2020 NATIONAL CHALLENGE SCENARIO

THE CHALLENGE:

Your team will design and build a device operated by fluid power that picks up wooden cylindrical objects from the "START" position and then places them on one of three destination shelves. The object must be moved and placed in an upright position on your chosen destination shelf. Your task will be to transport as many objects as possible in a time frame of two minutes.

SPECIFICATIONS:

(Please refer to plan and isometric drawings on pages 3 and 4.)

The base of your device will sit in the "FOOTPRINT AREA", a rectangle 202 X 145mm and it is surrounded by a wall approximately 10mm wide and 25mm high. The plane of the "START" and the FOOTPRINT AREA is the same and the start position is a small circle 50mm in diameter, where cylinders will be placed. The lower shelf is 21mm high, the middle shelf is 17mm high, and the smallest, top shelf, 19mm high. To place an object on the top shelf it must be lifted vertically 57mm.

The wooden cylindrical objects are 70mm high by 32mm in diameter and each weighs approximately 43g.

Your team will choose the destination shelf for each cylinder. A cylinder moved correctly to bottom shelf is worth 1 point, to the middle shelf, 2 points and to the top shelf, 3 points. Your team can move cylinders to any of the destination shelves every time you move a cylinder.

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.

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

DEDUCTIONS:

- *If your team manufactures a device that* ***only works when it is stabilized by hand(s)*** *then* ***only 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 for the pick and place cycle during which the touching occurs.***

BEFORE THE SCHOOL CHALLENGE DAY:

During the Workshop lessons, members of your team will have been introduced to a variety of tools and the materials that you can use to build a device. Your team will have designed, tested and built a prototype device to move the cylinders and you will have recorded your design process in a team portfolio. In that portfolio, you will also have noted how you could improve your prototype and what you plan to do differently on the Challenge Day. Every member of your team should understand these sections of your portfolio completely so that you can implement those improvements on Challenge Day. Remember that credit will be given to a well-designed device *particularly* one that is strong and stable (i.e. counter-balanced and rotating efficiently).

AT THE SCHOOL CHALLENGE DAY:

Your team will bring an electronic or paper version of its portfolio along with tools to the Challenge Day. You will be provided with a kit of materials to build your device with.

Referring to your portfolio and working co-operatively and within strict time limits, your team will build the device you have previously designed to meet the Challenge.

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.

Using Parts B, C and D the *National Challenge Rubric*, your local judges will evaluate your Teamwork & Work Habits and the Design, Construction and Performance of your device as well as asking you four questions on the rubric.

You will have two minutes to demonstrate and video-record your device in action.

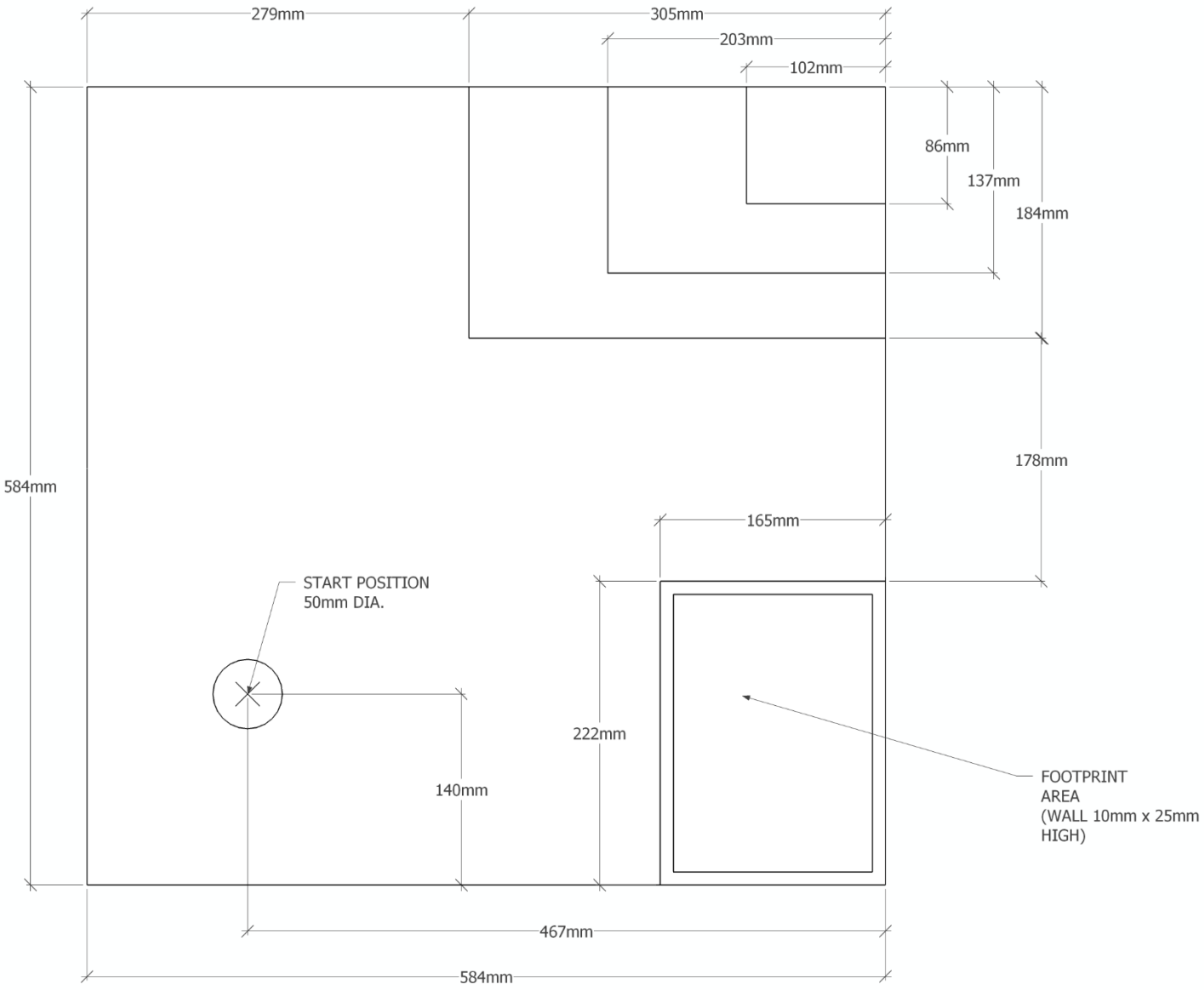
NO LATER THAN MAY 15, 2020:

The following needs to be sent to the CFPA at info@cfpa.ca.

- The *Team Application Form* with all information in Part 3 completed.
- Your Design Portfolio (this can be entirely electronic or scans of hand-written and/or hand-drawn material; the latter will not be penalized)
- Your two-minute demo video
- The *School Challenge Day Scoresheet* as completed by the local judges

Canadian Fluid Power Association
Association canadienne d'énergie des fluides

2020 NATIONAL CHALLENGE SCENARIO LAYOUT
PLAN VIEW



2020 NATIONAL CHALLENGE SCENARIO LAYOUT
ISOMETRIC VIEW