

Statement

We have tried to make the rules fit the challenge. Our original plan was to make the rules more open ended as you are leaning but not all schools will have the same resources as others. In order to keep things fair we need all teams to be on a level playing field. We are allowing the use of copper wire in the forming station; we felt that copper wire is readily available to everyone. How the wire is fastened to the rest of the kit is purposely open ended (use whatever means you wish). All teams receive the same kit so the use of anything in the kit is also fair. Part of the challenge is to be able to use the kit without modifying it by gluing or otherwise making it more rigid than it is from the manufacturer. The students must use bracing and other means available with kit pieces to make it function.

Question

1) Can we summarize rules 1-5 by just saying:

"The ROBOT must be constructed with parts only from the kit- and these parts cannot be modified or joined together in any way except by what is intended by the kit. The FORMING STATION can be constructed using any materials (incl. the kit parts)"

Answer

Rule 2 is the only exception to the rule of using only kit pieces. Copper wire may be added in whatever capacity to pierce, form or role the foil. Other than the copper wire only kit pieces can be used in the forming station. The kit pieces may be modified glued or whatever but no foreign materials other than the copper wire. Copper wire may not be used in any other part of the robot. The rest of your summary is correct.

Question

2) Are we correct to assume that the "ROBOT" is by definition anything constructed from the kit? Then if the forming station is constructed using only parts from the kit then it too is considered as part of the Robot?

Answer

The robot is the entire machine including the forming station. We have called that part of the robot the forming station purely to define that part of the robot (the area were the foil changes is the forming station). The robot should have three separate areas one were parts are loaded or a start point, a forming area, and a place where parts are placed when complete (this is outlined in rule 9). The robot must move the foil from each area and the minimum total distance is 10cm.

Question

3) Are we correct to assume that the "FORMING STATION" is by definition anything constructed that will cut, roll, bend, or pierce the aluminum?

Answer

Yes

Question

4) Can the FORMING STATION use electrical parts (egg. motors) NOT from the ROBOT kit?

(Note: there is no rule mentioned that excludes the use of electrical devices not from the kit.)

Answer

As in the first question, no other parts can be added to the robot motors or mechanical aids.

Rules 1 to 5 include devices and motors.

I know some schools have not seen the kits yet so here is a rough outline of the kit. The kit comes with 3 motors, 2 limit switches, 1 light sensor and 1 ultrasound sensor. There are also a number of pneumatic parts in the kit including valves a pump and cylinders. The kit also has a large number of gears wheels universal joints and so on. There is also a controller to link it all together. The hard part is to build the robot using the limited motors and pneumatic cylinders to do all the functions.

If the entire process is automatic including the pneumatic portion bonus points will be given.

Question

5) Can the FORMING STATION be "controlled" by the ROBOT?

Answer

Yes, the forming station should be controlled by the robot it is part of the robot. All motors connect to the controller. The controller is programmed using a laptop or desktop computer with the software provided.

The only part that is difficult to make automatic is the pneumatic component because the valves are manual. This means the robot must use one of the motors to trigger the valve; this would mean one less motor to do other tasks.

This is covered by rule number 13. we know it is difficult to make it entirely automatic so this is why we would give bonus points if it were entirely automatic.

Question

6) If the answer to question 5 is true, then how can the ROBOT and the FORMING STATION be considered separately? For example, if a motor from the kit needs to rotate a part on the forming station, then there needs to be some way of joining (fastening) the motor to the forming station. This joining method is not used by the kit. Therefore, this violates rule 1

Answer

All motors come with the kit and are easy to connect at different angles and positions. Again the forming station is part of the robot it is one machine and should be treated that way we only mention this part because we have opened the rules up for that area of the robot.

Question

Does there need to be ANOTHER rule that states:

"Glue, tape or other joining method can be used to fasten a motor assembly from the ROBOT KIT to the FORMING STATION"

Answer

This is covered by last answer.

7) Is TIME a part of the evaluation? The head to head challenge for the top three teams to see who can produce the fastest cycle would discourage a team from making too many changes to the aluminum sheet. Can the transformation be as simple as a single hole pierced into the middle of the aluminum sheet?

Answer

Time is not part of the evaluation process so the speed of the robot is not relevant for scoring.

The head to head challenge is just a visual challenge for the invited guests to watch. As with any manufacturing process quality and productivity are the most important parts of the process.

Quality is the main objective for evaluation but, the top three scoring teams will be compared for speed at the end purely for a visual run off. Yes piercing one hole into the foil would satisfy the objective as long as all other criteria are met, but this may not get the team within the top three. Keeping things simple is a good way to start, The product can be elaborated once the process is proven.

Question

8) Rules 11, 13 and 14 state that the pile of finished products was processed in an automated way except for the pushing of a "... a start button..." . Furthermore, the process does not exclude the use of hands for "...loading the foil at the loading station".

Can we summarize these rules by saying:

"The forming process is fully automated except at the beginning of the process. The beginning of the forming process can be started manually by loading the foil by hand at the loading point then pressing the start button with your finger. This manual operation can be repeated each time for each of the five cycles."

Does the statement "Bonus points are rewarded if the entire process is automatic" mean that extra points are rewarded if the loading operation is not done by hand except at the beginning of cycle one?

9) The rules mention both the terms "LOADING STATION" and "LOADING POINT". Does anything need to be constructed for the LOADING STATION? Can the LOADING POINT be inside the FORMING STATION? In other words, why not load the sheet directly into the forming station, (as you would in most manual machine shop operations)? (Note: the rules do not restrict where the loading point is, only that the finishing point be 10 cm from the loading point).

Answer

The foil can be loaded by hand but other than loading the foil the robot should move the foil to the forming station or point then out of the machine were it can be removed by hand. The robot needs to have a material handling function to move the foil through the three areas (loading, forming and unloading).

If the robot only forms the foil without moving the foil through the three points it has not completed the objective.

I hope this has helped you. We appreciate the questions and any constructive feedback. The challenge we have come up with is new and somewhat complicated to explain in print but we will do our best to evaluate fairly based on the information we are providing.

Here is a link to lego engineering for ideas on using Lego mindsorm NXT.
<http://www.legoengineering.com>

10) 'The robot will move only one piece of foil at a time'

The students are considering forming the pieces from a strip (progressive die idea with one forming/cutting station).

Is this allowable?

Answer: Yes this is allowed.

11) Can the foil start as a strip and be formed and cut from that strip or role?

Answer: Yes, as long as the foil changes shape and the end product is five individual pieces. There must still be three areas, starting point were foil is inserted then moves to a forming area and out to a finished point were completed parts are moved to. "Each part must be formed individually" this means five pieces of foil cannot be stacked on top of each other then formed as one unit then considered to be five pieces.

12) Is the use of forming rollers allowed or must it be a stamping operation?

Answer: Yes forming rollers would be allowed. The foil must go from a start point to a forming area and to a finished point, without being touched by human hands and the distance from each area is min 10cm. As long as the foil changes shape. Product will be marked on repeat ability and complexity of new shape.