

Waste Heat Transport

Design Goals and Constraints

- A heat source is heating the air of a temperature sensitive enclosure.
- Heat needs to be carried to outside of the enclosure.
- Limit temperature rise of heat source to under 15°C

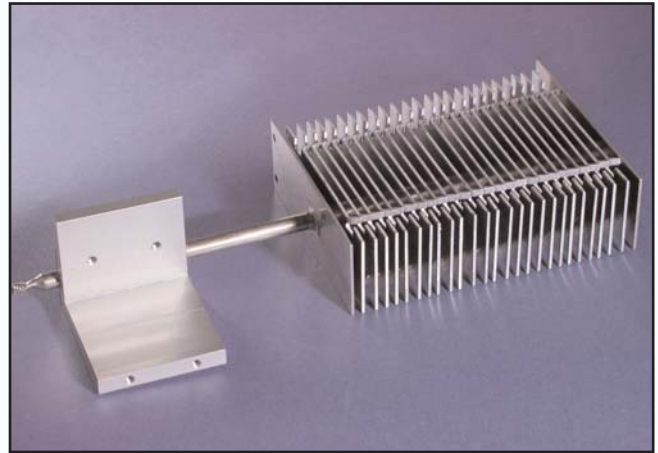


Figure 1: Pipe Thru Fin Heat Sink (Fin Array: 105 x 75 x 30 mm)

Sample	Airflow (fpm)	Power (W)	θ (°C/W)	ΔT (°C)
1	100	13.50	1.05	14.2
	200	13.27	0.99	13.15
	300	13.27	0.95	12.55
2	100	12.81	1.10	14.1
	200	12.92	1.02	13.2
	300	12.92	0.97	12.6
3	100	13.04	1.07	13.95
	200	12.81	1.03	13.15
	300	12.69	1.00	12.65
4	100	12.35	1.09	13.4
	200	12.46	1.06	13.15
	300	12.46	0.99	12.4

Figure 2: Experimental Results Performed Using Four Samples

Solution: Pipe thru fin heat sink shown in Figure 1

The customer has designed a temperature sensitive scientific device. One compartment of this device must have a low controlled temperature. However, there is a 13 Watt heat source in the compartment that cannot be moved out. The goal is to transport the heat from the source while limiting its rise in temperature.

Enertron engineers chose to transport the heat outside of the compartment. Once outside, the heat can be dissipated into a forced airflow stream. A heat pipe is used to transport the heat, and an aluminum fin array provides the surface area. Because of the efficiency of the solution, the temperature rise of the heat source is held to under 15°C. This temperature rise is less than the customer's limit, thus allowing for high accuracy detection.