總召 張振宇 0953-878-352

email: b05502096@ntu.edu.tw

ASME 學生競賽 (SPDC) 國內賽 副召 李冠廷 0933-720-650

email: b05502046@ntu.edu.tw

如詢問規則相關問題請私訊粉絲專頁其他問題也可私訊粉絲專頁

ASME SPDC 台灣國內賽

<https://www.facebook.com/ASME.SPDC.Taiwan/>

拾肆、競賽網站：

相關資訊會公布或修改在網站上，請密切注意。

ASME 官方網站網址：

https://www.asme.org/events/competitions/student-design-competition?_ga=2.139068662.49016842.1510994536-1990042056.1488987097

Facebook 搜尋：

ASME SPDC 台灣國內賽

**ASME Student Design Competition
2019 Contest**

The Pick-and-Place Race

Design Problem Setup

The 2019 Student Design Competition challenges your imagination and technical design skills to create a device that can quickly but carefully secure a variety of different balls that will be balancing on tube stands in the middle of a flat playing surface. You must construct a single remotely controlled device to collect as many balls as possible, and place them in a collection area – you must do this quickly, but avoid having balls fall off their stand and hit the ground. The competition will have an initial round where your device will run without competition, and then devices will compete against each other in a knockout format.

The constraints and competition procedures for all devices are as follows:

Pre-Game Rules

1. Students participating in the competition must be undergraduate engineering students (any engineering discipline is allowed) and must be ASME members. There is no limit on the number of students on a team.
2. At the start of the competition, teams **must provide a sizing box for your device** and any tools your team would use to make minor repairs during the competition. Throughout the competition, your device, controls, any extra batteries, and any tools must fit within your rigid sizing box. This box must be no more than 50 cm x 50 cm x 50 cm (internal dimensions), but *teams should minimize actual box size, volume is a tie-breaker in the competition.*
3. Your device will be stored inside your sizing box throughout all of the rounds of the competition. Teams will have one minute to remove your device from the box to compete in each round. No modifications to the device are permitted during this setup.
4. All energy for the device must be provided by rechargeable batteries. No other forms of stored energy (such as pre-compressed springs or gas) are allowed unless the stored energy of this component is returned to the initial state (for example an initially compressed spring must be re-compressed using the energy from the battery).
5. Teams may replace batteries between rounds, however replacement batteries must be identical to the original, mounted in the same way to the device, and stored in the sizing box throughout the competition.
6. Your device must be controlled via remote control through a transmitter/receiver radio link. Transmitter/receiver radio links may be any commercially available model controller. Radio transmitter batteries **do not** have to be rechargeable. All radio controllers will be shut off/stored within the team's box during the competition unless the team is competing.
7. Communication between controller and device must be able to be secured to allow for at least 3 other teams simultaneously using live controllers at other games taking place in the same auditorium area.

8. Flying devices are not allowed. Devices must remain intact throughout the game – for example, the device may not split and retrieve multiple balls at once.

Game Rules

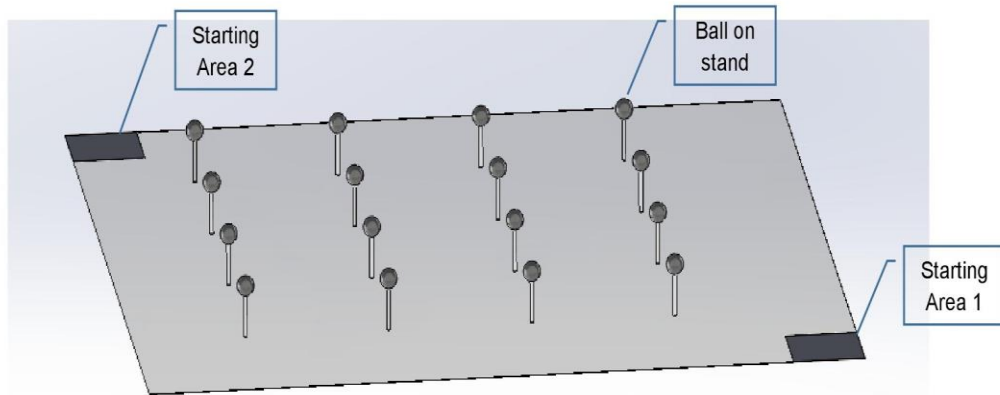
9. The playing surface dimensions are 5 meters x 5 meters, with boundaries marked by tape on the floor. The device will start each game in a 50 cm x 50 cm area in one corner of the playing surface, also marked by tape on the ground. See Figure 1 below with comments.
10. There will be sixteen balls each resting on top of a cylindrical stand at the start of each game. The balls will be at least 2.7 grams and 40 mm in diameter (a table tennis ball) and no larger than 650 grams and 250 mm in diameter (a basketball). Teams will not know the exact details of the balls (sizes or distribution of types of balls) until the competition – designs need to be flexible.
11. The sixteen cylinders will be approximately 3 – 5 cm in diameter (*probably PVC pipe*) and will be 20 cm tall. Judges may create a small base for each cylinder, but teams should expect that the stands will be easy to knock over if a device runs into them.
12. The playing surface will be level, and may be either hard surface or carpet typically found in public areas.
13. Just prior to the start of each game, judges will randomly place all the balls on the cylinders and immediately start the game. All games will last **5 minutes**.
14. Teams will earn/lose points as follows:
 - Plus two points for **collecting** a ball from its stand and securing it on their device
 - Plus three points for **placing** a ball in the team's starting area
 - Minus one point for every ball that is **knocked off** its stand and hits the ground
15. Once a ball has been scored (either secured, secured and placed, or knocked off stand) it can no longer be played during the rest of the game. Balls knocked off their stand will remain on the playing surface floor for the remainder of the game.
16. Teams earn two collecting points when a ball is secure within their device *for at least two seconds*; if the ball subsequently falls to the ground this does not change the scoring but placement points in the starting area cannot be earned for that ball.
17. Rules for earning the additional three placement points are as follows:
 - Only balls first secured within the device are eligible for placement points
 - Teams may either secure and then place one ball at a time, or may secure multiple balls and place them simultaneously
 - Placing points are earned when a ball is placed and remains stationary inside the starting area; if the ball is subsequently displaced this does not change the scoring.
 - The placed ball must rest on the ground within the scoring area, not touching the device
 - Balls that have been secured may be pushed on the ground into the scoring area, however any ball that leaves the 5m x 5m playing surface becomes ineligible.
18. If all sixteen balls are scored in less than 5 minutes, the game will end.
19. All teams will complete in one initial game with no other device present. The team score earned will be used to seed the first knockout round of the competition.

20. During the knockout stage, two teams will compete, attempting to earn the most points in the game. The team with the most points will advance to the next round. The following rules apply to team interactions during the knockout stage:
- Only minimal, incidental contact between devices will be allowed. Reckless behavior will result in a time penalty. Devices should be robust to survive minor collisions.
 - When one team's device is attempting to secure a ball, the other team must not interfere. Striking another device while it is in the process of securing a ball will earn the interfering team the one point penalty if the ball falls to the ground.
 - If judges are not able to determine which device causes a ball to fall off the stand, then no penalty will be awarded either team.
 - Teams are allowed to play defense and block the other device from returning to their starting area or moving to a desired location, as long as there is no intentional contact.
 - Devices must stay within the outside boundaries of the 5m x 5m playing surface. If a device **entirely leaves** the playing surface (all device contact with the ground is outside the boundary lines) the team will receive an **official caution** – the team must then remain motionless for 30 seconds before being allowed to resume competing
 - Intentional *fouls* and overly aggressive behavior will be stopped by the judges. Excessive contact with the other device may result in an **official caution** – the team must then remain motionless for 30 seconds before being allowed to resume competing.

Competition Scoring Rules

21. Teams will receive a score for their initial individual round – points for all balls collected/placed, minus deductions for balls knocked off stands.
22. The initial round score will be used to seed the knockout round. In the knockout round, highest scoring team will compete against lowest scoring team, 2nd highest against 2nd lowest, etc. For teams with the same score, the tiebreaker will be the volume of the team sizing box (smallest volume is best).
23. If there is an odd number of teams in any round, the two lowest scoring teams will compete against each other, and that winner will then compete against the highest scoring team in the prior round.
24. For all subsequent knockout rounds, each winning team's score earned will be used to seed the subsequent round. If necessary, the tiebreaker will be total number of points scored in the initial solo round (if still tied, box volume will be used). Again, highest score will compete against lowest score, 2nd highest against 2nd lowest, etc.
25. Knockout rounds will continue until the final match between the top two devices. The team with the most points is the champion. If the two teams are tied after 5 minutes, the course will be reset and the teams will compete in a one minute shootout. If still tied, shootouts will be repeated until there is a winner.

Figure 1: Overview of the Playing Surface



At the start of the 5 minute game, a team's device will begin in their designated starting area, a 50 cm x 50 cm square shown in two corners of the 5 m x 5 m playing surface. Teams will score points by collecting any of the 16 balls on stands, and attempt to bring the balls back to their own starting area. Teams are also trying to avoid knocking balls off the stands onto the ground.

The sixteen stands and balls are equally spaced 1 meter apart from each other and the overall game boundaries. The balls shown in Figure 1 are all the same size, this will not be the case for the actual competition. See the rules for the range of ball sizes. Distribution of the balls used will change throughout the competition.

附錄二 (本附錄僅供參考，請以 ASME 官網公布之規則為準)

Old Guard Oral Presentation Competition

Rules and Procedures

Like all professionals, engineers must possess a well-developed ability to synthesize issues and communicate effectively to diverse audiences. Among the highlights of ASME's Student Professional Development Conference (SPDC) program is the Old Guard Oral Presentation Competition. This competition is designed to emphasize the value of an ability to deliver clear, concise and effective oral presentations, particularly pertaining to some sphere in which an engineer is or should be involved.

Each student presentation lasts fifteen minutes and is followed by a five minute "Question and Answer" (Q&A) period. First Place winners from each of the District Conferences are invited to compete at the Society level at the International Mechanical Engineering Congress & Exposition.

Each presentation in the Oral Presentation Competition must be delivered in English. The subject matter of each presentation must address a technical, economic or environmental aspect of engineering or other basic engineering theme, provided it pertains to some sphere in which an engineer is or should be involved. A major portion of a competitor's total score is based on the judges' evaluation of his/her relative capability to communicate orally, including evidence of a talent to respond effectively in the Q&A period.

A competitor may utilize any available resource but must realize that the presentation is to be an individual effort. Assistance in the use of visual aids is advisable (Powerpoint, etc.). Film clips, if used, may not exceed one-minute total duration (i.e. a maximum of one minute of each student presentation may be used for video). Film clips may not be accompanied by any recorded sound. Good practice and courtesy suggests credit be given during the presentation for any outside help related to the reported project. A written paper or manuscript is not required.

Eligibility and Requirements

To be eligible to participate, each competitor must be a Student Member who:

- a. has not yet received an engineering degree* and,
- b. has been selected by his/her Student Section or ME Department to participate; and,
- c. is a Student Member in good standing.

* Student Members who complete the requirements for their baccalaureate engineering degree, or who actually receive that degree at the end of a term, semester, or quarter a short time before a scheduled conference may still participate. These Student Members, however, must not have completed their degree requirements before December 1 of the calendar year prior to the Conference.

At least two (2) weeks before the date of the District Conference, each participant's Student Section Advisor of his/her Student Section (or Department Head, if there is no Student Section) shall advise the Student Section Advisor of the host institution and ASME Staff of the names of their competitors and titles of their presentation (ASME Staff can be reached at oldguard@asme.org).

Competition Entry

The Old Guard Oral Presentation Competitions are held locally at ASME Student Professional Development Conferences (SPDCs). Students who wish to participate must:

- Visit the Student Professional Development Conferences website.
- Choose the location of the conference he/she plans to attend.
- Complete the appropriate entry form for that location.

Students entering the Old Guard Oral Competition may not enter the Old Guard Technical Poster Competition. There is no restriction on entering the Old Guard Technical Webpage Competition..

Conduct of the Contest

Each presentation in the Old Guard Competition shall be made by one contestant. Any questions regarding procedure shall be resolved by the Student Section Advisor and District Leader before the Conference.

The Chair of the Host Student Section usually presides during the contest and ensures that there is adherence to the time schedule given in the printed program. The Presentation's duration is fifteen (15) minutes plus five (5) minutes for Q&A immediately thereafter. Any time remaining or exceeding the fifteen minutes must be added to or subtracted from the five minute discussion.

Questions may be asked by any attendee of the competition except those from the competitor's own educational institution. Each person posing a question to a speaker must stand, identify himself/herself and school, and then proceed with the question. The Host Student Section must appoint two timekeepers from two visiting student delegations. Timekeepers must be non-contestant Student Members. They are to be introduced by name and college at the beginning of each session and instructed to keep time as follows:

- At the end of twelve minutes, the first timekeeper will rise to signal to the speaker that there are three minutes remaining.
- After the speaker nods to acknowledge the signal, the timekeeper will sit down.
- At the end of fourteen minutes, the second timekeeper will rise to signal to the speaker that there is one minute remaining.
- After the speaker acknowledges the signal, the timekeeper will sit down.
- At the end of fifteen minutes, both timekeepers will rise together and remain standing until the speaker concludes the presentation.
- Both timekeepers will rise at the end of five minutes to terminate the discussion period.

Judging and Scoring Criteria

Each contest is to be judged by the same individuals throughout, preferably ASME members of mature judgment, who are selected along with one or two alternates. Local ASME Sections and District Leaders will be pleased to cooperate in the search for judges. As an alternative, some Districts use one faculty member and one student from each represented school as judges, with the faculty and student not judging their own presenter(s).

The Presentations will be judged in four categories; Content, Organization, Delivery and Effectiveness, and Discussion.

Content

To what extent is the subject of interest to a technical audience? Is credit given for source of material or contribution by others? How much knowledge of subject was exhibited? Is work independent and original? Is the subject technical or general in nature?

Organization

Is there any novel approach to the subject? Is there sufficient background information provided in order to introduce the audience to the subject? Are the facts developed in logical and continuous sequence? Is there a definite conclusion, and was it adequately based on the facts or data presented?

Delivery and Effectiveness

Are the words distinctly pronounced and was proper volume used to be heard by all? Is proper English used, and is the vocabulary sufficient? Is personal appearance appropriate? Are there any distracting mannerisms? Is the manner of delivery (conversation, memorized, read from manuscript) satisfactory? If visual aids are used, how effectively are they used? Is the presentation within the time limit of 15 minutes allowed?

Discussion

Is the presentation evoking spontaneous questions from the audience? Are the questions indicating the need for clarification of facts presented, or were they merely of the type seeking additional information? How readily and with what self-assurance did the speaker answer the questions? Are the answers indicating knowledge of the subject beyond that disclosed in the original presentation? Is the ability to think clearly demonstrated?

Judges are to use the Scoring Sheet provided (see Appendix A) as the basis for judging all the Student Professional Development Conferences. The Scoring Sheet has been developed for the convenience of the

judges in evaluating the presentation in competition. Scoring Sheet samples should be sent to the judges for familiarity ahead of the contest. Scoring Sheets are not to be given to the presenters. Judges should be informed that they must agree to serve through the entire contest, be it one or two days.

Judges are encouraged to fill out the Feedback Sheet (see Appendix B) on each student’s presentation and give them to the contestants at the conclusion of the presentations. The Feedback Sheet has been developed for the convenience of the judge to assist him/her in this process.

District Awards and Recognition

Each Student Member that participates in the District competition will receive an ASME membership upgrade to Member, compliments of the Old Guard.

Judges at each conference are to select First, Second, Third and Fourth Place winners based on the criteria specified in the competition score sheet. A Fifth Place winner may be selected, at the judges’ discretion. An additional award is available for “Best Technical Content.” This prize may be given to one of the top four winners or any other presenter at a conference.

Student Conference (SPDC) Awards		Society Awards (Finals at IMECE)	
First	\$500.00 plus a trip to compete in the final competition at ASME's IMECE	First	\$2,000.00
Second	\$150.00	Second	\$1,500.00
Third	\$100.00	Third	\$1,000.00
Fourth	\$50.00	Fourth	\$500.00
Fifth		\$25.00	
Technical		\$50.00	

Competition Finals

Each ASME District is entitled to select one (1) Old Guard Oral Presentation finalist at its Student Professional Development Conference (SPDC) to represent the District at the finals of the Old Guard Oral Presentation Competition. Finals take place at the International Mechanical Engineering Congress and Exposition (IMECE) in November. North American Districts choosing to have more than one Student Professional Development Conference in a given year are entitled to select a maximum of two (2) Oral Competition winners, but no more than one per conference.

No substantial changes from the presentation given at the District Student Professional Development Conference may be made for the finals at IMECE. Any substantial change of title or major revision of the presentation given at the District SPDC will result in disqualification and may result in loss of travel reimbursement.

The final competition at IMECE is judged by a panel of volunteers from within the ASME community, based on the same criteria as the District events. The top four presenters among the finalists are eligible for Society

awards. The winners are also recognized at Society events and featured in various ASME publications and web sites.

Adopted by the Old Guard Committee

August 11, 2011

附錄三

2019 年國研盃智慧機械競賽(ASME Taiwan SPDC)報名流程

1. 報名時間：即日起至 2019 年 2 月 25 日截止。
 - A. 填寫報名及基本資料表單 <https://reurl.cc/Q6dyp>
 - B. 填完表單後請掃描所有參賽人員，學生證正反面，並寄到 asmetwspdc@gmail.com 信箱中，主旨: "xxxx 隊伍 成員學生證"
 - C. 繳交保證金 1000 元，請至下列繳費系統填寫資料與繳款，
 - D. **2019 年國研盃智慧機械競賽 (ASME Taiwan SPDC) 報名訂金繳費系統**
 - E. 線上資料填寫完成後，請選擇「信用卡繳費」完成繳費程序，或「列印收費單」至全省超商門市（7-11、全家、OK、萊爾富）繳費；亦可利用自動提款機、網路銀行、網路 ATM 轉帳繳費（需自付手續費）。
 - F. 註：因超商繳費入帳時間需費時約 5-7 日，利用全省超商門市（7-11、全家、OK、萊爾富）繳費者，若有問題煩請一週後，再來電 (賴小姐 (03-5779911 轉 656)) 查詢，謝謝！
 - G. 保證金一隊 1000 元整，需準時報到，並全程參與活動，在頒獎結束後，退還全額保證金 1000 元。
 - H. 報名後約三到五天之間會傳簡訊至隊長手機確認報名，如果沒有收到訊息，請聯絡：
 - I. 總召：張振宇 0953878352
 - J. 副召：李冠廷 0933720650
2. 填寫報名及基本資料表單
<https://reurl.cc/Q6dyp>
3. 填完表單後請掃描所有參賽人員，學生證正反面，並寄到 asmetwspdc@gmail.com 信箱中，主旨: "xxxx 隊伍 成員學生證"
4. 報名後約三到五天之間會傳簡訊至隊長手機確認報名，如果沒有收到訊息，請聯絡
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