

Prosthetic Arm Questions – as of 2/26/13

General

1. How much time in between tasks (not trials) to change attachments?
 - There is no set time but teams should be prepared to do it as quickly as possible as times will vary from the local events to the National event.
2. Can you have a harness that attaches to the opposite arm (above the elbow) that activates the device?
 - Yes, although it is considered part of the device and will count toward the \$40 price limit and must be included in the budget sheet
3. Can teams switch which student is using the device between trials?
 - Yes
4. The trans radial devices that we have researched all have a strap that goes around the shoulder that opens and closes the hand. Is it in the rules to add a similar feature to our device that attaches at the shoulder or between the elbow and shoulder?
 - This type of harness is allowable, but it considered part of the device and must be included in the total budget and included on the budget sheet.
5. Can the device itself go beyond the elbow?
 - The prosthetic device is actually comprised of three pieces defined below. The prosthetic interface to which is being referred to in the question cannot extend beyond the elbow.
 - i. Terminal device – gripping part of the device “fingers”
 - ii. Prosthetic interface – “socket” connection between terminal device and the body, in this case must attach between wrist and elbow
 - iii. Harness – suspends or holds device onto arm and actuates the terminal device
6. Do we need two articulated fingers or is one against a fixed piece of wood sufficient?
 - Designs that have one immobile finger and another finger that opens and closes the required 10 cm are allowable.
7. Can we place sensors in the sole of a shoe to control the grasping mechanism of my team’s device?
 - This is allowed, however, please remember that the maximum cost of the device cannot exceed \$40. Also, these pieces must be included in the total weight of the device.
8. Can the arm have different attachments for the different challenges?
 - Yes, per the specifications, general rule 16 “reconfiguration or adjustment of impounded parts between tasks will be allowed.” However, all other rules must be met by each configuration and per rule 14 “all parts of all configurations, cannot weigh more than 3 kilograms.” and the total cost for all parts of all configurations must meet the \$40 cost limit.
9. For the prosthetic arm, my kids understand they cannot use their opposite hand, but were wondering about (and here they did charades for me) pulling it across their belly or side, or rubbing against their knee?
 - Response: The only restriction is that the team may not use utilize the opposite elbow, forearm or hand to control the device. Any other method of control is allowed.

10. Can you have two "harnesses" on two students so when they switch during the relay, they only have to switch the prosthetic arm device?
 - Multiple harnesses are allowed, but all harness must be included in the \$40 cost limit and 3 kg weight limit.
11. If something is on sale, can the kids use this price or does it have to be the original retail price?
 - The sale price of the item can be used as long as the proper documentation is provided. Documentation must be from the original purchase or from a known retailer. Prices must be for the cost of a new item, used prices are not acceptable.
 - Need to have discussion on when budget sheet will be due.
12. Is it ok for the device to be attached to the wrist or hand in addition to the forearm?
 - Yes, the device can be attached to the hand, wrist and forearm of the immobilized arm.
13. General Rule 6a needs clarification – “part of the device that extends beyond the hand”. This statement has caused debate because it is interpreted two different ways: 1) “...extends beyond the person’s immobilized hand” and 2) “...extends beyond the device’s hand.”
 - Beyond the student’s immobilized hand.
14. Will hand immobilization materials count against the \$40 limit?
 - No, \$40 limit is for device.
15. Will students have to provide their own latex gloves to comply with General Rule # 9?
 - Yes, the host is responsible for providing latex gloves.
16. For the one minute to prepare and demonstrate the device, does this minute include time to immobilize the hand?
 - No. Team member’s hand should be immobilized before this one minute preparation period. The next “team on deck” should be ready to immobilize member’s hand.
17. General Rule 16 states “Reconfiguration or adjustment of impounded parts between tasks will be allowed. Does this mean adjustments are not allowed between trials?
 - No, reconfigurations and adjustments CAN also be made between trials.
18. Are any strings etc. added to the device to aid in movement of fingers restricted only to the shoulder and upper arm that has the prosthetic device?
 - No, strings or anything added to aid in the movement of fingers can be attached to any other part of the body that is not the opposite elbow, forearm or hand OR the forearm or hand of the arm that the device is attached to.
19. Can strings or other mechanisms be used on the upper arm for the purpose of controlling the fingers?
 - Yes, teams may attach strings or other mechanisms to the upper arm to control the fingers.
20. Does “immobilized” mean that no finger, hand or wrist joint can move? Is taping appropriate?
 - Yes, immobilization means that no finger, hand or wrist joint can move. It is up to the team to decide how the wrist, hand and fingers will be immobilized.

21. If teams has multiple devices (a different part depending on task), will they need to attach that portion during their one minute prep time or can they switch device while in the impound area?
 - The host is recommended to manage the tasks by having “team in-the-hole,” “team on-deck,” and “team up”. Please see page 28 of the National Specifications. While teams are waiting for “team up”, teams can use that wait time to reconfigure their device for the specific task.
22. If a device fails spec check and is disqualified, does the team get disqualified from the other components?
 - No. The team still competes in the other 3 components (paper, display, and oral); however, the team will receive a 0 score for device performance and design efficiency.
23. For all three trials, can other team members help in putting on the arm during the prep time or before the prep time?
 - Absolutely, other team members can help in the preparation, attachment and demonstration of the device.

Distance Accuracy Relay

1. “In the distance, accuracy relay, does the arm have to be switched between participants during mere 1 1/2 minute trial, or will more time be allowed to switch the arm from the first participant to the second?”
 - No additional time will be given
2. Would it be acceptable to use 2 arms in the relay (assuming that the arms must be switched during the 1 1/2 minute trial), as long as each of them met all of the specifications, and their combined mass was less than 3 kilograms?”
 - No, teams must demonstrate that the prosthetic can be used by multiple people and attached and removed quickly
3. Can the buckets have something in the bottom to prevent the balls from bouncing out?
 - No, part of the challenge is keeping the balls in the bucket
4. Does every ball have to be identical to the others? So would the center need to measure each kick-ball to ensure they are 2” in diameter and weighs the same?
 - We are counting the balls rather than weighing them so as long as they are close it should be fine.
5. Can you bounce balls into the buckets?
 - Yes bouncing the balls into the buckets is fine. Note: At the National Competition this event will done on a hard surface (e.g. concrete floor, wood paneling).
6. Do you get credit if a ball bounces out of bucket?
 - No, the balls must remain in the bucket to be scored.
7. Will the box that contains the balls be loose or secured to the table?
 - One the teams place the box where they like it will be taped down.
8. If the device is on the table the team gets 1.5 minutes to install the device and perform? Is the arm attached or not before starting?

- Yes, team has 1.5 minutes to pick the device up off the table, attach it, perform task and do at least one switch out. Device is NOT attached and is placed on the table before starting. See Task Details 1C.
9. Can you clarify Task Details 1h? What do you mean at least two members must participate in the relay?
 - At the beginning of the trial, the team places the device on the table. When the judge says “start”, the first team member walks into the Working Area and attaches the device and proceeds with the task. At any time during the trial, that member removes the device and places it on the table and steps out of the working area. The second designated member walks into the Working Area and attaches the device and proceeds with the task, etc...
 10. Task Details 1.h states “at least two team members must participate in the relay. One team member must toss no more than two types of balls.” This can be interpreted as only ONE of the team members, but another member may toss all 3 types of balls.
 - Each team member may not toss more than two types of balls. The intention is that EACH team member cannot toss more than two types of balls.
 11. For clarification, what are the “kick balls”?
 - The kick balls are similar to the hacky sacks. The difference is the kick balls have a plastic / vinyl outer layer and an inside layer of cloth. The kick balls are 2 inch in diameter and can be filled with any material.

Object Relocation

1. Object relocation. Will the objects be placed on the table in the manner they are intended. Example: will the water bottles be standing up or could they be either up or down.
 - The items will be randomly placed so students should be prepared for any configuration of the items
2. Can you move objects on the table prior to picking up?
 - Yes that is okay.
3. Can you slide objects slightly off the side of the table in order to get a good grip? Can you slide them at all as part of the picking up process?
 - Yes that is allowed.
4. Can boxes of nails be taped closed?
 - Yes, the boxes will be secured so that they do not open during the trial.
5. Can they lift more than one item at a time?
 - Yes
6. Should lock be taken out of package
 - Items should be in their original packaging, except the lock, tapes, pennies
7. Are the 10 items the same for all teams or do they rotate for each team?
 - The 10 items will remain the same for all teams in order to ensure that each team has the same possible total weight available to them for scoring purposes.
8. For middle school students who are short, they may not be able to reach the container. Will the host provide a step stool or something to stand on for short students?
 - No. It is difficult for the host to anticipate what would be needed. However, the team may bring its own stool. The team will be able to place its own

provided stool anywhere in the “Working Area” of the task. Also, at anytime during the task, the team member may move the stool anywhere in the “Working Area”.

9. Are the CD’s to remain on the spindle for the Object Relocation task.
 - Yes.
10. Are the wrapping of the masking and duct tape removed so that participants can pick them up through the middle of the roll?
 - Yes.
11. Can competitors pick up the milk crate with their prosthetic arm or can they pick it up with their other hand?
 - No. During the task, the container may NOT be moved. During the one minute preparation time, the team will place the container anywhere in one of the two “Container Areas”. When the trial starts, the designated team member picks up objects and placed them into the container.
12. Is it 10 items or is it 10 like-items? For example, do the water bottles count as one item or as two items?
 - 10 of the 15 items groups will be randomly selected and placed on the table. Two items of each item group will be selected and placed. Therefore, a total of 20 items (2 for each of 10 item groups) will be selected and placed.
13. What is meant by “the groups of objects that will be available to place into the container...” What does “group of objects” mean?
 - Page 5 lists 15 different groups of items. On the day of competition, 10 of the 15 groups of items and two items from each group of objects will be randomly selected.
14. Which of the items will remain the original packaging? For example, are the batteries in their original packaging or are they loose?
 - All items will remain in the original packaging, except the master combination locks, quart size Ziploc bags with 200 pennies, duct tape, and masking tape.
15. Are the items placed at random locations on the table and if so do we need to be consistent in placing the items in the same place for all competitors?
 - For each trial, items from 10 of the 15 item groups will be randomly placed on the table within the area between the two outlined “container areas”. For each trial, items will be randomly placed so there is no consistent placing of items for all competitors.

Dexterity

1. When placing the nut on the bolt, can you twist it on a little to keep it from falling off? How do you determine a little twist as opposed to a big twist?
 - Yes, the prosthetic should be used to secure the nut onto the bolt by threading it slightly. It will be left to the judge’s discretion as to how much is too much.
2. What does it mean to have secured the nut on the bolt (page 9, 3.g.iv)?
 - The nut will be threaded onto the bolt only enough so that the nut does not fall off when released by the device. It will be up to the judge’s discretion to determine how much is too much.

3. Are the tools provided or are students expected to bring their own?
 - Tools will be provided
4. Are the teams able to call time as in the Object relocation task. Example Team A secures all three bolts and start all three nuts can they call time without trying to tighten them in place.
 - Yes, students may stop the trial any time after securing all the nuts on the bolts
5. Does the side of the board with the nut always have to face away from the person working the task?
 - No, once the bolt has been placed, the device can be turned as long as the device stays in the working area and remains horizontal
6. For the dexterity competition, they give you a wrench for the nut, but are you allowed to not use the wrench, provided you only use the prosthetic arm?
 - No you must use the wrench provided for this task. As stated in the specifications, one of the purposes of this task is to demonstrate the device's ability to rotate these tools around an axis using the prosthetic device.
7. Are competitors allowed to rotate the testing device by 180 degrees about an axis that is perpendicular to the table? And if so, can they use their non encumbered hand to do so?
 - No, since one of the goals is to rotate the tool around an axis, the testing device cannot be rotated around the bolt/nut.
8. Are competitors allowed to strike the nut with the wrench to make it rotate? If not, does the wrench need to be fully engaged with the nut before it can be rotated?
 - Competitors are not allowed to strike the nut with the wrench. The intent of the task was to use the wrench to rotate the nut around the bolt. The wrench does not to be fully engaged with the nut before it can be rotated.
9. Is it possible to hold the nut with the prosthetic arm and to screw in the bolt with the free hand?
 - No, in rule 3.g. it states that the team member may only secure the bolt and is not allowed to twist/screw in any way.
10. Will the measurements on the bolts be taken from the head of the bolt or from the end of the bolt?
 - The measurements will be taken from the end of the bolt, not from the head of the bolt.
11. If the nut is dropped on the floor, does the team place it outside the 50 cm area or can they place back onto the table inside that area?
 - Yes, the team must place the nut back into the area outside the testing area, then they can use their prosthetic to bring it back into the testing area to complete the task trial.
12. Does the size difference in bolts affect the points earned?
 - No, the different bolts and nuts do not affect the points earned. Teams earn designated points by screwing the nut past markers on the bolt. See page 12 for the scores for the scoring zones of each bolt. The scoring zones at 0.5 cm markings are the same for all bolts.
13. Can Teflon or silicone lubrication be used on the bolts to overcome their low quality?
 - No, it is difficult to standardize the lubricant used. The nuts and bolts should be tested prior to ensure the nuts freely rotate around the bolts.

14. Can students use a sticky substance to pick up the wrench or do they have to use the fingers of the device?
 - Teams must use the fingers of the device to pick up and rotate the wrench. The intention is to demonstrate the device's ability to demonstrate fine motor control and rotate a tool around an axis.
15. Can the testing device be taped down to the table so it will not move.
 - No, the testing device may not be taped down. During the one minute preparation period, teams will place the testing device anywhere inside one of the selected Testing Areas
16. Can a team put one bolt in and get the respective nut on and then call time? Or do they have to have all three bolts in and all three nuts on before they can score? Or do they have to get all three bolt in and at least one nut secure before calling time?
 - A team can call time any time after they have secured at least one nut on a bolt.

General

Distance Accuracy Relay

Object Relocation

Dexterity Task