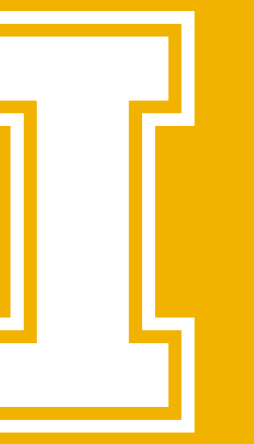


EXPO 2021 CNR EMBER GENERATOR

engineering ▲ design

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Objective

Design and build a portable ember generating device capable of outputting a steady stream of embers for fire testing and research

Background

- NIST Baby Dragon Influence
- Modified design to meet client needs:
 - Mobile and Transportable
 - More Autonomous
 - Controlled Remotely
 - Integrated System

Value Proposition

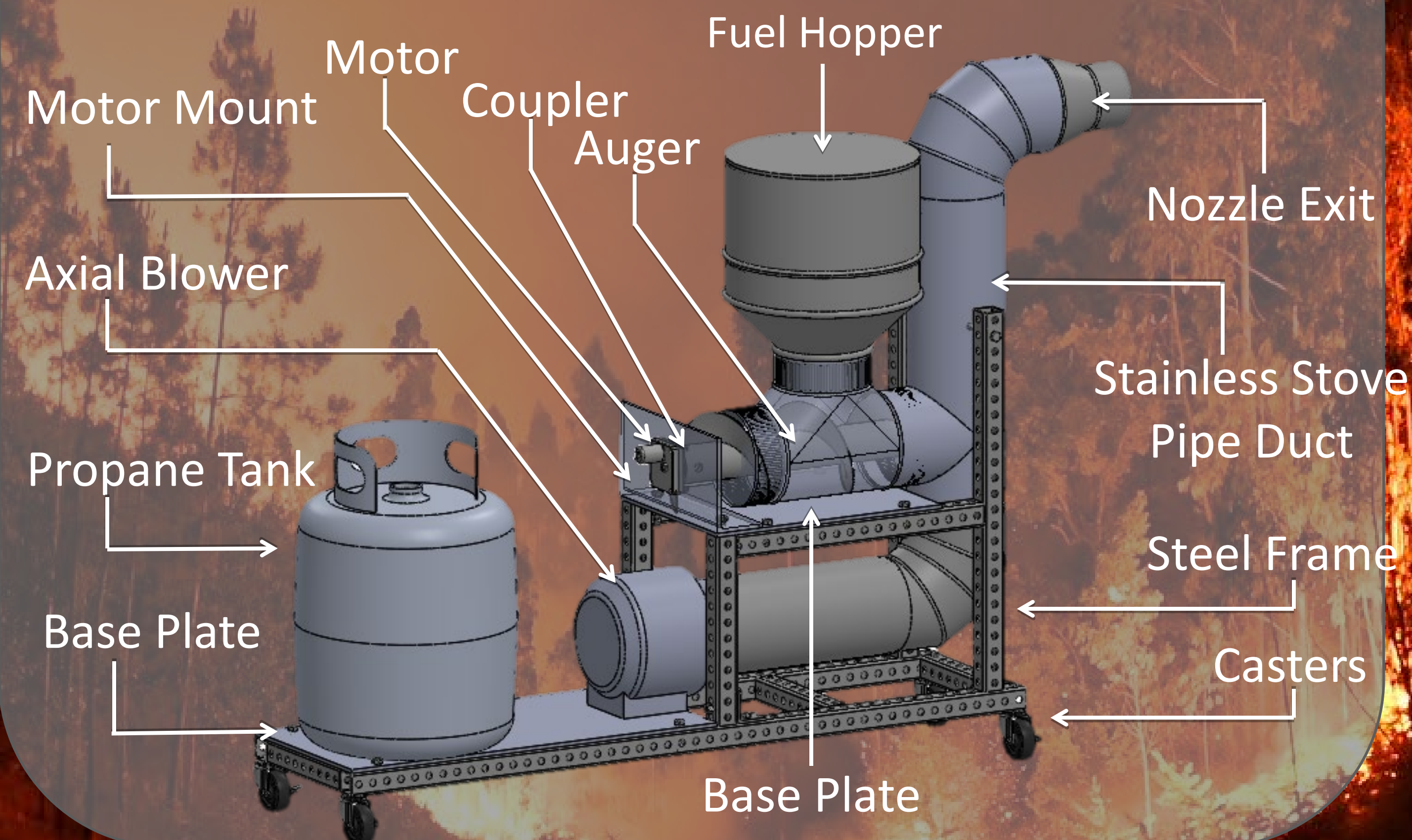
- Wildfires are costly and dangerous
- Difficult to replicate in a lab
- Our ember generator outputs firebrands like wildfire scenarios
- Enabling researches to test wildfire impact on structural materials

Key Requirements

- Run for 15 minutes without reloading
- Transportable in bed of truck
- Controlled remotely
- Emergency shutdown/safety features
- Lasts 5+ years, can handle up to 1400 °F
- Budget: \$2,037 used of \$3,100



Concept Development



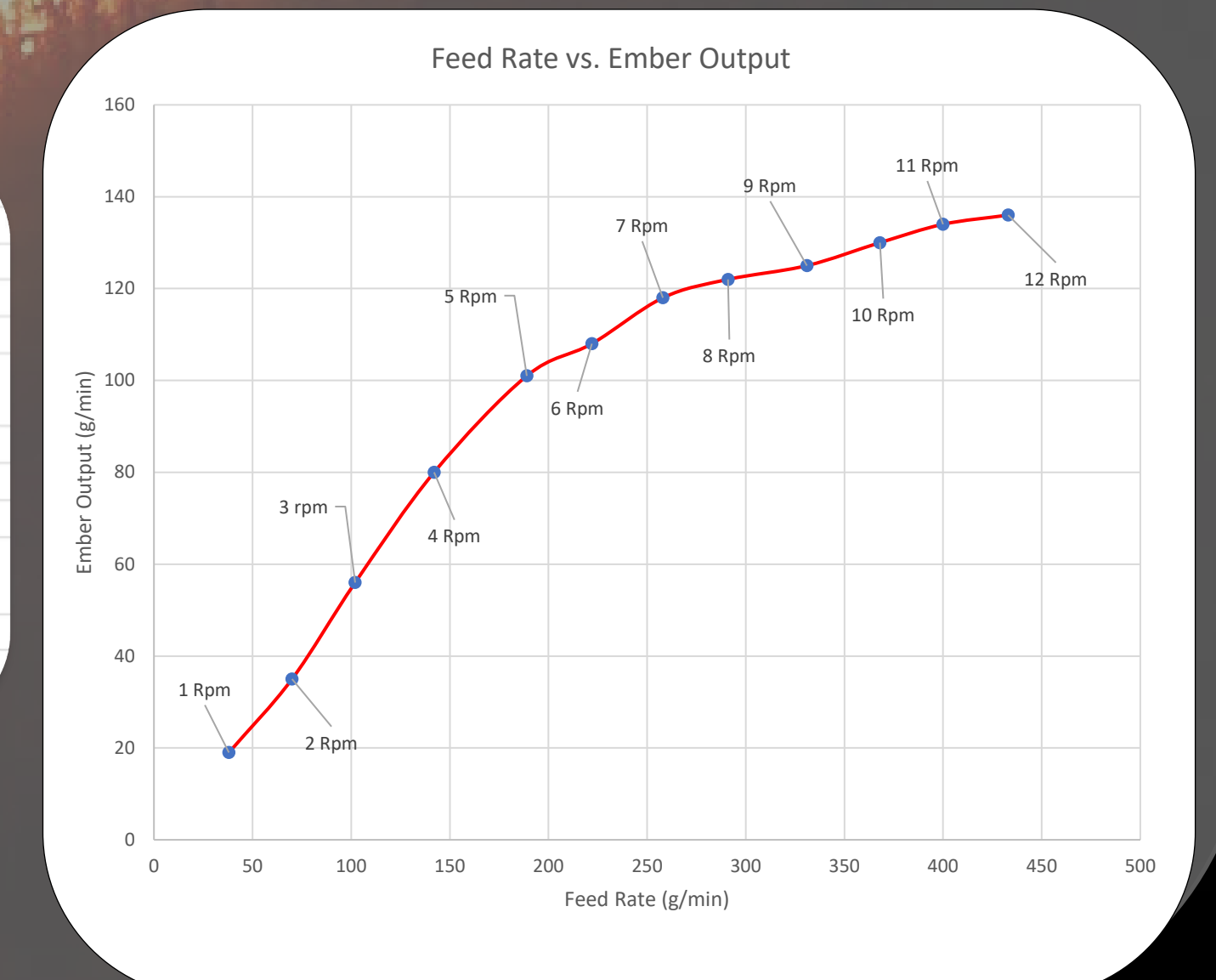
Final Product



Design Validation

- Extensive Fire Lab Testing
 - Use of several prototypes
 - Heat fatigue tests (15 min direct flame on materials)
- Overall System Functionality Calculations
 - Blower Speed (14 ft/s)
 - Feed Rate (200 g/min)
 - Ember Output Rate (50 g/min)

5	Wheel Diameter	8	in
6	Wheel Length	18	in
7	RPM	5	
8	Fuel Density	2	grams/in ³
9	Volumetric Feed Rate	100	in ³ / min
10	Mass Feed Rate	200	grams/min
11	Fuel Weight in Hopper	3000	grams
12	Required Motor Rating	1.565658	Watts
13			
14			
15			



Conclusion/Continuing

A fully functioning ember generator has been produced that meets all key requirements.

- Project will be continued
 - Overall Betterment
 - Wind Tunnel Integration



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