

## 2016 美國機械工程師學會(ASME)



### 學生競賽(SPDC) 國內賽簡章

#### 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 Professional Development Conference, SPDC)共分成三個層級，分別為國內賽、區域賽和總決賽，每個階段的優勝者可以代表參加下一層級的比賽，本次 ASME SPDC 競賽屬於國內賽，成績優勝隊伍可晉級參加 ASME 在世界上數個地點所舉辦區域賽的參賽資格。若在區域賽競賽中再次獲得佳績，則可參加 SPDC 全球總決賽（為 ASME International Mechanical Engineering Congress & Exposition (IMECE)會議中一個項目），與來自全球各區的優勝隊伍一較高下。

#### 貳、競賽宗旨：

- 一、提供培養專業機械工程師、領導人的技術平台。
- 二、創造國際間工程技術分享與交流。
- 三、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



協辦單位：國家實驗室研究院 儀器科技研究中心



承辦單位：美國機械工程師學會 清華大學學生分會

贊助單位：美商國家儀器股份有限公司 台灣分公司



財團法人自強工業科學基金會



國立清華大學 動力機械工程學系

#### 肆、競賽方式：

本次 ASME SPDC 競賽屬於國內賽，成績優勝隊伍可晉級參加 ASME 在世界上數個地點所舉辦區域賽的參賽資格。若在區域賽競賽中再次獲得佳績，則可參加 SPDC 全球總決賽（為 ASME International Mechanical Engineering Congress & Exposition (IMECE)會議中一個項目），與來自全球各區的優勝隊伍一較高下。

#### 伍、競賽項目：

國內賽包含二種項目：

##### 1. Student Design Competition 學生設計競賽：

2016 年 SPDC 設計競賽題目為 Manufacturing the Future。請依照題目設計出作品進行參賽。詳細規格請參照附錄一。

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，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。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。報名表請見附錄三。

### 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。

美商國家儀器並提供學生設計競賽參賽隊伍嵌入式系統 NI myRIO 的免費租借服務，租借辦法請參照附件四。myRIO 相關資訊請參閱下方連結

myRIO - Project essentials guide：<http://www.ni.com/white-paper/14621/zht/>

myRIO - 3 hours seminar manual：<http://goo.gl/VrC5nO>

myRIO - 線上教學短影片：<http://taiwan.ni.com/myrio/video>

### 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。

### 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)

美商國家儀器特別獎：30,000 元（一名，得與上述獎項合併領取。本獎項主要頒發給參賽作品中有使用到美商國家儀器相關產品之隊伍。若隊伍使用免費租借之 NI myRIO，獲獎隊伍可保留 NI myRIO，細節請參照附件四。）

## 二、演講競賽：

第一名：5,000 元

第二名：3,000 元

## 拾壹、競賽時間與地點：

2016 年 3 月 6 日 星期日。

詳細時程安排會公布於競賽網站上

國立清華大學人文社會學院（新竹市東區光復路二段 101 號）

交通資訊：<http://my.nthu.edu.tw/~adms/body/traffic.htm>

（如遇不可抗拒之因素，主辦單位得更改競賽時間與地點）

因校內只能步行或開車，主辦單位會於人行道上貼示路標，從光復路大門步行至人社院約需 20 分鐘，從寶山路大門步行約需 10 分鐘，請參賽者自行估計交通所需時間，敬請見諒。

主辦單位提供參賽者午餐

## 拾貳、報名辦法：

報名時間：即日起至 2016 年 2 月 1 日截止。

報名表：請見附錄三。

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。

報名時請使用郵局現金袋郵寄。內含：報名表、參賽成員學生證正反面影本、保證金（現金袋內現金只接受鈔票，如有收據請妥善保管），詳細填寫後寄至：

(30013) 新竹市清大郵局 2-264 號信箱

## 拾參、聯絡資訊：

ASME 學生競賽(SPDC)國內賽 總召 黃思瑜 0911-160-913 [cocohuang.syh@gmail.com](mailto:cocohuang.syh@gmail.com)

ASME 學生競賽(SPDC)國內賽 副召 林展均 0975-667-567 [dade60103@gmail.com](mailto:dade60103@gmail.com)

## 拾肆、競賽網站：

相關資訊會公布在網站上，請密切注意。

Facebook 搜尋：ASME SPDC 台灣國內賽

## 拾伍、違規事項（違規者將不得退還保證金 1000 元）：

1. 參賽者所設計的裝置一次只能裝一張A4紙，而且只能將紙裁切或折疊，不得進行其他動作。
2. 在將A4紙放入裝置前，不能對紙做出任何動作。
3. 將A4紙放入裝置後，不得在紙上添加任何東西。

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# American Society of Mechanical Engineers

## Student Design Contest

### Manufacturing the Future

#### 2016 Challenge

### Design Problem Description

Manufacturing plays an essential role in innovation. The field of manufacturing accounts for the majority of private research and development spending and employs a significant percentage of engineers [1]. In order for society to benefit from the latest advances in technology, skilled engineers and novel manufacturing techniques will be required.

This year's challenge is to build a compact engineering system in order to manufacture a projectile from a standard sheet of paper and test it by propelling it a maximum distance. The testing will take place on a competition course that consists of a 3 meter wide strip along the length of the room, with a 1.5-m x 3-m setup area for your system at one end.

The engineering design constraints and evaluation procedures for your device are as follows:

In order to verify the feasibility of your design concept, you must build and test a prototype engineering system which will be capable of fabricating three projectiles, each from a single sheet of paper, and of propelling all three the maximum possible distance down the course within a five-minute (300 second) time limit.

At the start of the competition, your system must be packed in a rectangular box provided by your team.

In the five-minute competition period, you will unload your system from the box, assemble your system if necessary, and feed in three sheets of paper.

Your system will be placed onto the floor for the competition and must not touch the floor outside the setup area.

The height of the assembled system must be less than 30 inches (76.2 cm).

The objects manufactured by your system may make use of the principles of aerodynamics.

### Design Specifications:

1. Engineering systems are required to have zero on-board emissions. Your system must be powered by a battery or batteries.
  - a) You may choose from any type of battery, but be sure to consider any transportation restrictions which may apply to the batteries and how it may affect your team's travel to the regional and final competitions.
  - b) You may use rechargeable batteries.
  - c) Other stored energy sources (spring or other potential energy for example) are only allowed if these energy sources finish the competition at the same energy as they started the competition.
2. Your system must be designed to manufacture projectiles from single sheets of 20-lb, A4 paper. The paper may not be modified before manual loading, and your device may only fold or cut the paper -- no additional material can be added to the sheet of paper after it has been loaded into your device.
3. Your system must be designed such that the paper is manually loaded one sheet at a time, after the prior sheet has been launched.
4. With the exception of loading each sheet of paper, interfering with the operation of the system after the first sheet has been loaded will result in your team being disqualified.
5. The ceiling in the competition space may be as low as 8 feet (2.44 m) or higher depending on the competition location. Your system should be adjustable to accommodate this.
6. The distance traveled by each projectile will be measured as the distance along the 3-m wide strip to the point where the projectile first strikes the ground or any other object.

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[1] Kurfess, Thomas (2013) "Why Manufacturing Matters," ASME.org.

- a) If the projectile strikes the wall at the end of the competition space opposite of the setup area, the total length of the strip will be counted for the distance traveled.
- b) If the projectile lands outside the 3-m wide strip, the point where the projectile first strikes the ground or any other object will be used to determine the distance traveled. This distance will be measured by extending a line perpendicular to the strip from the point of impact.
7. The volume of the system will be measured based on the size of the rectangular box in which your system is initially packaged. You may construct a custom rectangular box but the volume will be calculated from the maximum length, maximum width, and maximum height dimensions of the box.
- Each team's score will be calculated from the total distance traveled by the three projectiles and the volume of the box in which the system is initially packaged.

Scoring is based on the following equation:

$$S = \frac{\text{distance}_1 + \text{distance}_2 + \text{distance}_3}{\text{volume}}$$

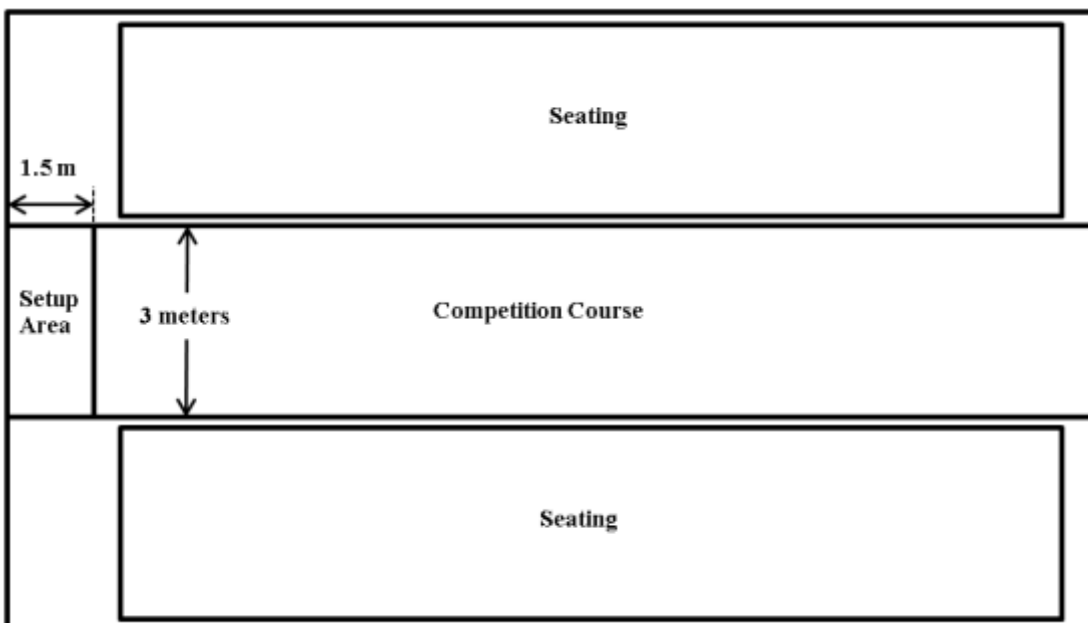
where:

- distance for n = 1, 2, 3 is the distance traveled by the nth paper projectile
- volume is the total measured volume of your system based on the inside dimensions of the box in which it is initially packaged
- dimensions will be measured in meters, the units of S will be m<sup>2</sup>.

Relevant Resources:

- Paper Airplane Building Machine:
  - <https://www.youtube.com/watch?v=TDiIOTjyHzU>
- Paper Airplane flight of 266 feet, 10 inches
  - <https://www.youtube.com/watch?v=wedcZp07raE>

Room Arrangement:



Room should be (i) as long as possible and (ii) have as high a ceiling as possible.

There will be awards for the following:

- 1st place: Maximum Total Score (based solely on the previously stated S equation)
- Best Use of Advanced Manufacturing (optional for competitors; will be awarded at conference judges' discretion)
  - A one page report is to be submitted by the team prior to the Student Professional Development Conference. Judges at each competition will provide specifics regarding submittal timing. The report will explain how the team used Advanced Manufacturing in the design of their system.
  - Judges will ask teams who have submitted reports any necessary clarifying questions during normal pre-judging period at the competition.
- Best Use of Predictive Design and Simulation Tools (optional for competitors; will be awarded at conference judges' discretion)
  - A one page report is to be submitted by the team prior to the Student Professional Development Conference. Judges at each competition will provide specifics regarding submittal timing. The report will explain how the team used Predictive Design and Simulation Tools in the design of their system.
  - Judges will ask teams who have submitted reports any necessary clarifying questions during normal pre-judging period at the competition.

# 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](mailto: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

## 2016 年美國機械工程師學會(ASME)學生競賽(SPDC)國內賽報名表

### 一、參加項目：

- |                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Student Design Competition 設計競賽<br>隊伍名稱：<br><input type="checkbox"/> Old Guard Oral Presentation Competition 演講競賽<br>※附註：設計競賽組隊報名人數至多四人，演講競賽限以單人報名。 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 二、參賽名單：

指導教授		姓名		
		E-mail		
隊長	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	

※附註：若為單人報名，填寫隊長欄位即可。

### 三、注意事項：

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"><li>1.隨報名表請附上參賽成員學生證正反面影本以及保證金(一隊 1000 元整)。</li><li>2.每參加一項競賽請填寫一份報名表。</li><li>3.報名日期：即日起，至 2016 年 2 月 1 日截止。</li><li>4.詳細填寫後寄至：<br/>(30013) 新竹市清大郵局 2-264 號信箱</li><li>5.聯絡人：<br/>ASME 學生競賽(SPDC)國內賽 總召 黃思瑜 0911-160-913 <a href="mailto:cocohuang.syh@gmail.com">cocohuang.syh@gmail.com</a><br/>ASME 學生競賽(SPDC)國內賽 副召 林展均 0975-667-567 <a href="mailto:dade60103@gmail.com">dade60103@gmail.com</a></li></ol> |
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## 2015 美國機械工程師學會(ASME) 學生競賽(SPDC) 國內賽 美商國家儀器科技 (NI) myRIO 借用辦法

### 國內賽基本資訊：

- 一、競賽時間：2016 年 3 月 6 日
- 二、競賽地點：國立清華大學
- 三、主辦單位：美國機械工程師學會 台灣分會
- 四、協辦單位：國家實驗室研究院 儀器科技研究中心
- 五、承辦單位：美國機械工程師學會 清華大學學生分會
- 六、贊助廠商：美商國家儀器科技股份有限公司
- 七、競賽網站：Facebook 搜尋 ASME SPDC 台灣國內賽

### 借用辦法：

#### 一、申請資格：

已報名參加 2016 ASME SPDC 國內賽之隊伍。

#### 二、借用儀器設備：

由美商國家儀器根據各隊伍所提交之構想書進行選核，借用 NI myRIO 控制器一套。

NI myRIO 控制器之相關資訊參閱下列網址：

myRIO - Specifications: <http://www.ni.com/myrio/zht/>

myRIO - Project essentials guide : <http://www.ni.com/white-paper/14621/zht/>

myRIO - 3 hours seminar manual : <http://goo.gl/VrC5nO>

myRIO - 線上教學短影片：<http://taiwan.ni.com/myrio/video>

#### 三、申請方式：

- 欲申請 myRIO 借用之競賽隊伍，請於 104 年 12 月 31 日（四）前將競賽構想書（附件五），以電子郵件方式寄至美商國家儀器姜長青工程師(email: [chang-ching.chiang@ni.com](mailto:chang-ching.chiang@ni.com))，逾期恕不受理。
- 競賽構想書由美商國家儀器科技全權選核，選核標準將以構想書內容之創新性、實用性、可行性、與完整性為主。收件後採隨到隨審，於 1 週內完成審核和 myRIO 寄件程序。

#### 四、本補助辦法未盡事宜，主辦單位保留隨時解釋、修正內容之權力。

2016 年美國機械工程師學會(ASME)學生競賽(SPDC)國內賽 競賽構想書

競賽隊伍名稱				
指導教授	姓名		連絡電話	
	學校/科系		E-mail	
隊長	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	
隊員	姓名		連絡電話	
	學校/科系		E-mail	

競賽平台構想概述(至多 2 頁，含圖片)：

技術特點及預期成果(至多 2 頁，含圖片)：