Team 10: Climatic Camera

Design Review II

Nash Bonaventura
Diego Gonzalez
Bryce Shumaker

Team Introductions

Diego Gonzalez
Design Engineer

Nash Bonaventura
Simulation Engineer

Bryce Shumaker
Project Manager

Stakeholders

Engineering Mentor
Kourosh Shoele, Ph.D.
Assistant Professor
FAMU-FSU College of Engineering

Sponsor
Vinayak Hegde,
Reliability Engineering Manager
Danfoss Turbocor Compressors, Inc.

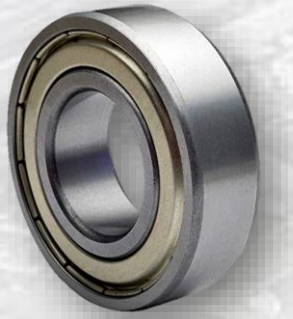
Objective

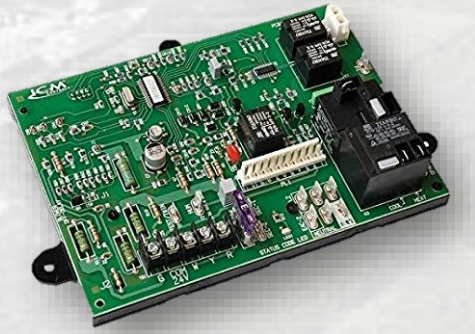
The objective of the project is to design a product that will maintain operation of a recording device at extreme temperatures (-40 to 160 °C)

Diego Gonzalez

Background

- Air compressor manufacturer
- All components are tested by reliability engineering department
- Components are tested using cyclic temperature tests
- Tests go full duration or until visible LED failure





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Current Problems

- Physical presence is necessary to monitor to determine failure
- During cooling cycles window gets foggy and obstructs view

Diego Gonzalez

Outside Visuals

- Reflection from window
- Poor visibility
  - Frost Accumulation
  - Fixed viewing distance
- Low reachability

Diego Gonzalez

Technical Specs

CSZ ZPHS(HP)-32-12-ST2/WC

Cincinnati SZ		Thermotron
97 x 97 x 97 cm	**Workspace Dimensions**	102 x 100 x 97 cm
-50°C to 160°C ± 5°C	**Test Temp. Range**	-50°C to 160°C ± 5°C
12.5°C/min	**Cooling Performance**	9.6°C/min
10-98% RH	**Humidity**	10-90% RH

Tests last up to 71 days

Thermatron SE-1000-10-10

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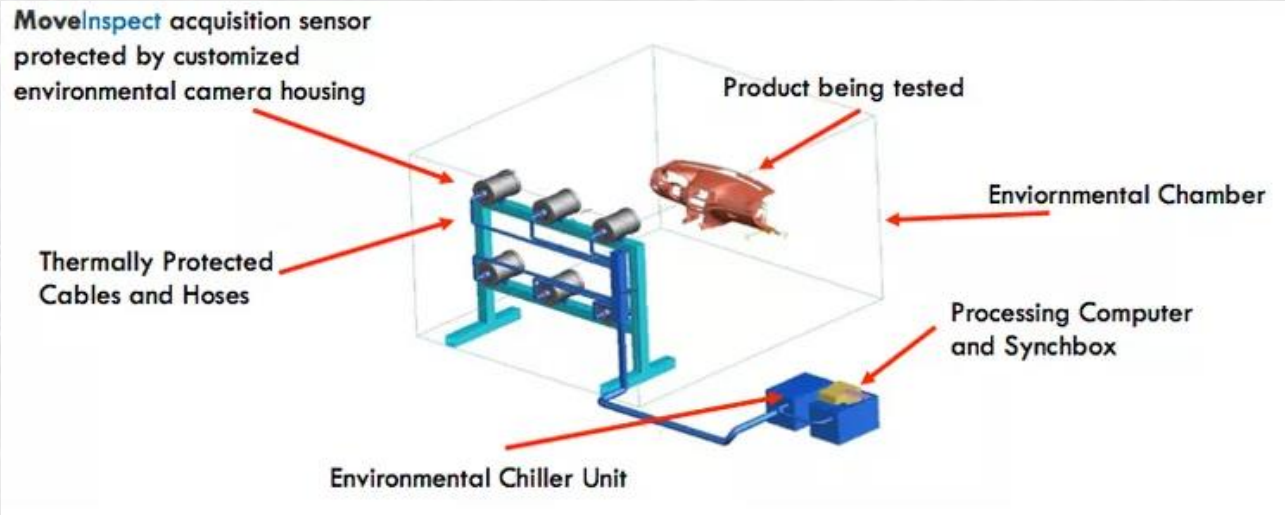
Existing Product

ChamberCam

- 15 frames/sec
- Real time point measurements
- 0-95 % RH
- -50 to 150 °C (± 30 °C)
- 3-D point-data charts



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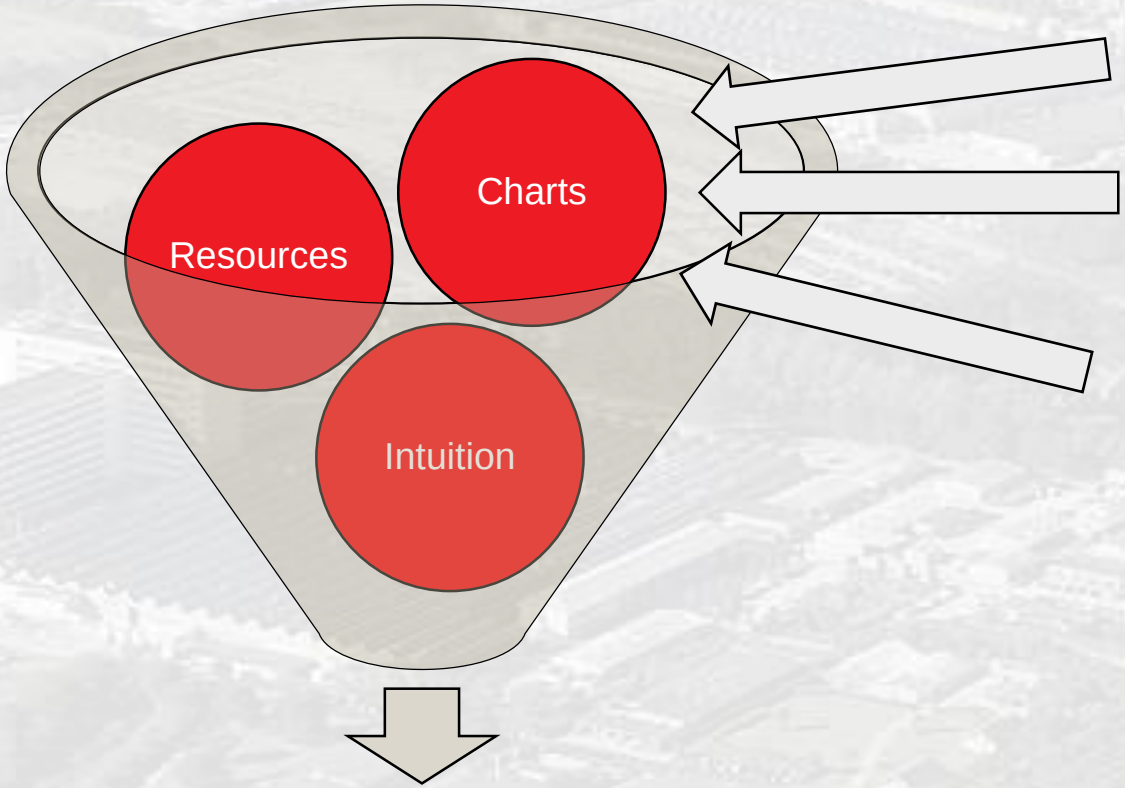
Available Resources

- Compressed Air – temperature regulation
- Laptop – power supply, software interface, data storage
- Chamber Port – connection with auxiliary systems
- Racks – mounting

Diego Gonzalez

Concept Selection



Binary Piecewise Comparison

House of Quality

Analytical Hierarchy Process

Final Concept

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House of Quality

Rank	Characteristic
1	Control Temperature
2	Transmit Visuals
3	Capture Visuals
4	Control Humidity
5	Supply Power
6	Replay Visuals
7	Secure Position
8	Provide Stability
9	Store Visuals
10	Secure Rotational Angle
11	Record Time

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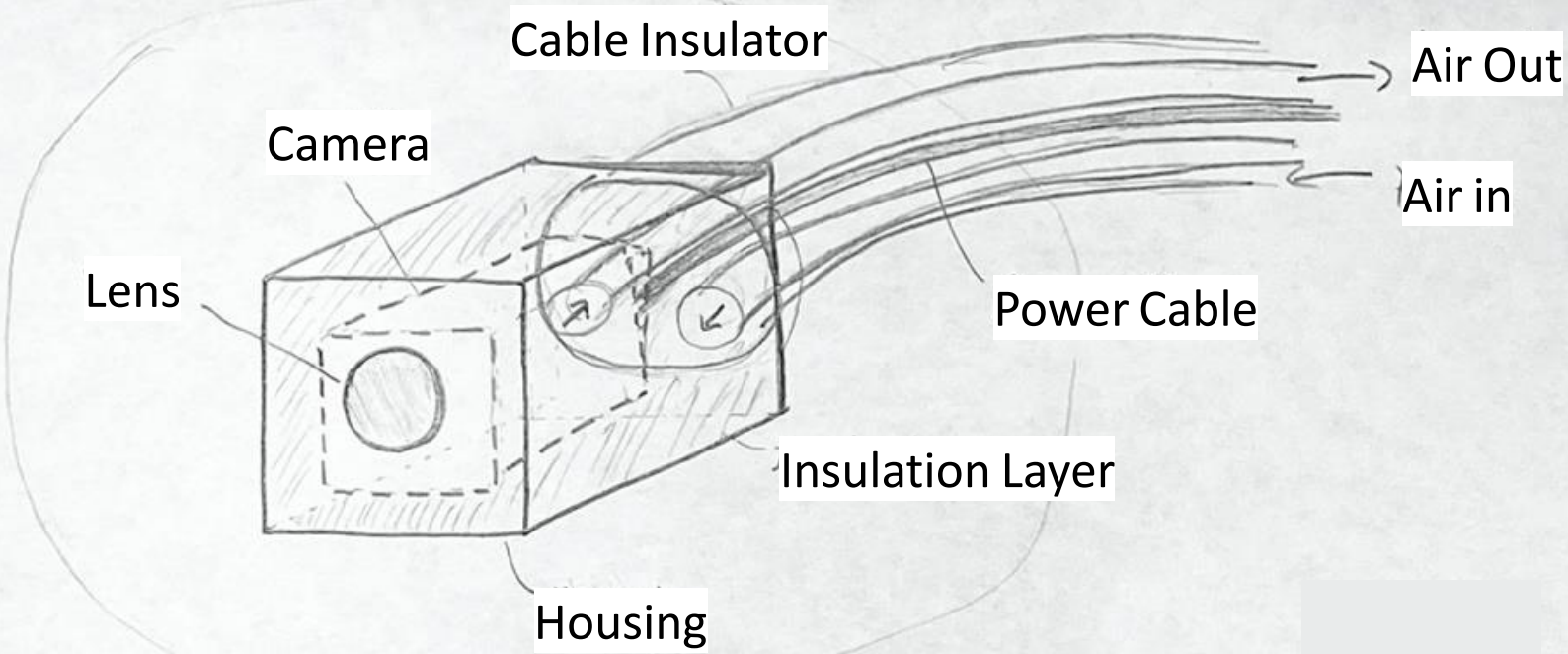
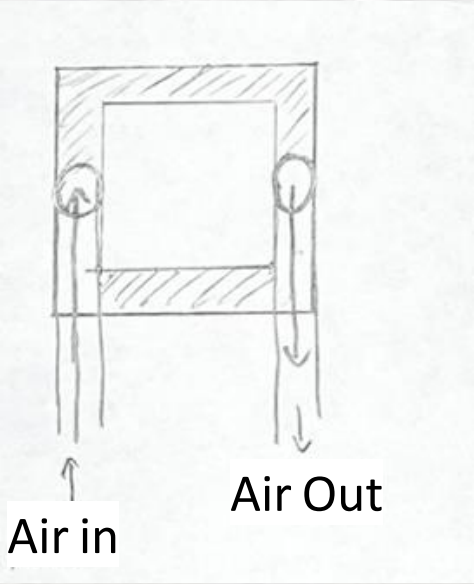
Top Concept 1:

Compressed air, USB Borescope Camera





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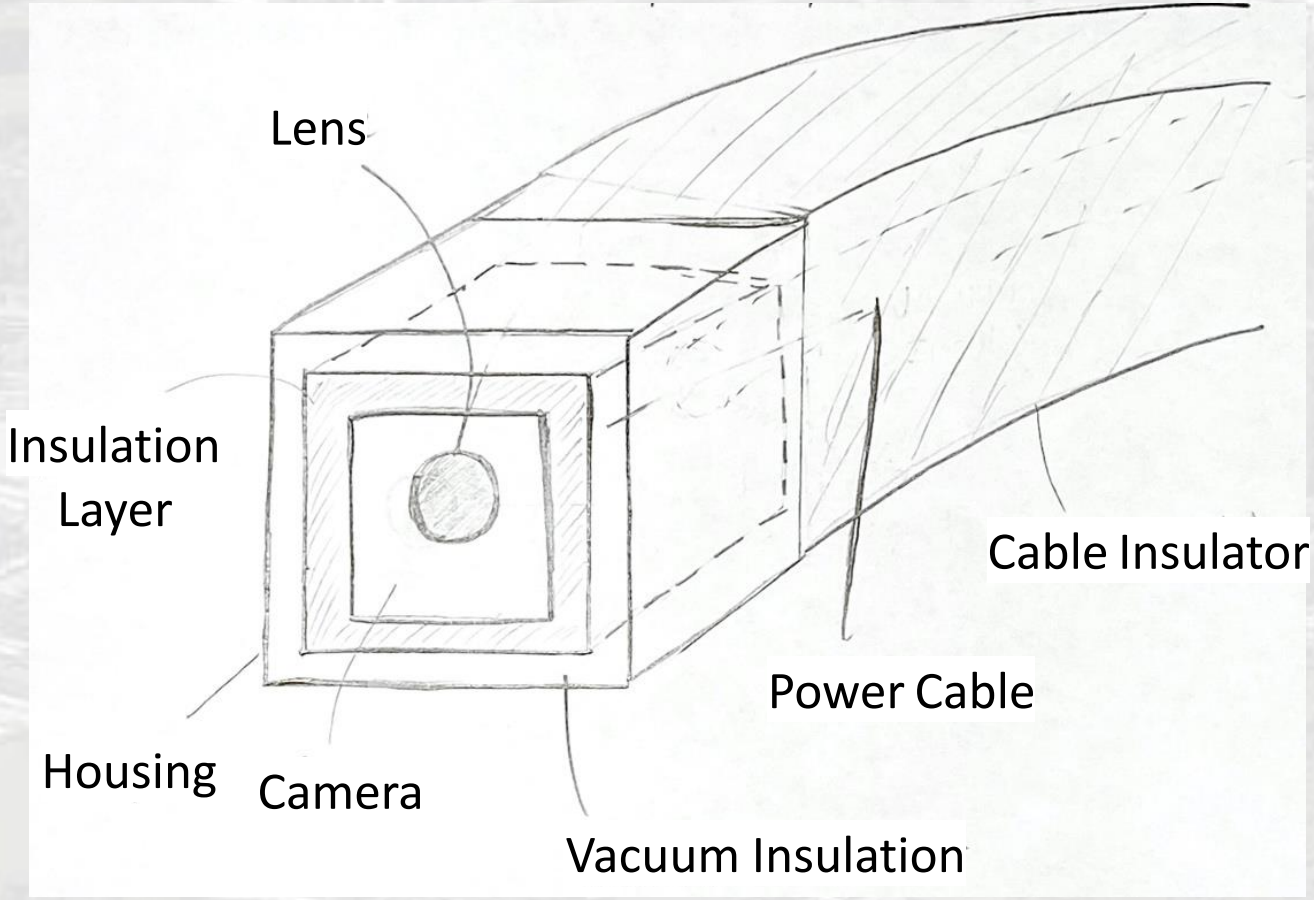
Top Concept 2:



Vacuum insulated, USB Borescope Camera

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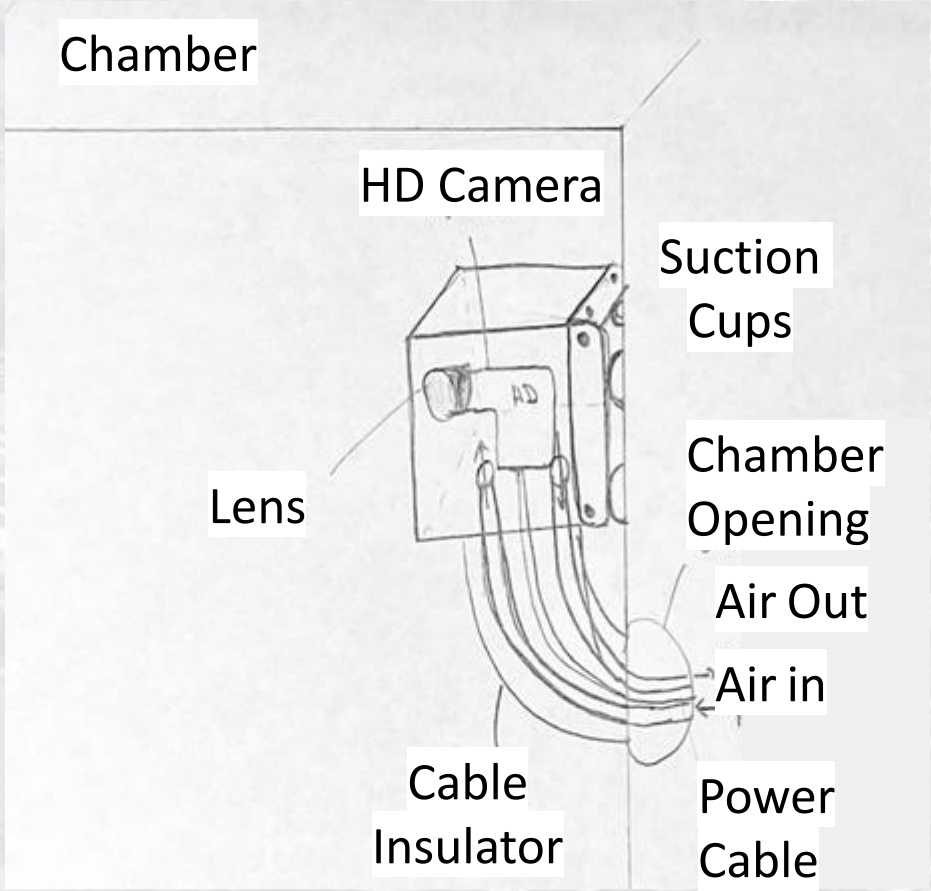
Top Concept 3:



Compressed Air
and
Vacuum insulated
USB Borescope Camera

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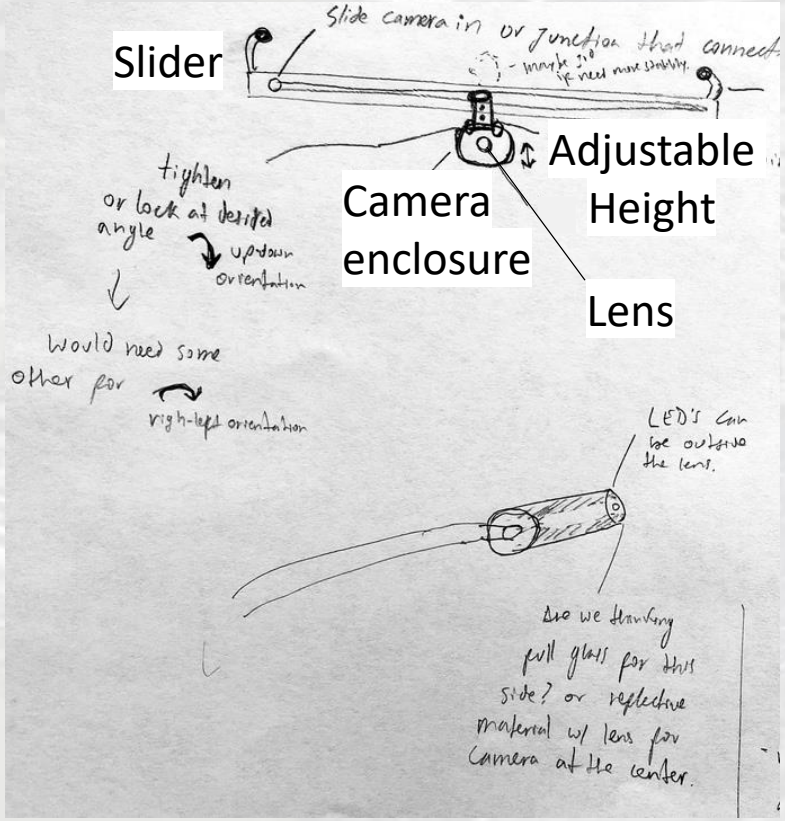
Top Concept 4:



Compressed Air, Slider Linkage, HD Camera

Use existing rack support to aid mobility of the design

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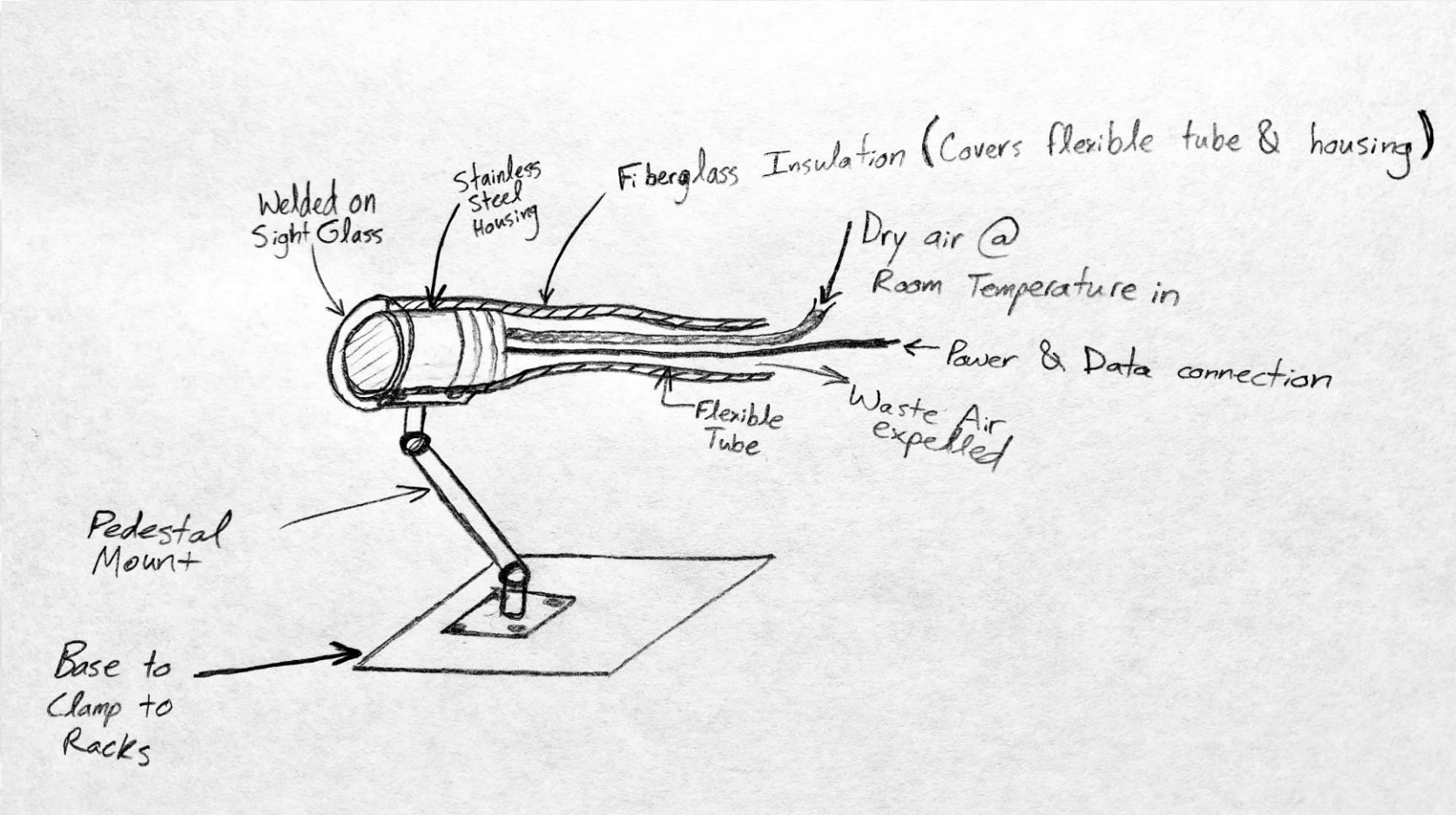
Final Concept



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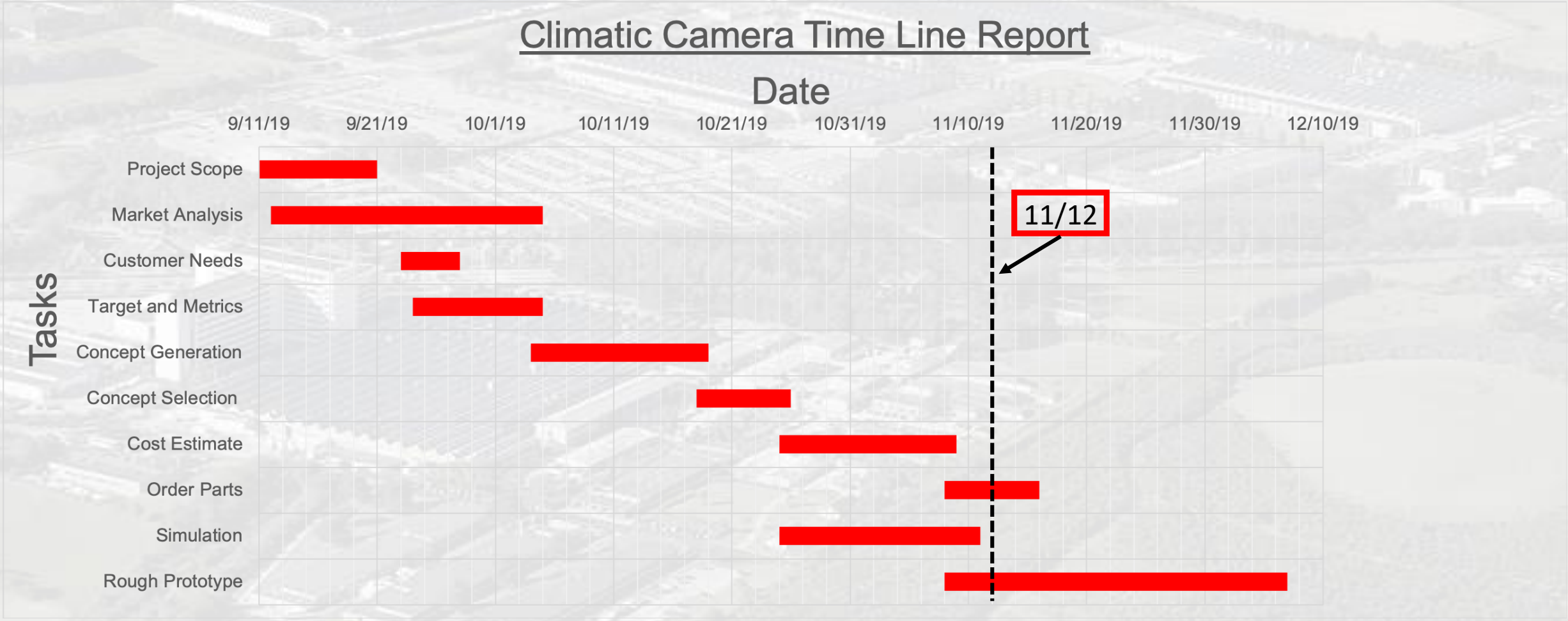
Time-Line


Climatic Camera Time Line Report
Date
9/11/19
9/21/19
10/1/19
10/11/19
10/21/19
10/31/19
11/10/19
11/20/19
11/30/19
12/10/19
Tasks
Project Scope
Market Analysis
Customer Needs
Target and Metrics
Concept Generation
Concept Selection
Cost Estimate
Order Parts
Simulation
Rough Prototype
11/12

References

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"It's not a problem it's an opportunity"