

2018 Design and Build

SCHOOL OF MECHANICAL ENGINEERING

As future engineers, you will be consistently asked to do the impossible, the 'never before seen' and all whilst being sleep deprived and running on LOTS of coffee.

Your team's objective is to build a mechanical device to bowl a bowling ball for a game of ten pin bowling. The competition will be based on standard ten pin bowling rules. Teams will compete and progress through to the finals based on their scores. You will work in teams of between 8 and 12 people, each coordinated by a current 4th year mechanical engineering student (team captain). The remainder of your team will comprise of 1st, 2nd, and 3rd year mechanical engineering students.

Main Requirements & Regulations

1. The bowling device will be placed within a defined launch area. A starting horn will be sounded, indicating a 5-minute launch period within which the ball can be bowled (with judges' approval).
2. The ball **MUST** begin at rest and only be propelled by mechanical potential energy (i.e. without any electrical or chemical assistance).
3. All energy must be generated within the launch period and only by hand.
4. The final firing of the device may be released or triggered by hand, but must not be assisted in any way.
5. The bowling ball launch device, prior to launch, must be strictly no larger in size than the following dimensions of 70 x 70 x 70 cm (length x width x height).
6. Scoring each round will be based on the points system describe below, and will be at the discretion of the judges. The competition winner will be the team who scores the highest from the grand final game.
7. A short report must be submitted at 10:30am the competition morning detailing your design process. This will be marked on the day of the competition and a prize awarded accordingly.
8. The competition judges have the final say in ensuring that the intent and good nature of the competition has been adhered to and reserve the right to determine how the scoring is interpreted and how points are awarded.
9. A bowling ball will be supplied for use in the games. The ball must be separated from any attachments by the foul line.
10. The launch devices must **NOT** be hazardous to any of the other competitors, bystanders or the judges. Devices deemed dangerous by the judges will be disqualified.

For comprehensive details and elaboration of rules please see the last page.

Competition Details

Date: Friday 23 / 02 / 18

Time: 10:00am – 10:30am for practice, 10:30 for competition start

Location: Walter Young Garden (see map on final page)

You will have one week to plan, develop and construct your design prior to the competition. It is your responsibility to liaise with your team members throughout the preparation week! (Beginning 19th Feb).

There will be approximately 30 teams. Each team will compete in heats of two frames (... bowling lingo) leading up to the finals. The frames will take place with four teams at a time. The top eight teams will progress through to the semi-finals. The top four teams from the semi-finals will compete in the grand final. The finals will only consist of one frame and the scores will be independent for each frame.

AND MOST IMPORTANTLY, there will be a free BBQ lunch for participants (12:00pm – 1:00pm)

Scoring

Scoring during the tournament will be based on ten pin bowling rules, modified for the limited number of frames.

HEATS

1st FRAME

Each team will launch two balls, unless all pins are knocked over with the first ball STRIKE.

2nd FRAME

Each team will launch two balls, unless a STRIKE or SPARE is scored. In this case the team will launch three balls.

FINALS

Each team will launch two balls, unless a strike or spare is scored. In this case the team will launch three balls

The number of pins knocked down in each frame will be the score (plus adjustments for strikes and spares – see below), which will accumulate for the two frames.

Strike: For the heats, if a strike is scored in the first frame (all ten pins knocked down with the first ball) the score will be set at 10, however it will remain open until the next frame. The total score for the first frame will then become 10 plus the count for the next two balls. The score from the second frame will simply be the second frame count, unless a strike is scored in the second frame. In this case two more balls will be bowled for that frame. The score for the second frame will then be the count from all three balls. For the finals, there will only be one frame for each round. If a strike is scored, then the team will deliver three balls (as per rules for the second frame of the heats).

Spare: Any team who bowls down the remaining pins in a frame with a legally delivered second ball has scored a spare. The count in the first frame of the heats will then be set at 10, but will remain open until the first ball in the second frame. The score will then be 10 plus the count for the first delivery. When a spare is scored in the second frame, a third ball will be bowled. The score for the second frame will then be the count from all three balls. For the finals, the rules for the second frame of the heats will apply.

The maximum score possible from the heats is 60 and in each of the finals rounds it is 30.

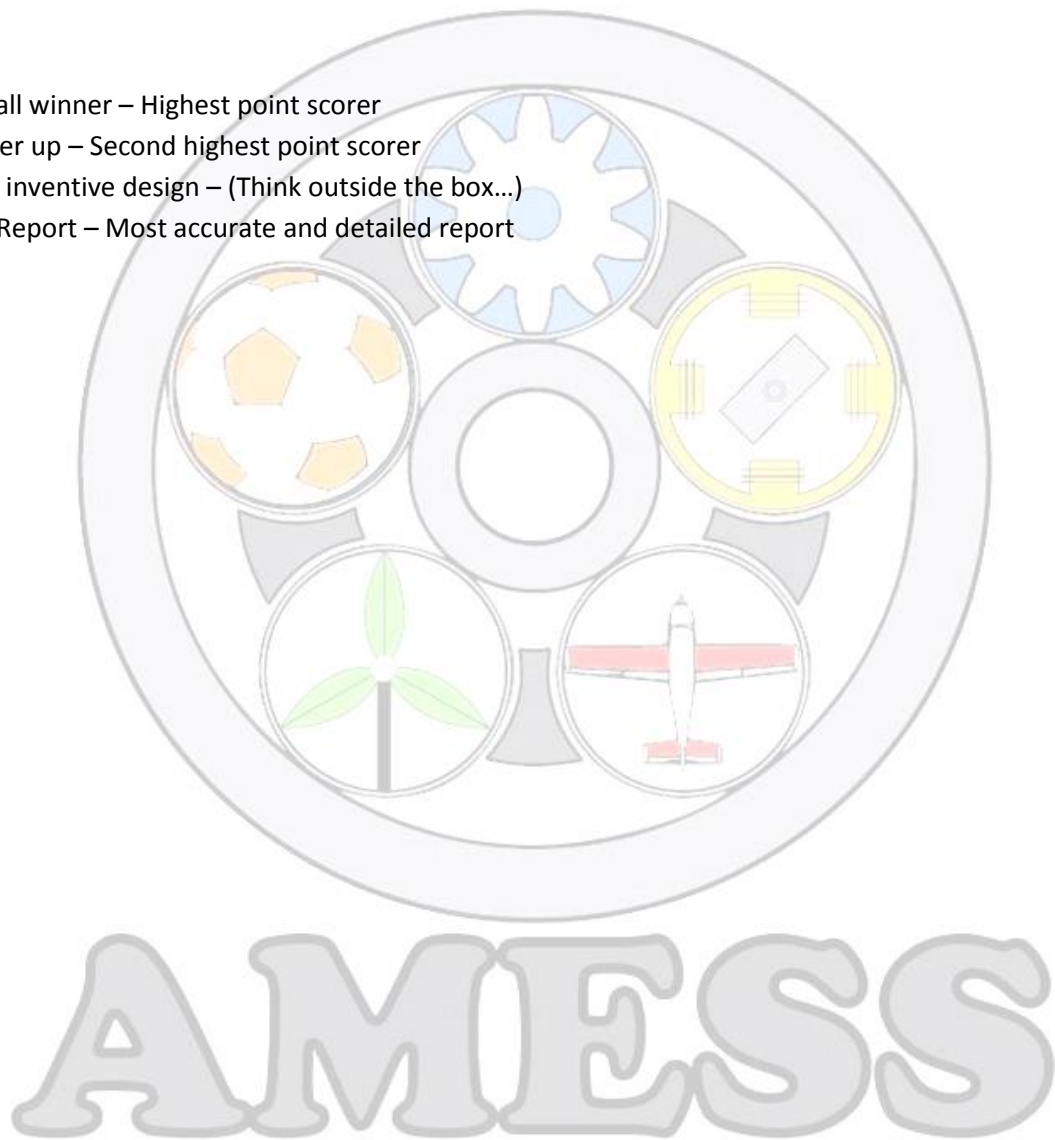
Tips

Below are some potential considerations for your groups 'research' phase:

1. Investigate different release mechanisms
2. Investigate different ways of storing potential energy
3. Consider...
4. Think outside of the box!

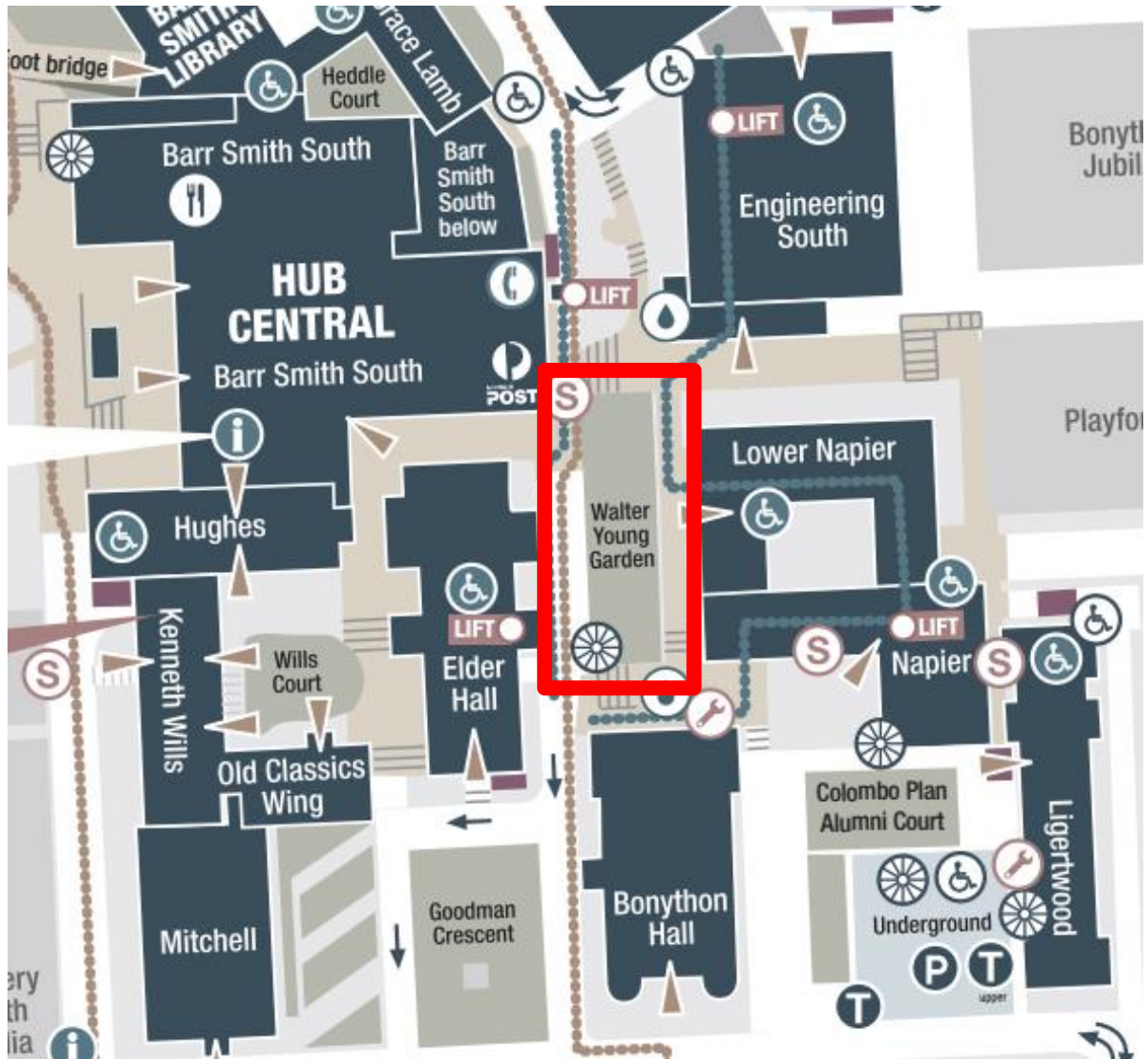
Prizes

1. Overall winner – Highest point scorer
2. Runner up – Second highest point scorer
3. Most inventive design – (Think outside the box...)
4. Best Report – Most accurate and detailed report



Location of the Walter Young Garden

The lawns are in front of the Lower Napier Building, or just to the left as you come down the stairs from the Hub.



Event contact

AMESS Committee: amess.uofa@gmail.com (Primary)

Dr Zhao Tian: zhao.tian@adelaide.edu.au (Secondary)

Comprehensive and final rules:

1. Judges have the final say in ensuring that the intent and good nature of the competition has been adhered to. This means that if rules have been skirted around, or loopholes mischievously exploited, judges may disqualify entries at their discretion.
2. All the material for the construction of the craft should cost no more than AUS \$50.00 (fifty Australian dollars) per group. An AUS\$50 Bunnings gift card will be available for collection for each team from Tuesday. Receipts for materials must be produced. Craft with costs greater than AUS \$50.00 will not be reimbursed at all. Receipts will be inspected by judges of all winning craft to ensure materials contained in craft actually match materials obtained.
3. You will be required to submit a short report to the judges at 10:30 am the morning of the competition (Friday 23rd Feb). This will be marked on the day of the competition and a prize awarded accordingly.
4. The bowling ball launch device, prior to launch, must be strictly no larger in size than the following dimensions of 70 x 70 x 70 cm (length x width x height).
5. The launch device must be exclusively mechanical powered. No other forms of power generation are allowed.
6. The use of stored mechanical potential energy is allowed. However, the potential energy must be generated by hand and must not use any other non-mechanical methods.
7. The launch device must have a mechanical trigger/release mechanism to active it. This trigger may be activated by hand, but no assistance to the launch of the ball is allowed.
8. No assistance by or from any form of living animal is allowed (such as using a pigeon to carry the bowling ball).
9. The launch device must remain in the launch area except where allowed by rules 18 and 19.
10. Your launch device will need a creative name and this must be displayed somewhere on the device.
11. The length of the bowling lane from the edge of the launch area to the head pin will be 10 m.
12. The bowling lane will be 1 m wide. The ball must land within your team's lane to be counted as a legal launch.
13. The pins will be placed in standard triangle configuration with 18 cm spacing between pins. The pins will be 23 cm tall and have a max diameter of 8 cm. The pins will weigh around 600 g.
14. The launch area will be grassed. The pins will be seated a hard flat surface, which will be laid on top of the grass.
15. There will be a foul line 4 m from the edge of the launch area (i.e. 6 m from the head pin).
16. A bowling ball (14 cm in diameter and 120 g in mass) will be provided for use each frame.
17. The ball does not need to always remain in contact with the deck (i.e. it can be launched through the air towards the pins), but the ball should not be above the deck for more than 5 cm (i.e. the distance between the bottom of the bowling ball and the deck is always less than 5 cm).
18. The bowling ball may be assisted by attachments to the ball from the launch device up until the foul line. After this point, the ball must be unaided. The attachments must remain behind the foul line and within the team's bowling lane.

19. The attachments must weigh no more than 400 g and be no larger than 30 x 30 x 30 cm (including the ball diameter).
20. Direct modifications to the ball itself are not allowed.
21. You will not be allowed access to the bowling alley until the morning of the event and practice will take place at set times based on your team number.
22. Several practice balls will be available to those teams who make use of the practise time from 10:00 am to 10:30 am.
23. No ball or pins will be supplied prior to the competition day.
24. Judges reserve the right to determine how the scoring is interpreted and how points are awarded.
25. In the event of a tie during the heats, the progressing teams will be decided based the number of pins knocked down by the first ball of the two frames (that is, if several teams have the same total count, the team who knocked down the most pins in their first balls of the frame will be taken as the winner). In the finals, an additional ball will be delivered by the tied teams in that final to decide the winner.
26. Launch devices must NOT be hazardous to any of the other competitors, bystanders or the judges. Devices deemed dangerous by the judges will be disqualified.
27. The launch devices must meet all of the inclusive criteria to be successful.



AMESS