FENCED DROP ZONE CHALLENGE

SCENARIO:

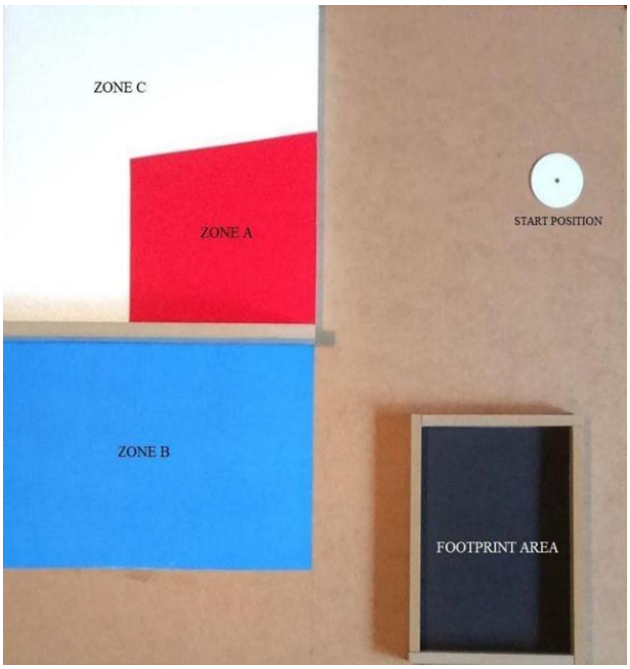
Your team has been commissioned to design a controlled pneumatic or hydraulic device that will safely move an object from a starting position to one (1) of three (3) DROP zones.

THE CHALLENGE:

Your team will design and build a device that picks up cylindrical wooden objects from the "START" position and then place them in one of three destination zones. The object must be moved and placed in an upright position in your chosen destination zone. Your task will be to transport as many objects as possible in a two-minute time frame.

SPECIFICATIONS:

The base of your device will sit in the "FOOTPRINT AREA," a rectangle 8" X 5¾" and it is surrounded by a wall ⅜" wide and 1" high. The plane of the "START" and the FOOTPRINT AREA is the same and its position is a small circle where cylinders will be placed. The "DESTINATION AREA" contains three (3) zones, the plane of two (2) of them are 1" above the FOOTPRINT AREA – Zone "A" and Zone "C" while the third zone ("B") is on the same plane as the start position and the footprint area. There is a 2½" high wall between the zones, measured from the plane of the "START" area. The wall is ½" wide.



The wooden cylinders are 2¾" high and 1¼" diameter. Each cylinder weighs approximately 1½ oz.

Your team will choose the destination zone for each cylinder. A cylinder moved correctly to zone "A" is **worth 2 points**; to zone "B" is **4 points** and to zone "C" is **5 points**. Your team can move cylinders to any of the destination zones every time you move a cylinder.

All movements of the device MUST be controlled using fluid power.

Any cylinder dropped in transit will be returned to its starting position. Once a cylinder is moved to its destination zone it will be returned to its starting position ready to be moved again.

IF YOUR TEAM MANUFACTURES A DEVICE THAT ONLY WORKS WHEN IT IS STABILIZED BY HAND(S) THEN 50% OF THE 'MOVING OBJECT' SCORE WILL COUNT.

IF YOUR TEAM BREAKS THE DEVICE DURING THE ALLOCATED 2 MINUTES, THEN YOUR TEAM CAN REPAIR IT DURING THOSE 2 MINUTES AND SUBSEQUENT 'MOVING OBJECT' SCORES WILL COUNT 50%.

IF YOUR DEVICE IS TOUCHED BY HAND IN ANY OTHER WAY, THEN THE 'MOVING OBJECT' SCORE WILL BE ZERO

NOTE: It will be necessary to understand the mechanics of using a piston-syringe, mounted on a platform, to translate the linear movement of its plunger into the rotational movement of the arm.

BEFORE THE COMPETITION:

Your team will design a device to move the cylinders and record the process in a team portfolio. On Workshop Day, your team will be introduced to the variety of tools and the materials you can use by building two kits that demonstrate movement by pneumatic power. Between the Workshop and the Challenge, you must design your solution. Credit will be given to a well-designed device, *particularly* one that is strong and stable (a stable base and counter-balanced arm), makes economical use of the materials available and effective use of the piston-syringes.

AT THE COMPETITION:

Working co-operatively your team will build a device and use it to meet the Challenge using the plans in your portfolio and from the same materials that you take with you to your school (with the following additions: 8 glue sticks, two 20cc syringes, an extra white syringe holder and an extra 6ft. of tubing)

Glue stations will only be available after lunch on the competition day according to the discretion of the Challenge Facilitator. You are encouraged NOT to use hot glue unless it is an emergency – wood glue and cardboard gussets are much stronger and less likely to become loose if in contact with water.

Your team will bring TWO COPIES of its portfolio and the tools kit to the competition. The judges will evaluate one of your portfolios and all your team members will be expected to answer questions about the function and design of your device. You will be judged according to the Challenge Rubric.

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