# Airbus/WSU High School Wingbox Challenge

Prize money

1st Prize : $1000

2nd Prize : $500

3rd prize : $250

Deadline : March 29th, 2019

# The Challenge

- Wings are a critical part of airplanes
  - They carry the weight of the plane
  - They are necessarily long and skinny
  - The wingbox is the core structure of the wing
- Engineers work very hard to make the wingbox light, strong, and stiff
- Here is a chance for you to do the same, & more!
  - Work with Airbus & WSU engineers
  - Start your future with WSU & with Airbus
  - Win prize money!

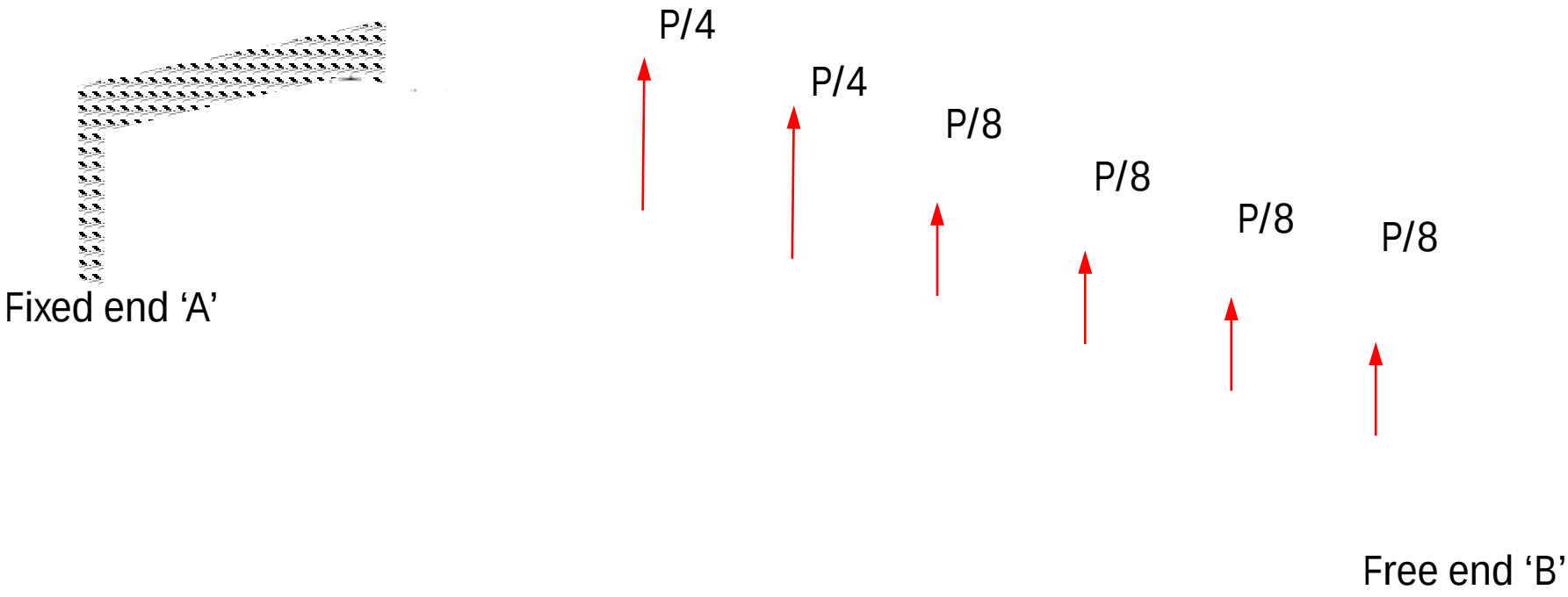
# The Challenge


https://theallnewairbusa350xwb.wordpress.com/2013/02/08/the-all-new-airbus-a350xwb/


http://sahil34935.blogspot.com/2013_02_01_archive.html

# The Challenge

Using balsa sticks, design and build the lightest[A], strongest[B], and stiffest[C] wingbox. The wingbox should withstand a minimum P=5 lbs. to qualify.



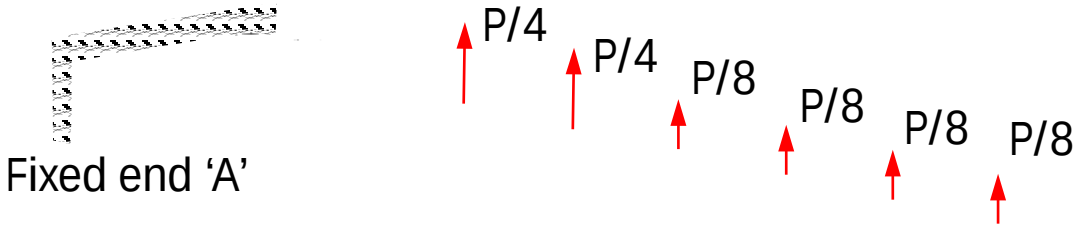

A. Minimize the weight
B. How much force it can withstand
C. Higher stiffness implies smaller deflections

# Deliverables

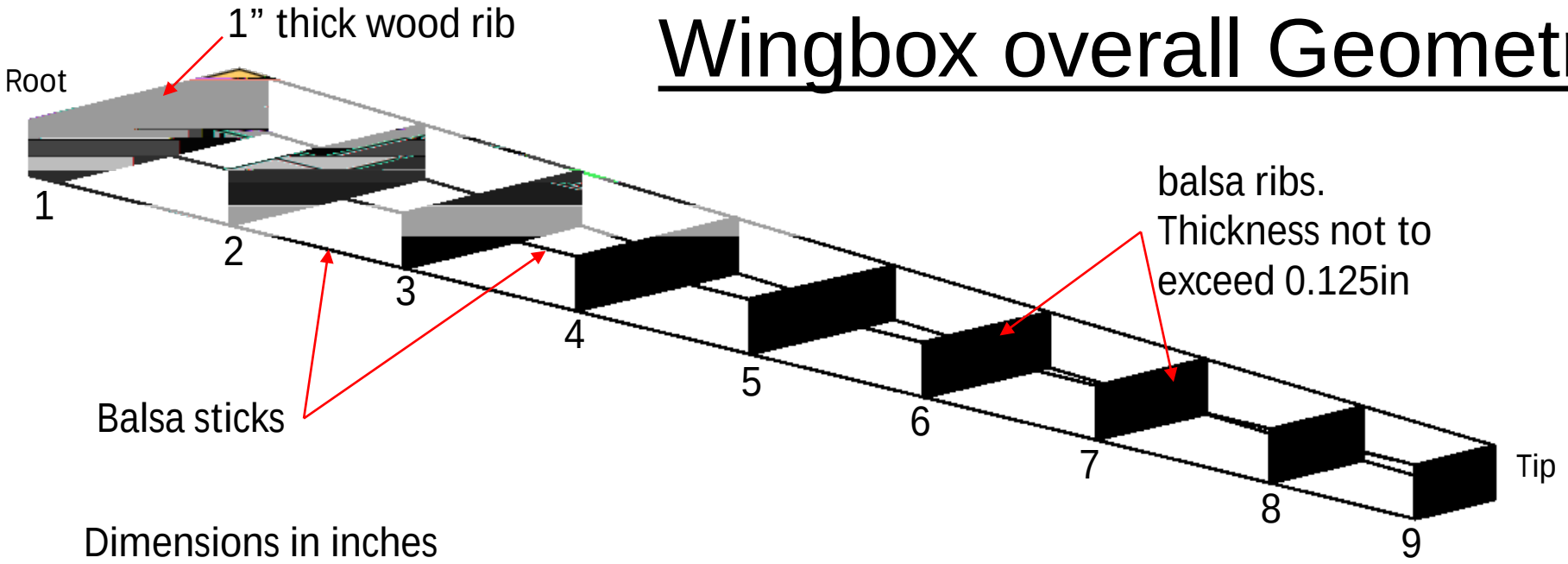
- Deadline : 5 p.m., March 29th, 2019
- A summary report (not exceeding 3 pages in Word format, 12pt font, single spacing, 1” margins) outlining the following:
  - Team name, affiliation, list of Team members, & mentors
  - Summary of your design (why you decided to build the wingbox a certain way) and a simple drawing identifying the various parts
  - Summary of activities (materials used, time spent in design, constructing, testing, etc.). Photographs of activities are also welcome.
  - Estimate how much load (P) your wingbox will withstand and how much the tip will deflect at failure.
- Deliver your fully constructed Wingbox to WSU

# Testing of Wingboxes

- The Wingboxes will be tested during the Annual Engineering Open House ( ~ 1st week of May. Exact dates will be announced when they become available).
- The Wingboxes will be prepped for testing (ends casted, loaders mounted) after the teams submit their wingboxes to WSU

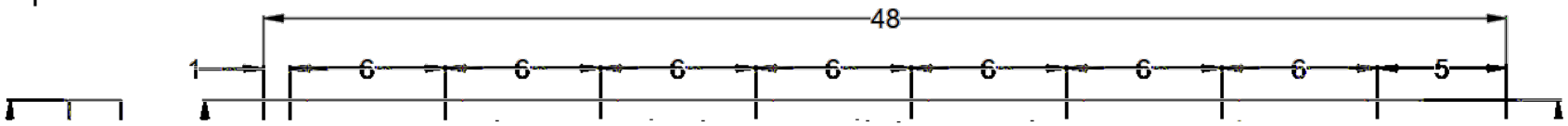


# Wingbox overall Geometry

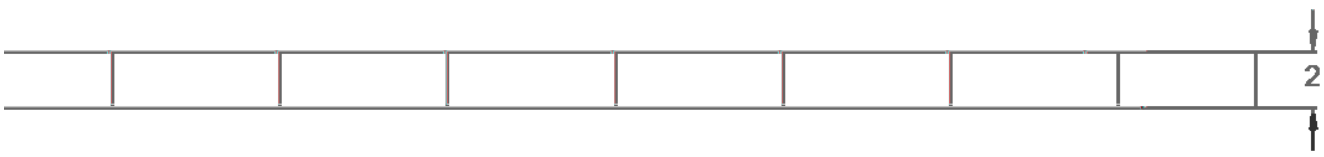



Dimensions in inches

Tip View



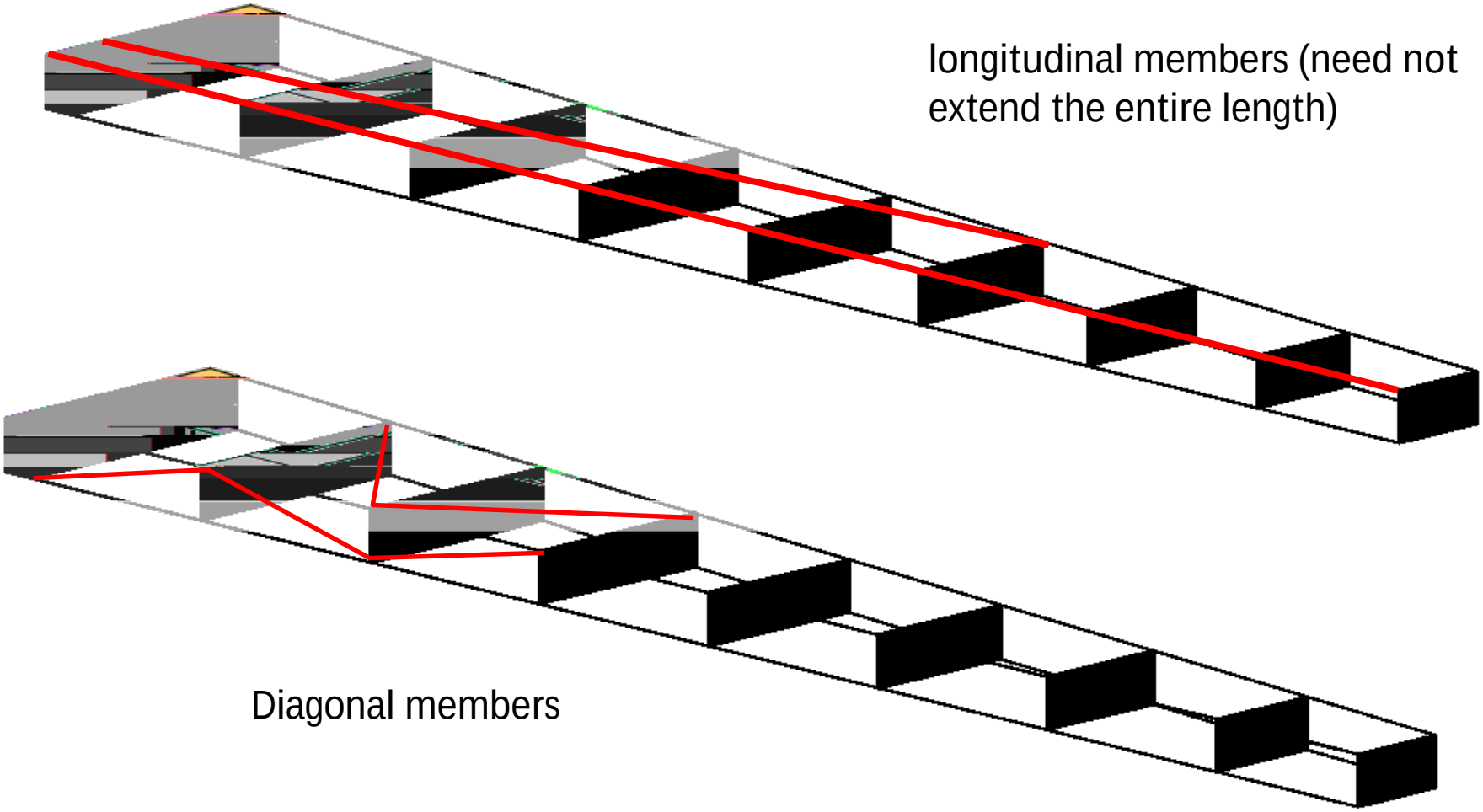

Top View





Front View

NOTE (1): Acceptable configuration examples….




Use any combination of longitudinal and diagonal members as long as

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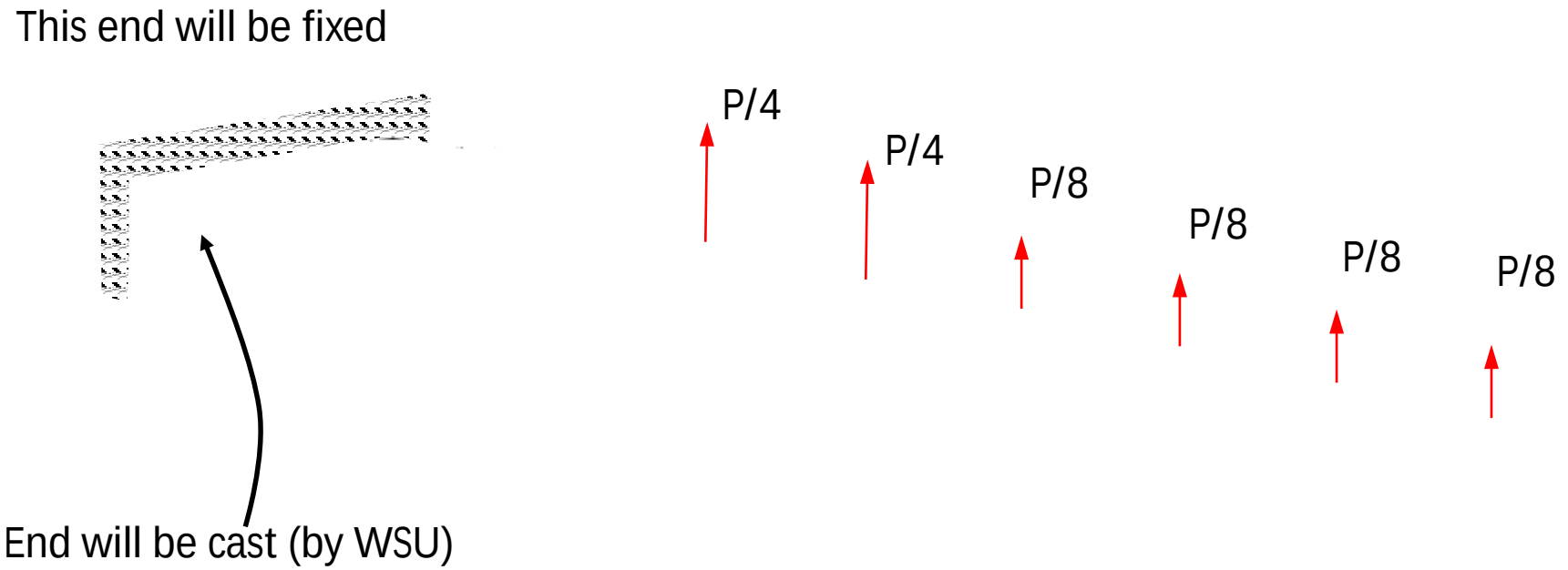
NOTE (2):

- The balsa sticks (extending the length of the wingbox) may pass through recesses cut in the ribs or may be placed along the edges of the ribs. In the latter case, the dimension of the ribs must be altered such that the overall dimension remains the same. For illustration purposes, rib #1 has

# Design Constraints

- Materials
  - Balsa sticks with only 1/8-inch square or smaller (square)cross-

# Wingbox Loading



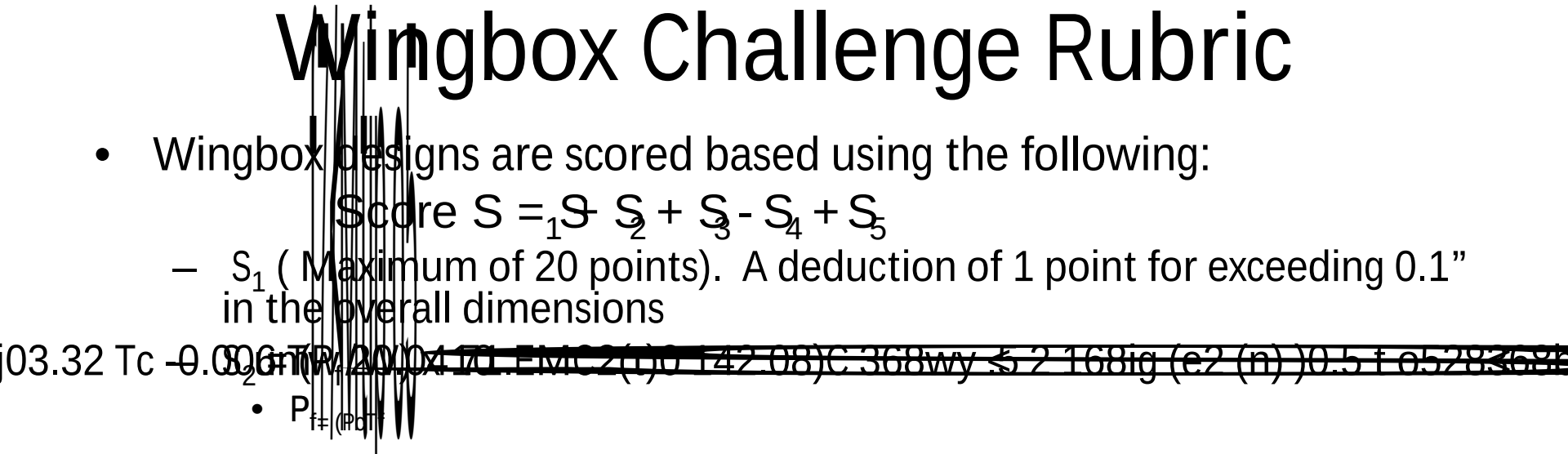

The Wingbox will be loaded using forces as illustrated in the figure.

# Wingbox Challenge Rubric

- Wingbox designs are scored based using the following:

$$\text{Score } S = S_1 + S_2 + S_3 - S_4 + S_5$$

  - $S_1$ ( Maximum of 20 points). A deduction of 1 point for exceeding 0.1” in the overall dimensions
  - $S_2$ [illegible]
    - $P_f$ [illegible]



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## ENTRY FORM

School Name & District:_____