



## ASME STUDENT DESIGN COMPETITION

**Official responses to questions supersede original competition statements as well as any earlier question responses where there is contradiction. The questions are numbered sequentially as responded to, where Answer 1 is the earliest response.**

Information about the ASME E-Fests can be found at: [efests.asme.org](https://efests.asme.org)

*(Questions will answered about the 2024 ASME SDC until February 1, 2024)*

### Q&A Update September 29, 2023

#### Question 1:

- Do you have the obstacle CAD files to share so I can 3D print them for our local course? Obstacle D, E, G, H specifically, and the ramp to get to the elevated platform.
- Does the robot need to travel under the platform for Hole #4? Assuming they miss and need to get to their ball on the other side of the platform? Or can they reset the ball to tee off again?

#### Answer 1:

- Yes, .stl files of all obstacles will be made available for manufacture to all competitors. See the SDC website to access these. Teams should recognize that the fabricated obstacles at competitions may have slight variations.
- Teams may choose to play the golf ball where it lies or have the caddy transport it back to the designated tee with approval from the judges (see Rules 15, 22 and 32). Transporting the golf ball back to the tee counts toward the scoring as one stroke. However, the device must be capable of accessing any part of the field under its own capability – it may climb over barriers. For example, during the elimination round, the first stroke must be made from Tee #1 (see Rule 20), and the device must traverse the field without physical assistance from the team.

**Question 2:**

- How do we move the robot from tee #6 to tee #7? Are we supposed to take the bot over the wall using big tires or something else because increasing the size of the wheels may cause problem in moving the bot from below the elevated surface between tee #5 and tee #4.

**Answer 2:**

- The “wall” between tees #6 and #7 will be a standard 2x4 lumber on end. Teams may choose to pass over or under the elevated surface between tees #4 and #5. How the device navigates obstacles is part of the design challenge.

**Question 3:**

- What are the dimensions of the tees? Are the tees flat mini-golf tee mats with an indent, t-shaped stands, or do the golf balls start directly on the ground within a marked circle?
- Once we have putted the golf ball off the tee, are we allowed to have more than momentary contact with the ball? i.e. can we "hold" or center the ball with a mechanism prior to the putting action (without engaging the robot's travel function).
- Can we use Pneumatics (with proper safety precautions)?

**Answer 3:**

- Golf balls will be placed directly on the ground within a marked area at each of the tee locations.
- See the rules for legal putting given in “Expected Device Functionality.” Devices may secure the ball before making contact with the ball as long as the ball does not touch the device after impact. The stroke ends when the device breaks contact with golf ball.
- Pneumatics are allowed as long as they meet the other requirements in the rules (for example rule #4). Safety precautions are expected but ASME SDC does not provide specific safety requirements regarding pneumatic systems.

**Question 4:**

- We're interested in competing in the SDC competition this year, and had several questions regarding some specific rules. On the website, it says that an official Q&A forum will open "in September", but as we're getting closer to the end of the month we wanted to know when the forum will open up.?

**Answer 4:**

- The Q&A forum is now posted, please direct all questions to [sdc@asme.org](mailto:sdc@asme.org)

**Question 5:**

- Can we use pneumatic systems?
- Is having stored air within the rules?
- Can you define the rules for chipping in more detail?
- Can we hit the ball into our own system in order to elevate the ball?

**Answer 5:**

- Pneumatics are allowed, see rule #4.
- Teams may not start with any stored mechanical energy such as compressed air, but must compress any air during the competition. See rule #4: "...any stored potential energy at the start of the device's duty cycle must be returned to the original state under its own power by the end of each run."
- Chipping the ball should follow all the rules for legal putting given in "Expected Device Functionality." The primary difference is that the chipped golf ball will travel in the air, not roll along the ground after being struck.
- After the device makes contact with the ball and imparts energy, the ball must not touch the device again until the next attempt to putt or chip the ball at the next location.

**Question 6:**

- The rules state:  
"Students participating in the competition must be undergraduate engineering students, including community college students and students in associate degree programs (any engineering discipline is allowed) and must be ASME student members"

Does the wording suggest that only engineering students would be interested, emphasizing that all disciplines can participate- or is it strict that the students must be

engineering and cannot be (for example) a business student that has robotics experience?

**Answer 6:**

- While the primary audience is undergraduate engineering students, we welcome all undergraduate students who are interested in participating, regardless of their major.
- All students who wish to participate must join ASME, regardless of their major.
- This is a competition intended for undergraduate students only. Graduate students who wish to be involved in the competition are welcome to reach out to ASME to enquire about finding a role.

## **Q&A Update October 4, 2023**

**Question 7:**

- Can the robot pick up the ball and launch it?
- And if so, once the ball is picked up is the robot allowed to move to aim?
- Also, Answer #1 says the STL files are available on the SDC webpage, can you confirm that and share the link?

**Answer 7:**

- Yes, provided that the travel function is disengaged while the device is in contact with the golf ball.
- The robot may pick up the golf ball to initiate the stroke, actuate various functions to aim the golf ball, and then launch the ball to complete the stroke (once contact with the golf ball is ended). However, the travel function specifically may not be engaged during the stroke, so any tertiary actuation must not be part of the device's travel function.
- Yes, the .stl files are available for download in a zip file at the SDC [website](#).

**Question 8:**

- In between holes, do we need to transport the golf ball to the next tee or does the ball get placed for each hole?
- Obstacle I says it is a target outside of the field, will that target have raised edges or is it something like a flat tape circle?

- In response to question 3 in the Q&A, you said “Devices may secure the ball before making contact with the ball as long as the ball does not touch the device after impact.” Can you clarify what you mean by securing the ball before making contact with it? Are we allowed to stay in contact with the ball while it is moving so long as the travel function is not moving?

**Answer 8:**

- See Rule #21. During the Initial testing round, teams may choose to either play the golf ball where it lands or have the team designated caddy manually transport it to a tee of their choice with the approval of the judges (see Rule 15). Transporting the golf ball back to a tee while trying to complete an obstacle counts toward the scoring as one stroke. Once an obstacle has been completed or all the strokes have been used up, the golf ball will be manually placed at the next obstacle’s tee without a stroke penalty. The team’s device must move itself to that obstacle.
- The specifics will depend upon the field fabricators at the venue. Obstacle I may indeed be a tape circle, or it may be a mat with slightly raised lips. Please be prepared for minor variations such as this.
- The robot may make contact with the golf ball (up to and including picking it up), to initiate the stroke, actuate various golf ball aiming functions or move it about the device, and then launch the ball to complete the stroke (once contact with the golf ball is ended). However, travel functions must not be engaged during the stroke, so any device action taken while in contact with the golf ball must not be part of the device’s travel function.

## **Q&A Update October 11, 2023**

**Question 9:**

- The rules state that the golf ball may be manipulated about the device as long as the travel function is not engaged. Does this involve turning?

**Answer 9:**

- If the “turning” motion in question is part of the device travel function that assists the device in traversing the field, then no. However, if the “turning” motion is a separate function from the travel capabilities, then it is indeed permitted to have a component hold and “turn” the golf ball to aim the launch.

#### Question 10:

- What is the terrain being used? Is it similar to actual grass or is it more like turf? Also how tall is the grass/turf?
- In Figure 6 (Obstacle E Detailed View), the distance between the ground and the bottom of the rocking arm is listed to be 1.95 inches while the distance between the ground axle of the rocking arm is listed to be 1.04 inches. Visually in the Figure, the latter distance seems larger than the former distance. Are the listed measurements in Figure 6 correct? If not, what are the actual dimensions?
- As California State University, Northridge is located in southern California, we would like to know the location where the competition will be held so that our team can manage the process and cost of traveling. From my understanding, an official location has not been picked for the competition. With that being said, is there a general time range on when we will know the location?
- For tee #7, the appearance of the terrain resembles sand; however, we are not sure if the actual terrain is indeed sand. Can we have confirmation about the terrain at this tee?

#### Answer 10:

- The specifics of the terrain will depend upon the field fabricators at the venue. The terrain may range from carpet, to turf, to flooring, etc. Please be prepared for variations such as this.
- *Dimension correction:* The distance between the ground and the bottom surface of the arm is ~1.06" (27 mm), and the distance from the ground to the rotational axis of the bearing is ~1.95" (49.6 mm). The .stl files of the obstacle are available for [download](#) if more specific dimensions are desired.
- ASME is currently working to confirm and finalize location(s) that will host the SDC competitions. As soon as this information is made available, and announcement will be made on the [ASME SDC website](#).
- There will indeed be actual sand around tee #7.

## Q&A Update November 9, 2023

#### Question 11:

- The STL for the Tollbooth is mirrored. Is this the intended orientation for the tollbooth?

- Are the field pieces going to be fixed to the field? If not, will there be a penalty for moving the obstacles with just the ball?

**Answer 11:**

- The intended orientation is that which is shown on the field rendering (i.e. the motor housing will be against the side wall). In some event locations, there may be multiple fields, some of which could have a mirrored layout due to space/safety considerations.
- The obstacles may or may not be fixed in place, depending on the substrate utilized by the competition venue. If the golf ball strikes the obstacle in such a way that it moves, the team may choose to leave it in the new orientation or ask a judge to return the obstacle to its original position. If an obstacle becomes unplayable, a judge will return the obstacle to its original position without exception (ex: If Obstacle D is knocked over, it will be placed upright so the team may try again). Additionally, see Rule 42: Obstacles may not be intentionally moved by the device.

## **Q&A Update December 16, 2023**

**Question 12:**

- Are we allowed to move the ball around our own device before launching? If we pick the ball and move it to our launching area without losing contact with the ball, is that allowed?

**Answer 12:**

- The robot may make contact with the golf ball (up to and including picking it up), to initiate the stroke, actuate various golf ball aiming functions or move it about the device, and then launch the ball to complete the stroke (once contact with the golf ball is ended). The device must maintain contact with the golf ball at all times during the stroke, and no part of the travel function(s) may be engaged during the stroke while in contact with the golf ball. Any device action taken while in contact with the golf ball must not be part of the device's travel function.

**Question 13:**

- My question is, what is the total height of the platform that must be traversed for holes four and five? I also see that the thickness of this particular piece is not defined. Can you clarify this?

**Answer 13:**

- The top surface will be a standard sheet of plywood no thicker than 1” resting atop standard 2x4 lumber (note that the 2x4 lumber label is not reflective of actual dimensions). The top surface may or may not be covered with another material, such as but not limited to turf, which is at the discretion of the venue. Teams are thus advised to design for some variation of the playing field dimensions and materials.

**Question 14:**

- During the elimination rounds, rule 31 states that “the teams must complete the obstacles in the judge-designated order and from the designated tees.” Does this mean that the judges will select a starting tee and an obstacle to complete for each e.g. complete obstacle A from tee 7? Or will an obstacle always be completed from its respective tee?

**Answer 14:**

- The judges are allowed to mix tees and obstacles during the elimination round if they so choose. Teams paired in direct competition on the bracket for this portion of the competition will attempt the same judge-designated challenge.

**Question 15:**

- What angle is obstacle B placed on the field as shown in Figure 1 of the field drawings?

**Answer 15:**

- Obstacle B will rest at an angle of *approximately* 45°. Teams may expect some variation depending on the venue and manufacturing/supply availability.

**Question 16:**

- Are the dimensions given for the field measured from the inside of the field and are the widths of the field lengths a constant 3ft?

**Answer 16:**

- The measurements are from the outside of the lumber walls. The substrate is ideally intended to be comprised of 3’x12’ sections upon which the lumber walls



and obstacles are built. Teams can expect minor variation depending upon the venue of the competition and what local building supplies are available at that venue. Variations may result from local building supplies/joining methods specific to the venue, and some minor adjustments may be required in order to deliver the best experience for the competing teams.

**Question 17:**

- Obstacles, B (angular position), C(position), D(position), F(position of curved ramp relative to plywood), H(position) seem to not be defined relative to the field. Further, tees 2 and 7 are missing some dimensions. Will dimensions defining these obstacles relative to the field be provided, and more importantly the positions of tees 2 and 7 be provided?

**Answer 17:**

- Please note that the following dimensions are approximated, and teams should prepare for some variation depending on the venue of the competition. Variations may result from local building supplies/joining methods specific to the venue, and some minor adjustments may be required in order to deliver the best experience for the competing teams.
  - Obstacle B will rest at an angle of *approximately* 45°.
  - The far edge of Obstacle C is *approximately* 10.5' down the first straightaway.
  - Obstacle D is in line with the right wall of the first straightaway and placed central with respect to the second straightaway.
  - Obstacle F is downloadable as an .stl, and will be distanced from the edge of the plywood surface such that the top ramp lip is in approximate alignment. There may be minor adjustments on this distance once the venue has built the physical field in order to provide the most beneficial outcome to all the competing teams.
  - Obstacle H will not be centered on the field, but will be placed in the sand such that the center axis of the tube will be approximately ¾' from the side of the playing field. Some variation may occur due to the sandy terrain.
  - Tee 2 is *approximately* 5' from Tee 1.
  - Tee 7 is *approximately* aligned with the center point of Obstacle I and is *approximately* centered in the straightaway width.

**Question 18:**

- For Obstacle H, would hitting the ball into the ground opening of the elbow such that the ball travels through the elbow, exits the upper opening and falls back

through the elbow consist of a successful completion of obstacle H as the ball does end up passing through the obstacle in the specified direction?

**Answer 18:**

- To complete Obstacle H, the golf ball must pass through the obstacle from top to bottom. However, if the golf ball is launched from the bottom such that it exits the top *and then* falls back through the top and exits the bottom, this will count as completing the obstacle. In this instance, please note that the golf ball must actually exit the opening, not simply peek partially out of the tube into view.

**Question 19:**

- To successfully complete obstacle I, is the ball required to come to rest inside the hoop or does it need to have its first bounce from the shot inside this zone?

**Answer 19:**

- To complete Obstacle I, the golf ball must be launched from the sand into the circular area. After the launch, the golf ball must land directly in the target area. While the golf ball may bounce away/out of the target area, for the obstacle to be cleared, the golf ball's first contact with the ground must be in the target area (i.e. the golf ball may not bounce along the ground until it reaches the target area).

**Question 20:**

- Is there any requirement for the sizing box to have cubicle dimensions? Can the box be fitted to the shape of our robot?

**Answer 20:**

- While the sizing box does not have to be cubicle in nature, the Sizing Box Factor is calculated off of the maximum length, width, and height. Teams must ensure that there are clearly designated, orthogonal measurement points/flat surfaces for collecting the distances.

**Question 21:**

- Can multiple obstacles be completed with a single stroke?

**Answer 21:**

- During the Initial Testing Round, yes, a device may complete more than one obstacle with a single stroke, provided the device follows all the competition rules. During the Elimination Testing Round, however, teams will complete one designated obstacle at a time, and thus, completing multiple obstacles at a time will not improve the score.

**Question 22:**

- What is the thickness of the platform for Obstacle F?
- And is that platform fixed?

**Answer 22:**

- See Answer 13.
- The platform will be fixed to the top of the standard 2x4 lumber by a method chosen by the venue. This fixture method may range from wood screws to adhesive strips. While some stability is designed into the field, teams are advised to design appropriately so as not to cause permanent damage to the field.

**Question 23:**

- In the competition, are traditional golf balls going to be used or are there golf ball alternatives that we have to compete with?

**Answer 23:**

- The golf balls utilized during the competition will be reflective of a typical minigolf ball. GoSports All Purpose Golf Balls is one appropriate example of the type of golf ball that will be utilized during the competition.

## **Q&A Update January 4, 2024**

**Question 24:**

- We have a doubt related to ASME SDC 2024, that dimensions mentioned in problem statements says that height of Obstacle 7 is 15 inches, while that according to .stl files provided to us is 38 meters.

- Also, according to problem statement our bot should span to only about 2.3 inches while .stl files says it can be 50 centimeters. So, can you please say what is correct or what is wrong in my understanding?

**Answer 24:**

- This issue seems to have arisen due to different units set for the local program when opening the .stl files, leading to incorrect scaling. For dimension details and clarifications, please refer to the schematics provided in the Rules and Q&A Document Questions 10 - 11, and 15 - 17.
- Please see Rules 2 and 6 for the details regarding the sizing box limitations ( 50 cm x 50 cm x 50 cm as measured from the interior walls) and the device expansion allowance (no larger than 100 cm in any orientation when operating at full reach).

## **Q&A Update January 13, 2024**

**Question 25:**

- This obstacle 9 has dimension written such that bot size should be less than 5 cm, so are we supposed to make that small size bot to pass through bot or we are supposed to just pass golf ball through this obstacle?
- If bot is not to be passed through this obstacle then from where is bot supposed to go further because entire boundary elsewhere is packed by wall.

**Answer 25:**

- Only the golf ball is required to pass over the bridge to score. The device must traverse the wall in some manner to progress to the subsequent obstacles.
- The wall is an intended obstacle, and how the device traverses this obstacle is part of the design challenge.

## **Q&A Update January 21, 2024**

**Question 26:**

- My team and I have a question about chip shots. When attempting obstacle D, there have been instances where we launch the ball and it hits the ground before the obstacle, bounces off the ground, and then passes through the elevated hoop. We wondered if the

ball hitting the ground and bouncing before going through the obstacle counts as completing the obstacle and if there are any repercussions for it?

**Answer 26:**

- This would absolutely count as completing the obstacle. So long as no rules are violated (ex: golf ball must not go out of bounds, must not violate travel rules, etc.), bouncing or rebounds off the wall are legal.

**Question 27:**

- I have a question regarding the SDCfield traversal rule. On page 4 under the heading of "Expected Device Functionality", it says that the device can be "expected" to traverse the field (between obstacles, over walls, and potentially under a low platform). Now the low platform encountered near obstacle E and F is very low for a robot to cross underneath. Near obstacle 6 the wall encountered is also a massive challenge to cross over. Now because page 4 of the document makes use of the word "expected" the question arises whether it is mandatory for the robot to overcome these hurdles without human intervention? That is after playing the shot at tee#4 can a team member move the robot manually to the region of tee#5&6? And similarly after playing shot at tee#6 can the robot be moved to the region with tee#7 manually?

**Answer 27:**

- The device may not be manually moved about the field except under very specific, judge-directed circumstances. During the Initial Testing, the device must traverse the field itself without outside interference. During the Elimination Testing, the teams will take turns on the field and may be directed to manually remove/return their device from the field. However, during this scenario, the judge will indicate where the devices will be manually placed.
- In summary: It is in the team's best interest to design a device that can navigate the raised platform and short wall without manual intervention.

## **Q&A FINAL Update February 6, 2024**

**Question 28:**

- Is it legal play to allow the ball to leave the boundary of the field and land in another part of the field provided that the ball does not land out of bounds? (i.e.

could the ball start at tee 1, pass over the white out-of-bounds area, and land by tee 6?)

- What is meant by rule 38? Does this mean that a laser cannot be pointed at an object more than 3 inches above the ground, or that the laser source cannot be mounted higher than 3 inches from the ground?

**Answer 28:**

- While the golf ball may never touch the ground at any time outside the playing area, chipping across the out-of-bounds is allowed. The starting point for each of the 9 competition obstacles will be at one of the 7 numbered circles shown on Figure 1.
- The laser beam may never pass more than 3 inches above the ground. It cannot be mounted any higher than 3 inches and it must be aimed horizontally or downward. This rule is a safety precaution for individuals near the game field during the competition.