

Abstract

The SDI Copperworks plant produces copper wire using a rotating circular mold, which constantly takes in molten metal from one side, and puts out one long bar of copper. In order to keep the copper from sticking to the mold, and to insulate the mold from the heat of molten metal, they coat the mold in a fine layer of soot by burning acetylene directly onto the mold. This process creates a lot of extra soot, which escapes into the air as smoke. As part of a new cleanliness initiative, Copperworks has asked us to design a system which can capture escaping soot and filter it out of the air.

Customer Needs and Requirements

- Mitigate excess soot
- Do not disturb the soot coverage on the mold
- Do not require maintenance more than once a week
- Don't disrupt current maintenance
- \$25k budget

No.	Requirement	Unit	Value
1	Amount of smoke captured	%	90
2	Does not upset the flame	-	Pass/Fail
3	Weekly uptime	Hours	144
4	All captured soot dumped into reclaim pit	-	Pass/Fail
5	Labor needed for assembly removal	People	≤ 1
6	Budget	USD	< 25k

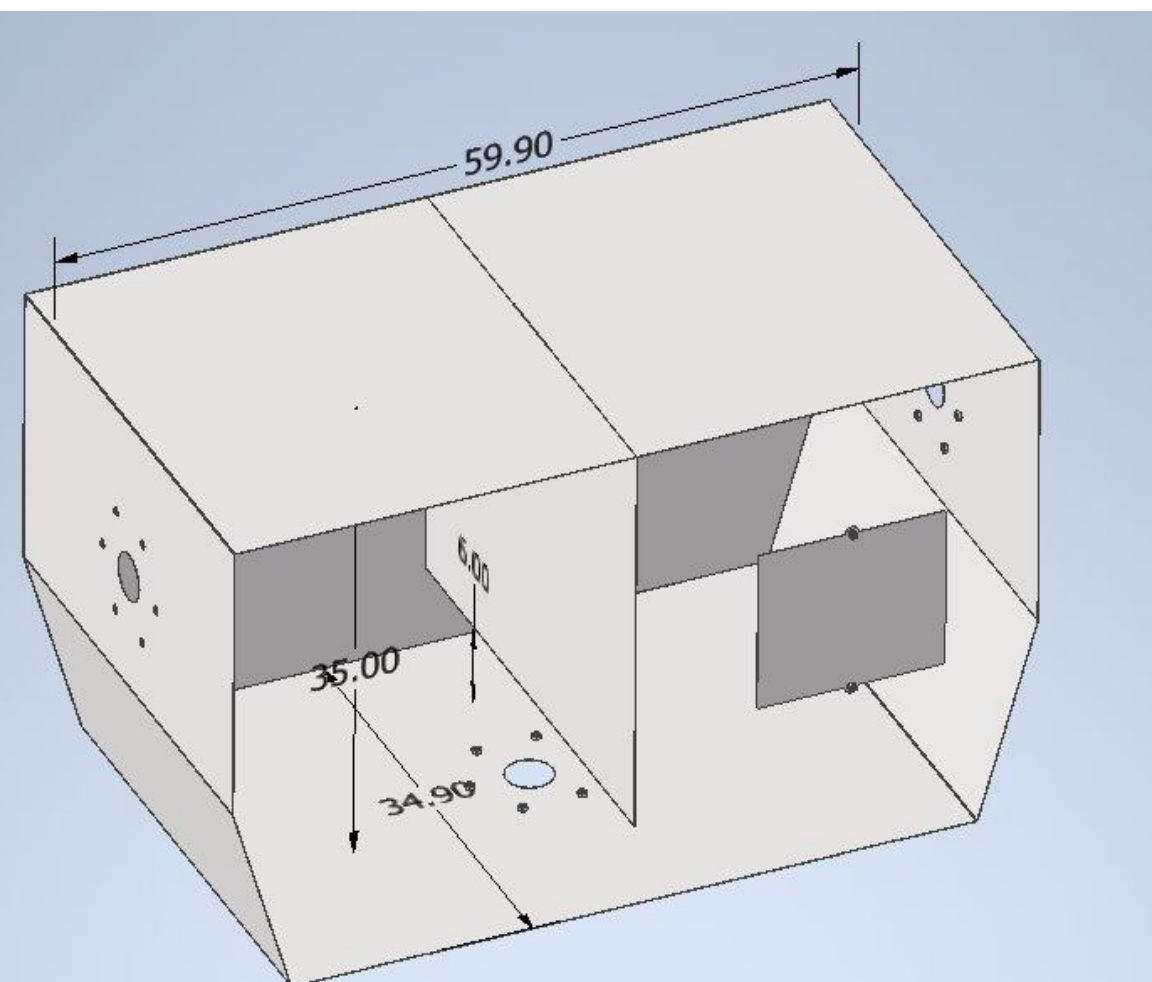
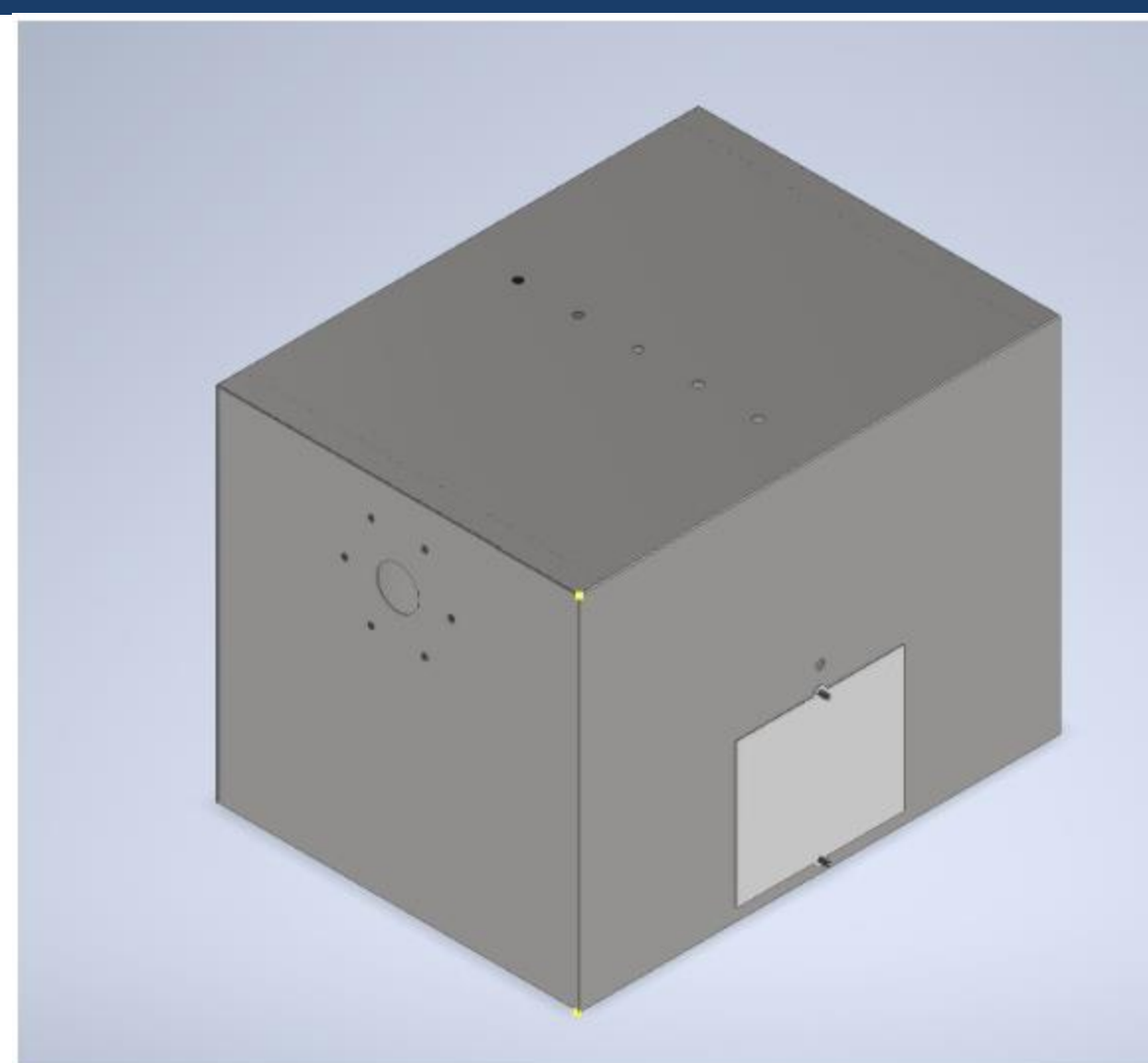
Concept Selection

- High-output blower fan
- Filter box main sprayers
- Filter box secondary water sprayers
- Pipeline water sprayers



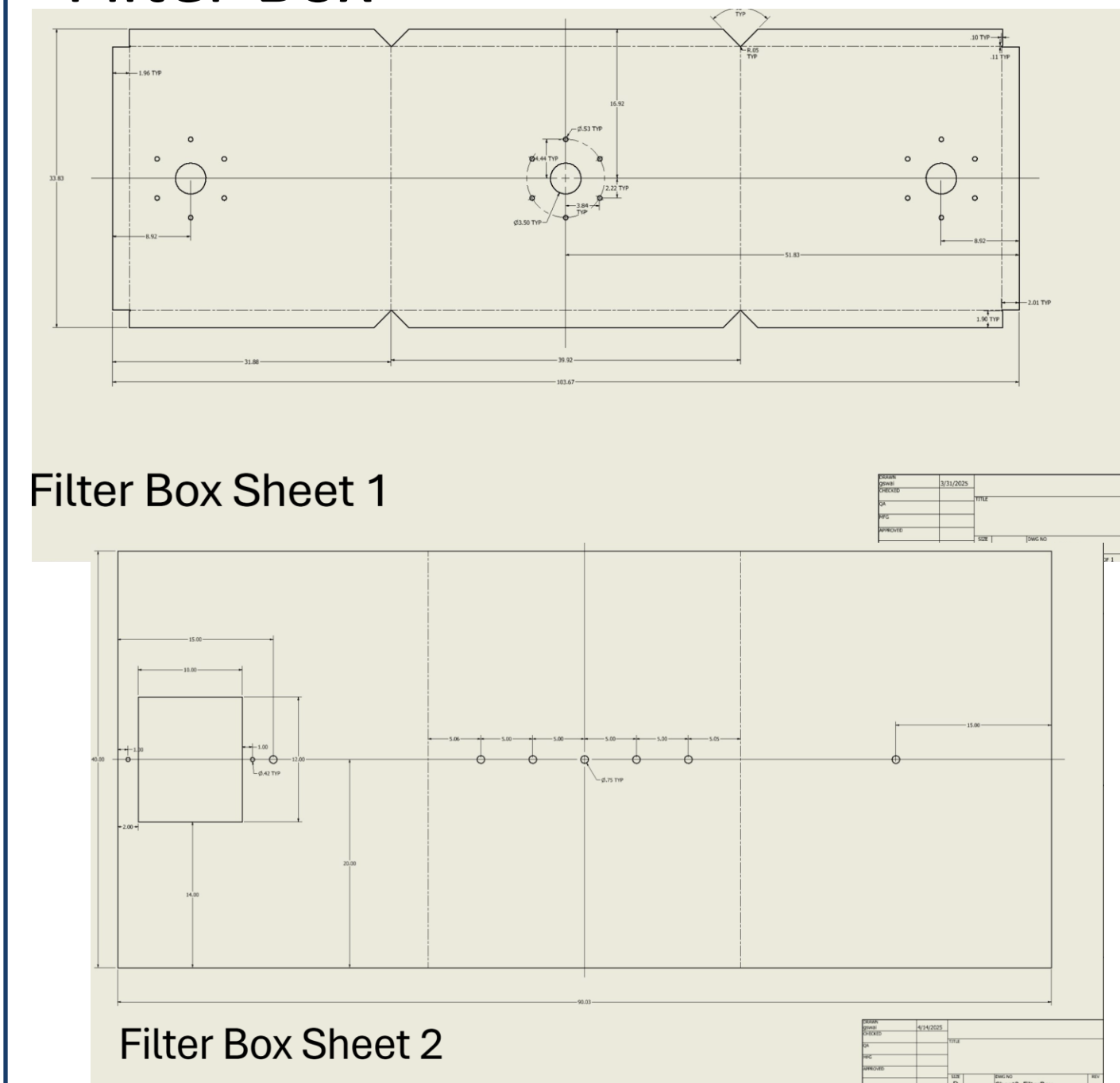
Design Solution

The team had to design a filter box that is geometrically similar to scale filter box, as well as design a settling chamber that would reduce the amount of water that would be ingested by the fan.

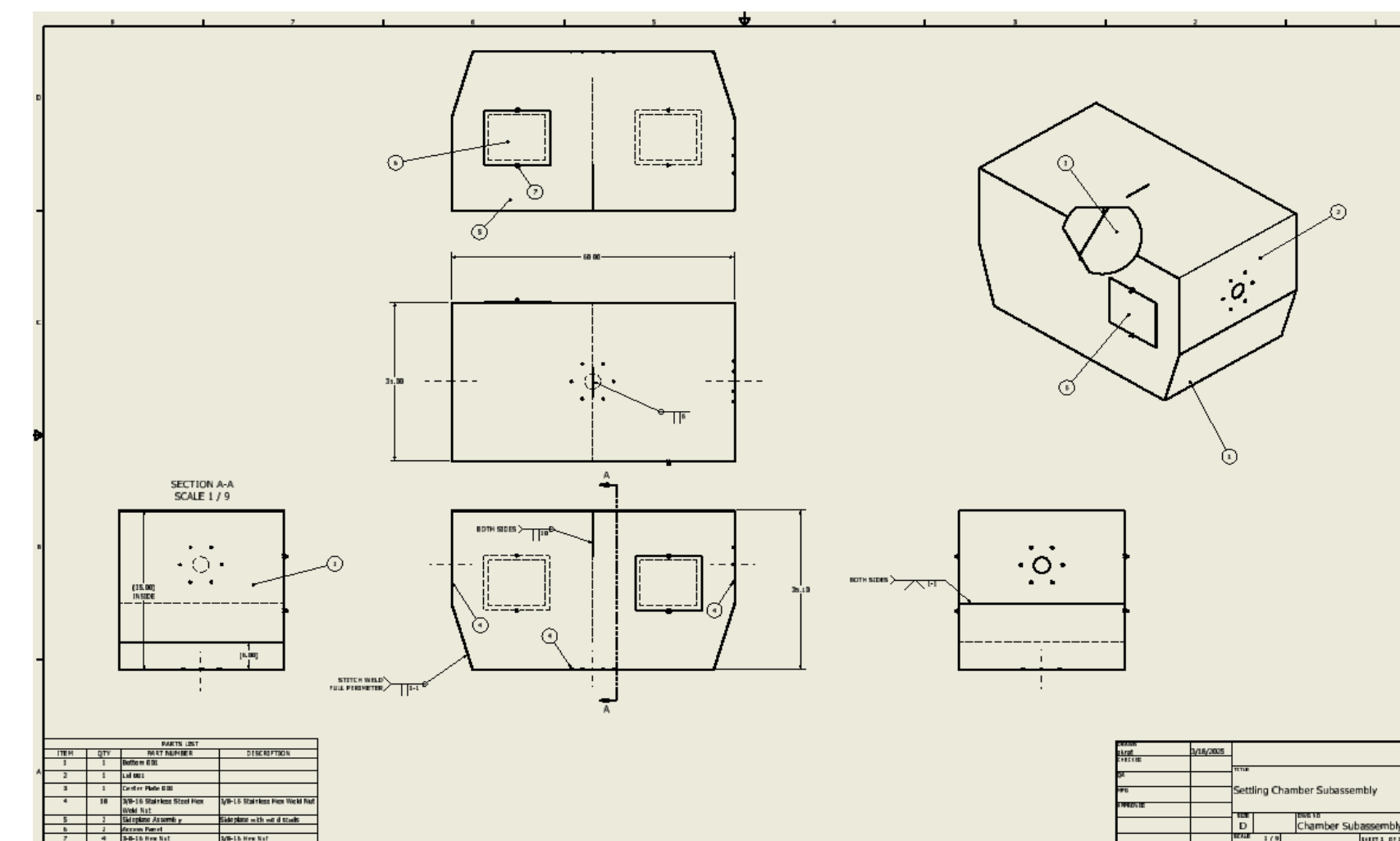


Manufacturing

Filter Box

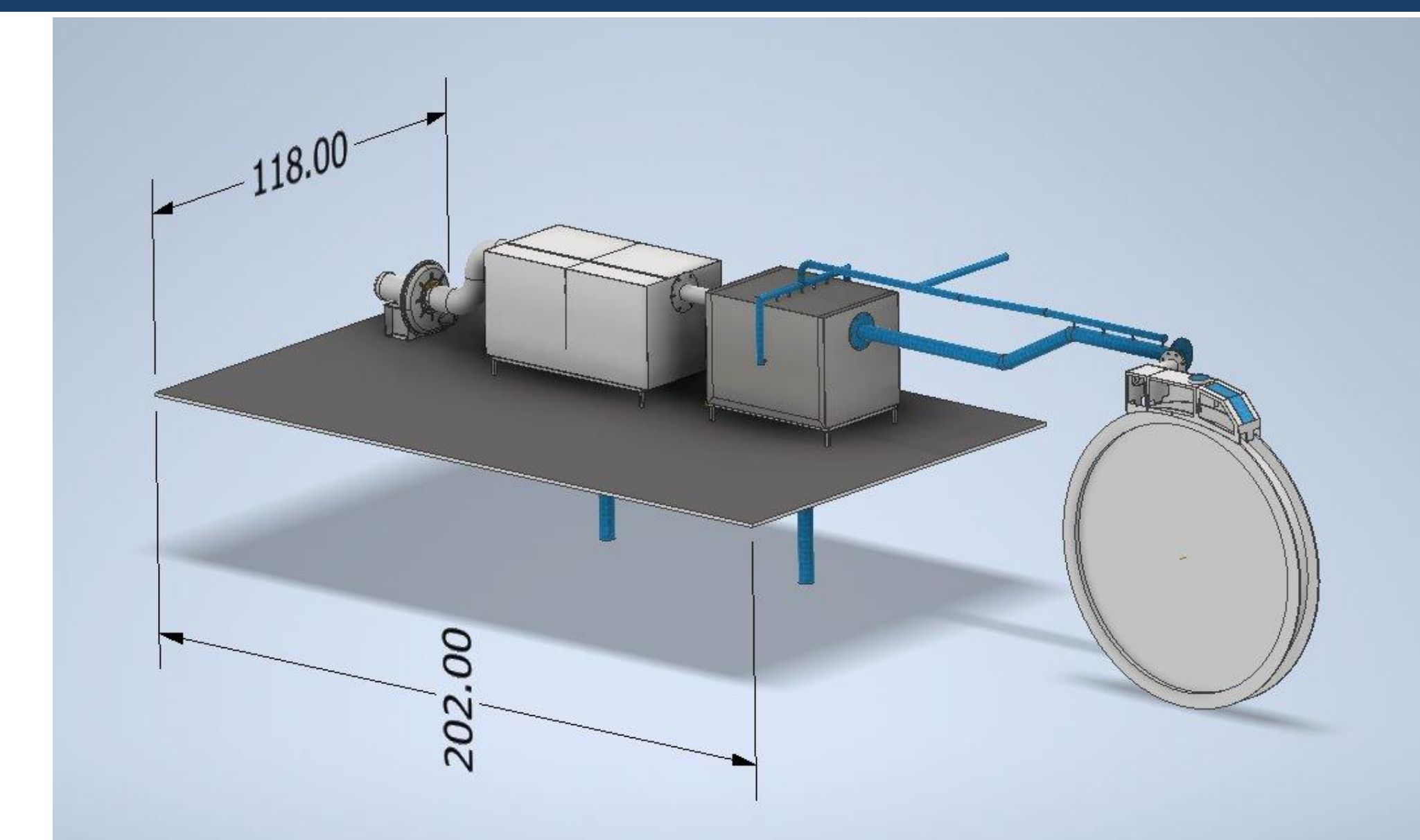


Settling Chamber



- 7108.36 square inches of 18 gage stainless 304 sheet steel

- 7963.71 square inches of 18 gage stainless 304 sheet steel

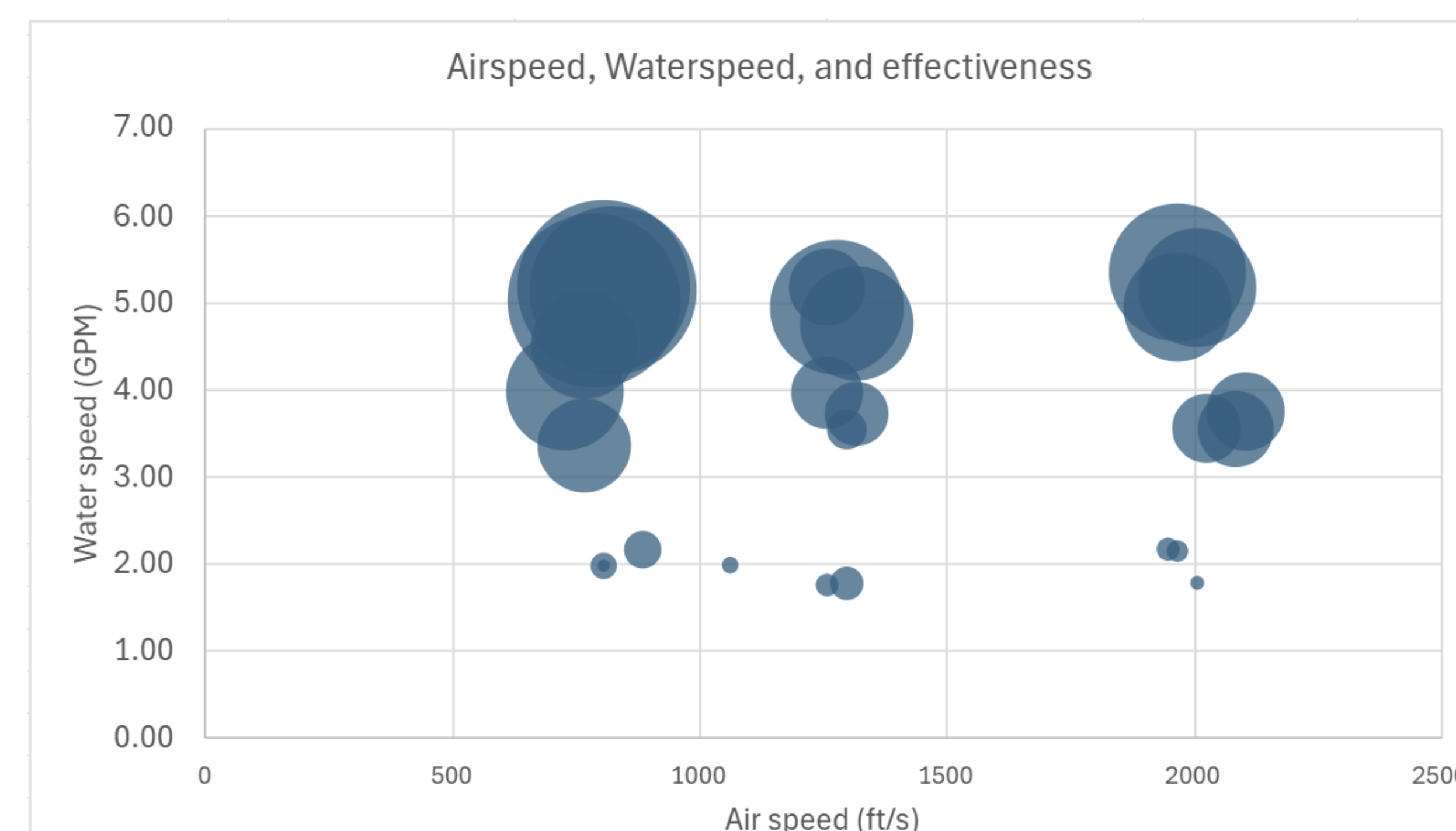


Full design built and installed by Copperworks and contractors.

Testing and Validation

Test : The Filtration test

- Tested air speed that most efficiently pulled soot into wet scrubber
- Variable air speed weld fan
- Tested volume of water that best captured soot
- Turbidity tester used to measure soot percentage capture



Bubble diameter = % soot collected

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SDI LAFARGA
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