

Delta Critical Design Review

January 15, 2026

TEAM
THERMOCLINE



Southern
New Hampshire
University

Project Team & Roles



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CDR Request for Action Deliverables

1. CBE of Weight
2. Cabling Port
3. AC/DC Conversion & Voltage Regulation
4. HMI Control System

CBE of Weight

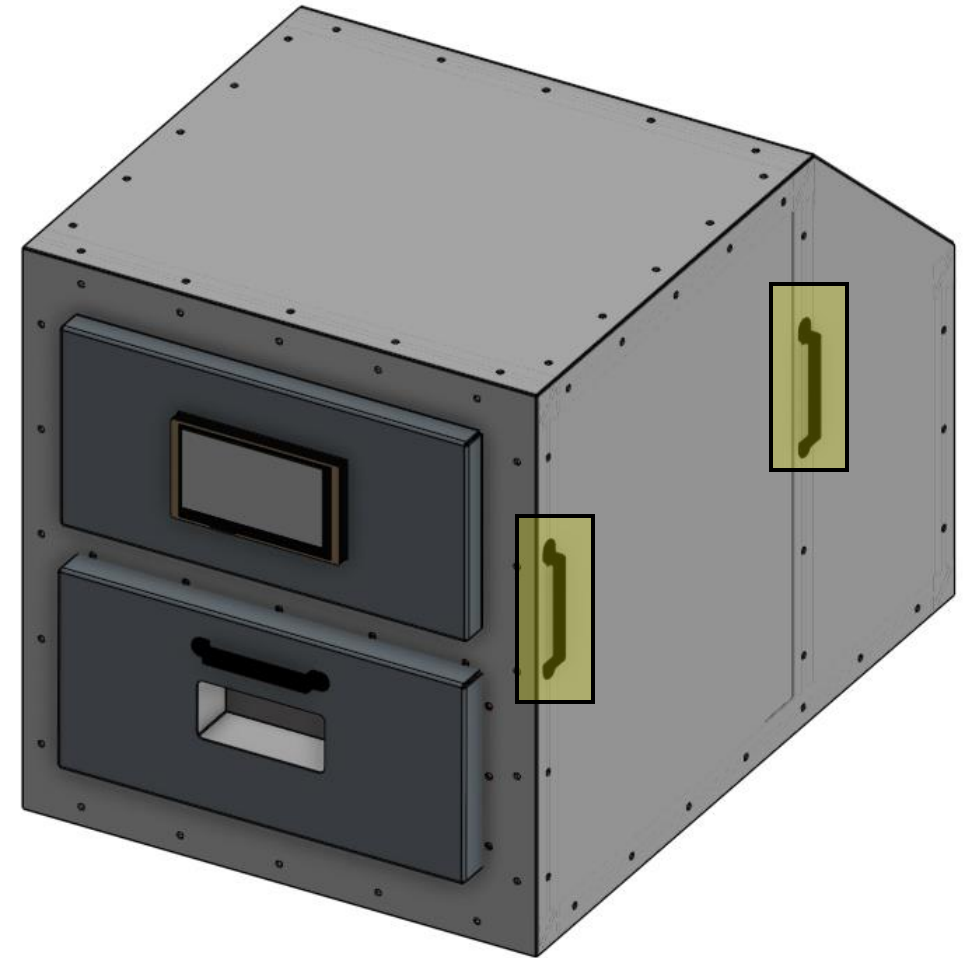
CURRENT BEST ESTIMATE ("CBE") OF WEIGHT			
	<i>Inventor & Onshape</i>	<i>Material Specifications & Estimation</i>	<i>Calculation</i>
STRUCTURAL ASSEMBLY	Volume [m³]	Density [kg/m³]	Weight [kg]
Skeletal Frame	7.93E-03	2700.00	21.33
External Body Panels	4.01E-03	2712.63	10.88
Chamber Door & Handle	4.58E-04	2712.63	1.25
PCB Testing Chamber & Support	1.13E-03	2712.63	3.07
Airflow Management Chamber	7.83E-04	2712.63	2.14
Thermal Insulation	*Unknown	12 - 48	< 3.00
Total			41.67

- Volume measurements verified across Inventor & Onshape CAD.
- “Mass” property function in Inventor cross-checked with “Volume” x “Density” values.
- CBE does not include thermal-fluid system components, whose weight is yet to be measured/estimated.

**Important note: no official OSHA standard dictates the number of personnel required to lift in certain weight ranges, albeit the team will enforce proper safety measures when moving the system.*

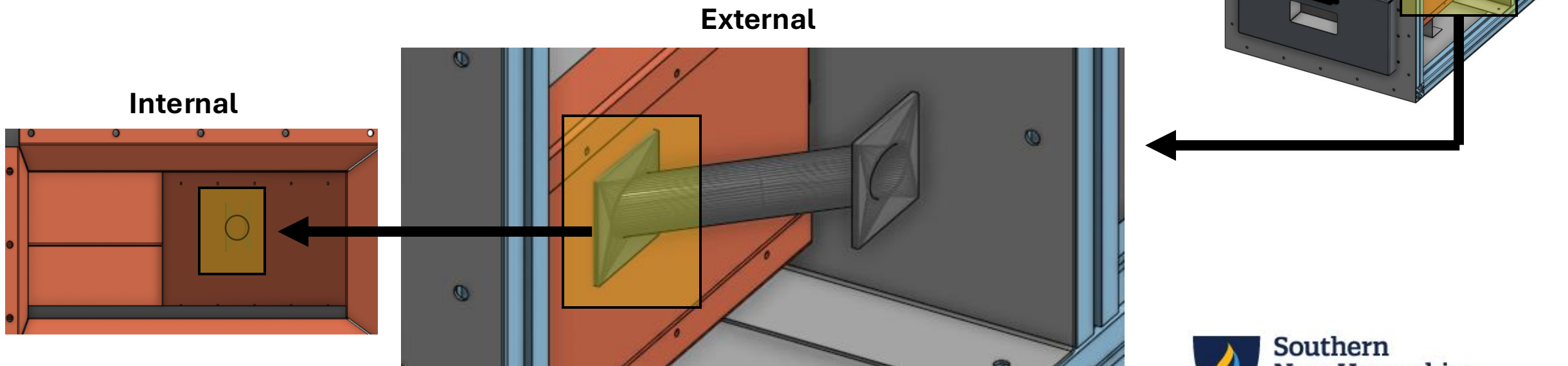
Team's Weight Guidelines

- Weight-reduction would require sacrificing structural integrity and a large increase to the project timeline.
- Adherence to OSHA suggestions for manual lifting: 0 - 50lb / person.
 - Chamber is ~2 person lift
- Ergonomic handle as prospective design.
- Additional personnel or mechanical assistance as needed.
- Operation requiring movement & maintenance is minimized.



Cabling Port; Housing Design

- Accounts for pass-through area
 - Testing cables
 - Normal operating equipment
- Sufficient structural design



Cabling Port; Insulation Material

- Mitigates handling safety & difficulty constraint
- Increases user-friendliness

Characterization	Fiberglass	UltraTouch Denim
Nominal Thickness [<i>in</i>]	3-12	3.5-5.5
Conductivity [$\frac{W}{m \cdot K}$]	0.032-0.036	0.039
Cost [$\frac{\$}{ft^2}$]	0.30-1.30 ✓	1.00-2.00 ✓
System Suitability	✗	✓
Port Suitability		

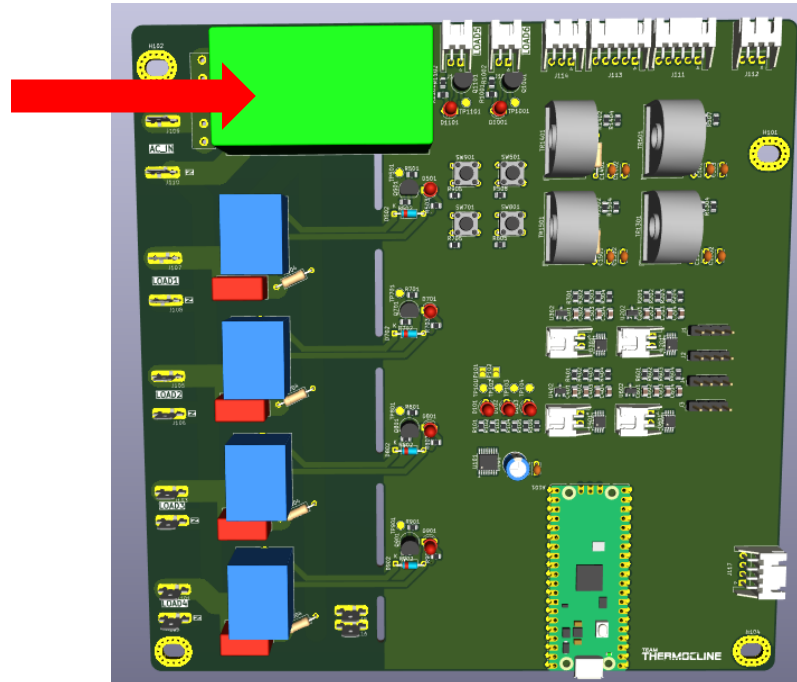


AC/DC Conversion & Voltage Regulation

- The voltage is converted from AC to DC using the IRM-20-5
 - AC/DC Converter, Output 5V/4A, Rated for 85 - 305VAC/120 - 430VDC
- Any other voltage levels (i.e. the HMI screen) have a regulator on chip



IRM

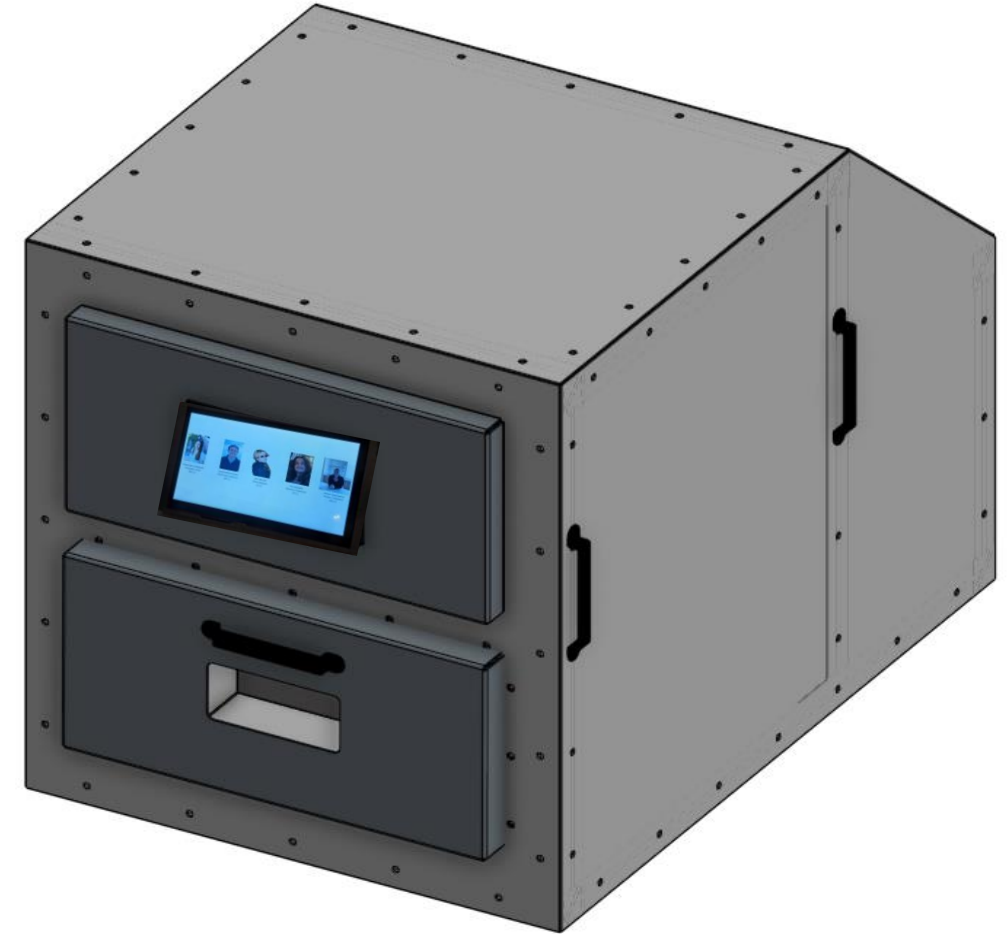


Datasheet



HMI Control System

- Touch-screen HMI
 - Operators, maintenance personnel, & engineers
 - Major controls
- In consideration:
 - Manual safety reset/shutoff button w/power supply
 - Manual buttons for some mechanical operations



QUESTIONS

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BACKUP SLIDES