Detailed Description of Concepts

Our two initial ideas were to change the alloy or the structure. Changing the alloy would allow for control over which properties are enhanced and uses the same amount of material that is presently used. Changing the structure only improves the stability and requires more material than is currently used. So, changing the alloy is more favorable than changing the structure. The university was also not able to reveal to us any information on the structure of the bleachers due to safety concerns.

Currently the bleachers would be made of 3000 series aluminum alloy. It is the most widespread use of aluminum and has moderate strength (only 20% higher than pure Al) and is not heat-treatable.

Idea #1:

5000 Series Aluminum Alloy – properties: (Mg principal alloy addition) less tendency to streak or discolor, resistance to corrosion, weldability, high strength, good fatigue properties, excellent formability

Idea #2:

6000 Series Aluminum Alloy – properties: (Mg and Si major alloy addition) one of least expensive, excellent resistance to corrosion, spot and fusion welding, can be dyed, good fatigue properties, fabricated by virtually all methods

Idea #3:

7000 Series Aluminum Alloy – properties: (Zinc primary alloy addition) spot welding, poor corrosion resistance, has to be protected, fracture toughness inferior to others, excellent fatigue properties

Idea #4:

Clad Aluminum – properties: (pure Al bonded to both sides of alloy sheet) high strength, superb corrosion resistance, roll bond as strong as Al itself