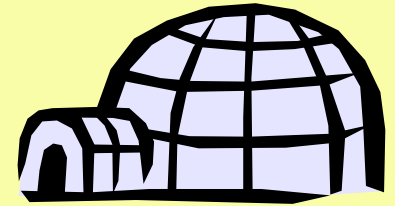


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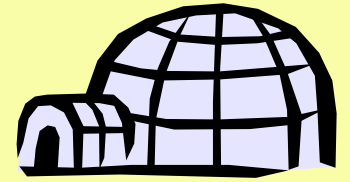
iNEMI

May 31, 2006

**Integrated Liquid
Cooled Heatsink**

**Gregg Kloeppe
Jeff Stein**

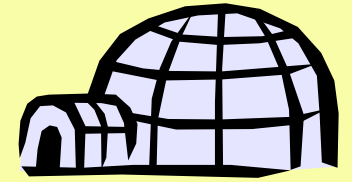
ARTECH



Putting a "NEW
SPIN" on
Thermal Cooling!

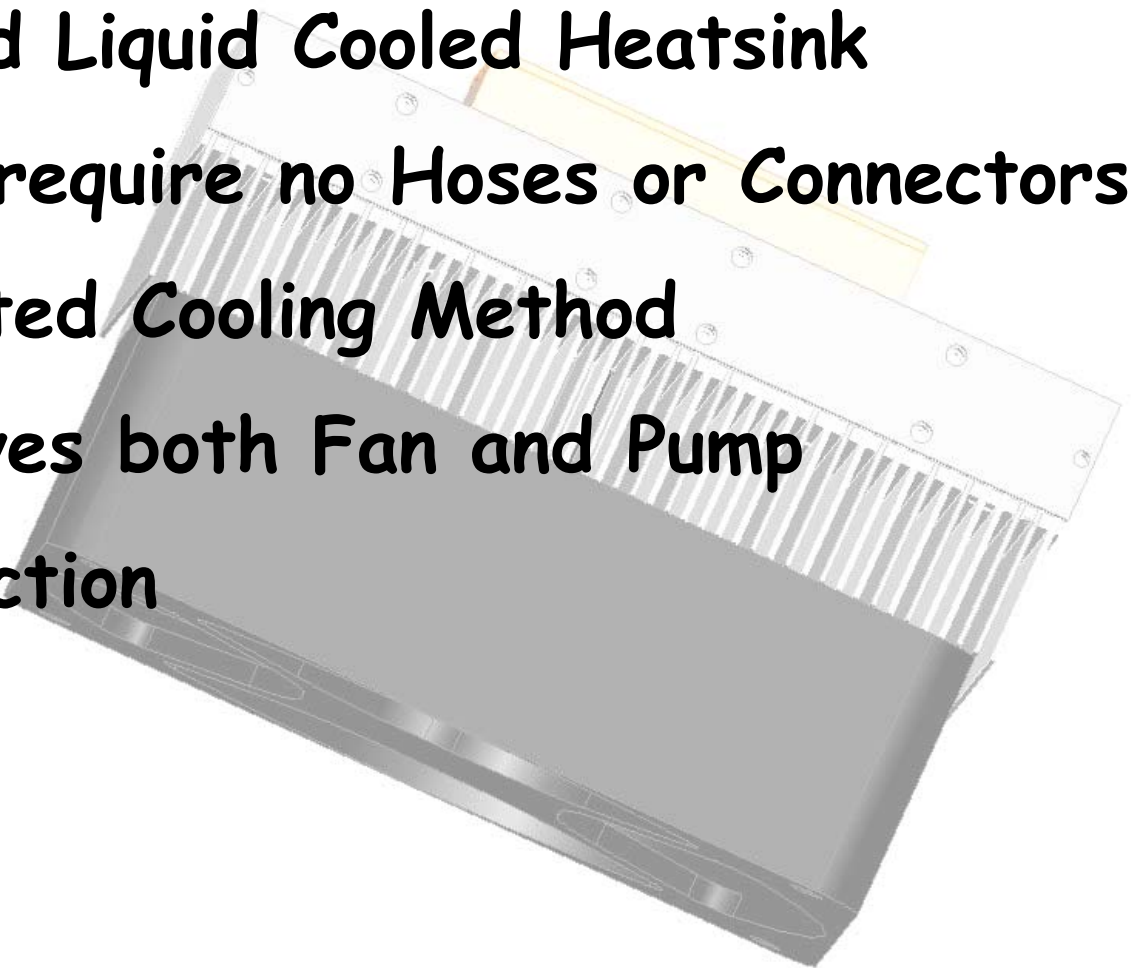


ARTECH

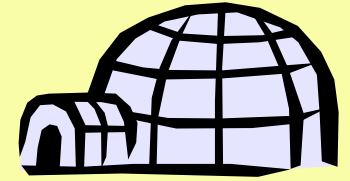


Our New Water Cooled Technology

- Totally Enclosed Liquid Cooled Heatsink
- Single System require no Hoses or Connectors
- Highly Integrated Cooling Method
- One Motor drives both Fan and Pump
- Simple Construction
- Low Cost
- High Reliability



ARTECH

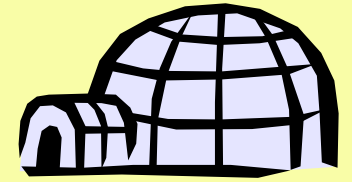
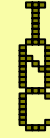


Background of Our New Water Cooled Technology

- Division of Advance Industries
- This Technology was Developed over 5 years ago for large consumer based manufacturers of under sink cold water delivery systems.
- Artech, Inc. Introduced this Technology last year at the Semi-Therm Show.
- Collaboration with Dr. Alfonso Ortiga at the University of Arizona.
- Patents Pending.



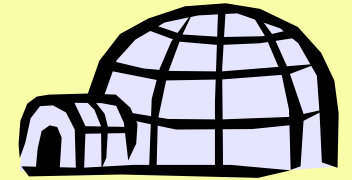
ARTECH



**What is Our "New Spin"
on this Water Cooling
Technology ?**



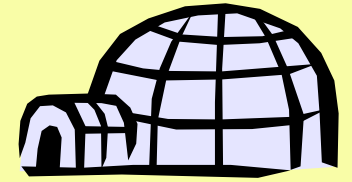
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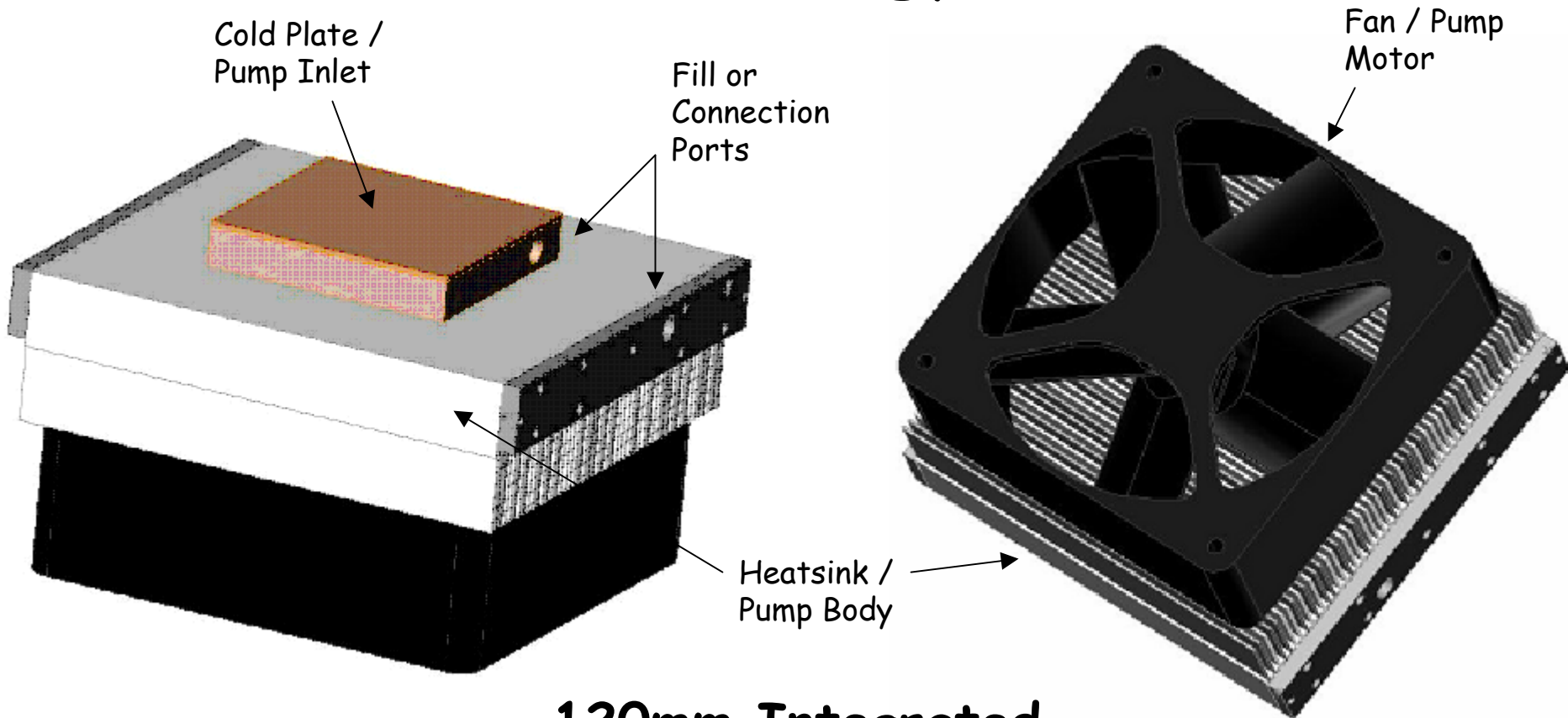
Existing Water Cooled Technology



ARTECH

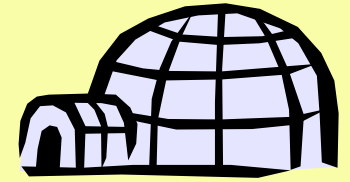


Our "New Spin" on Water Cooling Technology

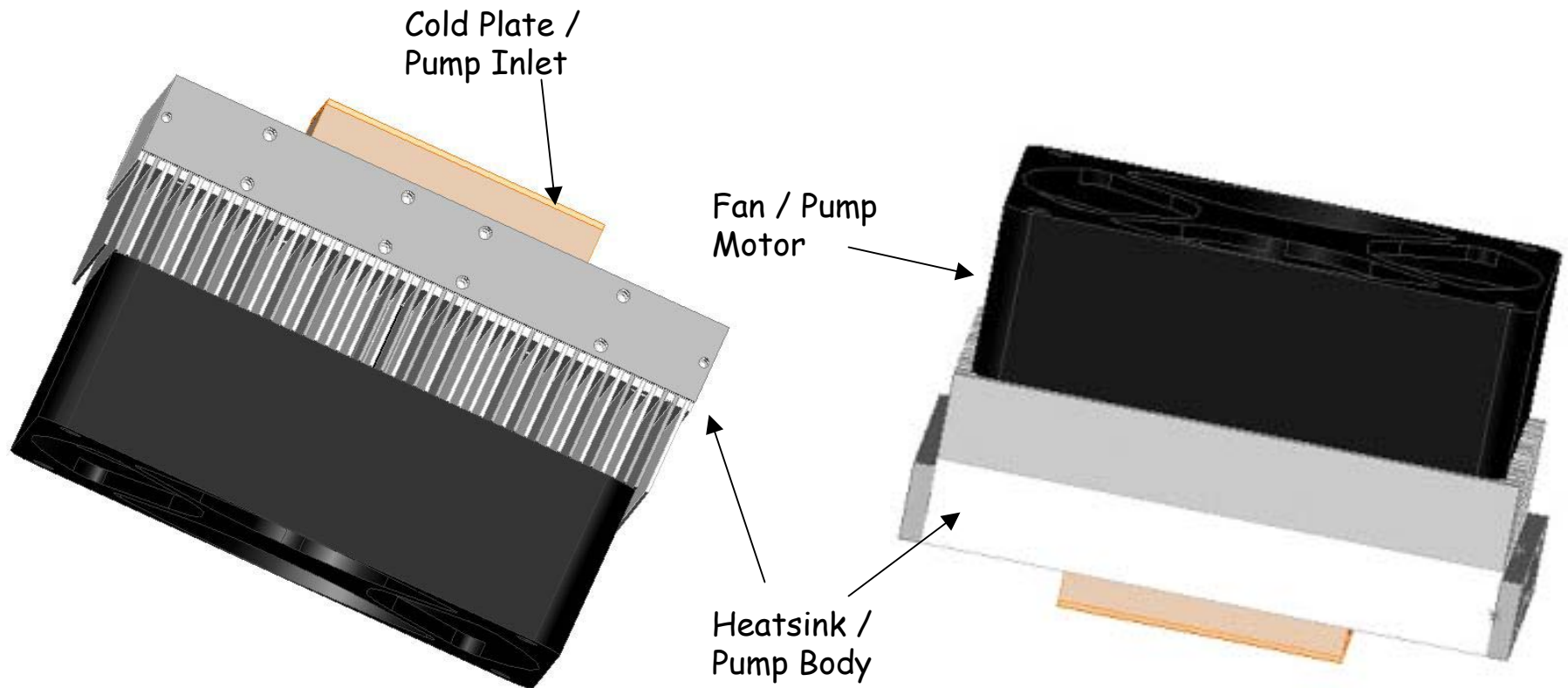


120mm Integrated Cooling System

ARTECH

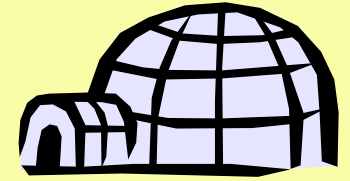
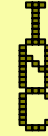


Our New Water Cooling Technology

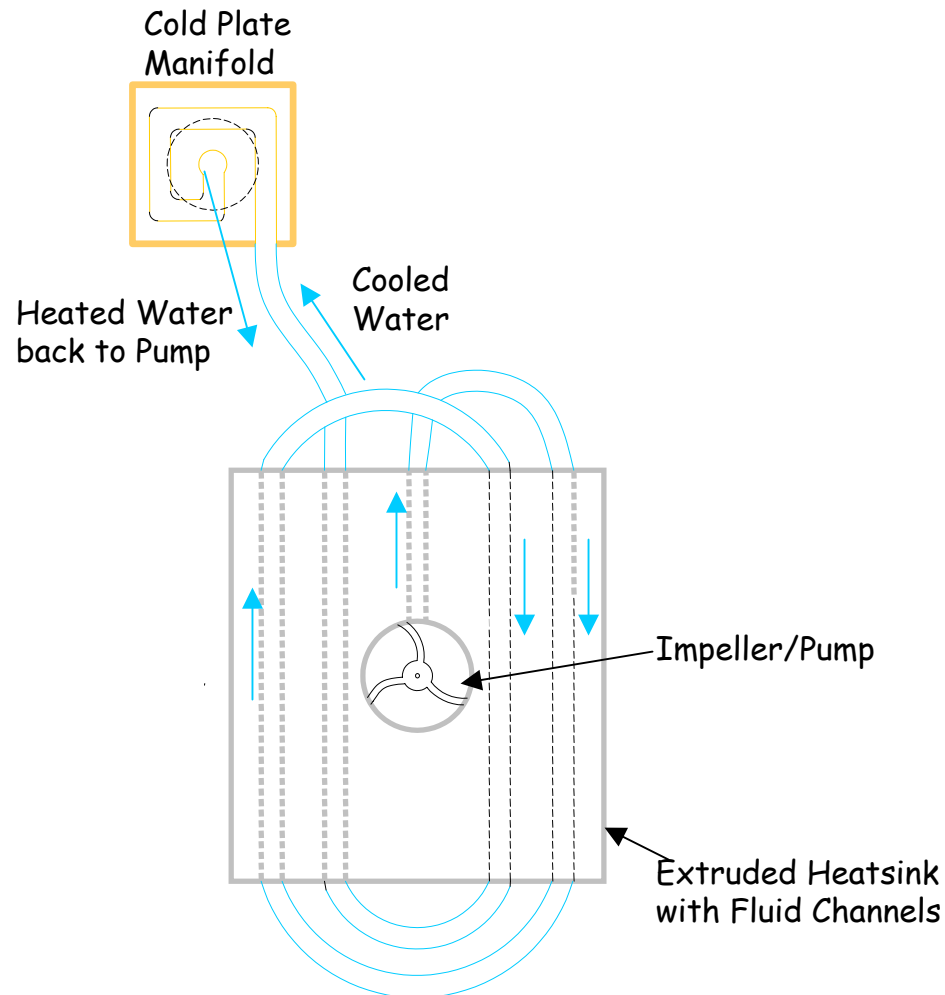


**120mm Integrated
Cooling System**

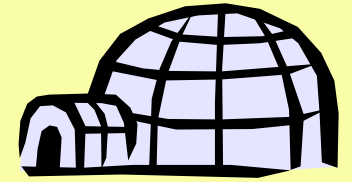
ARTECH



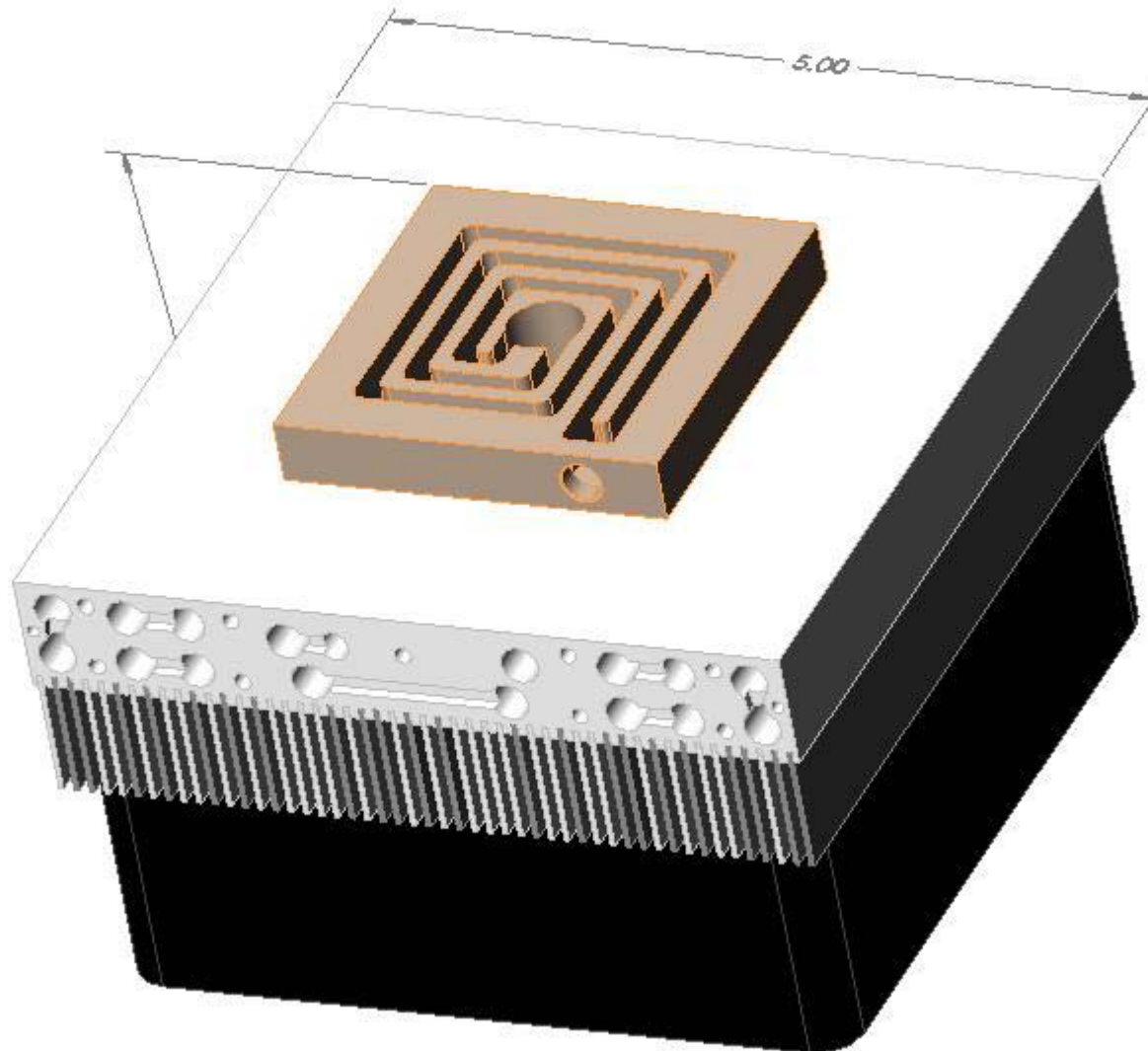
Integrated Closed Loop Water Cooled System



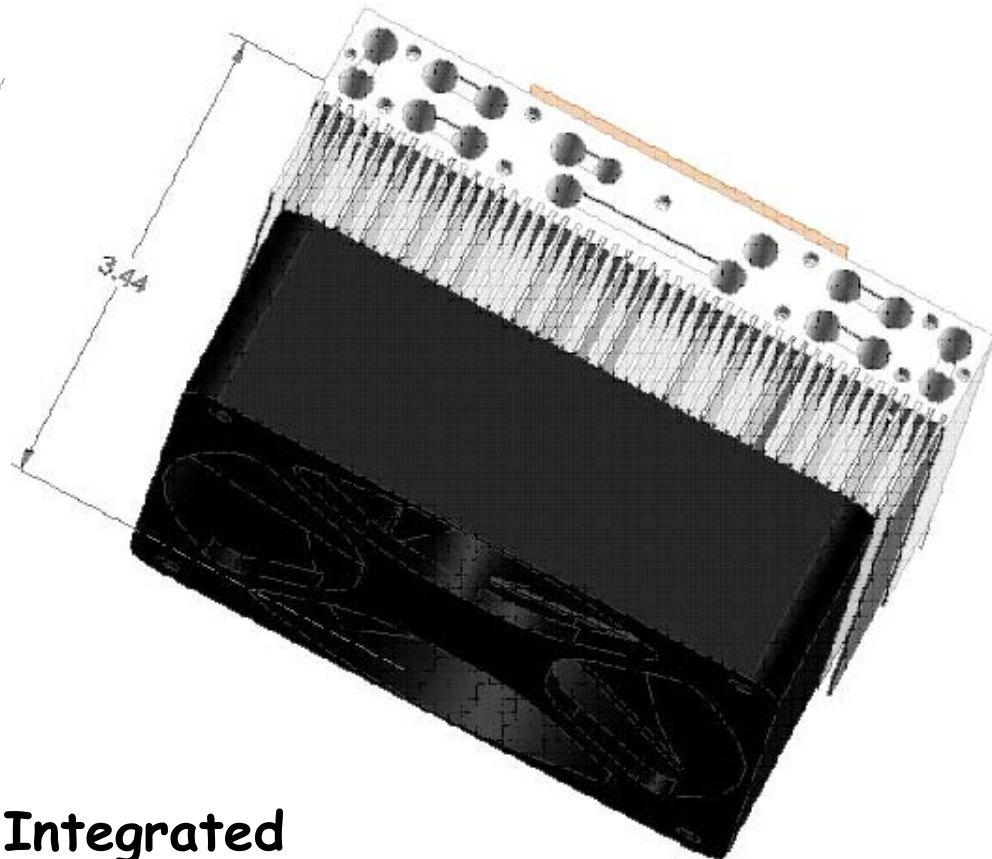
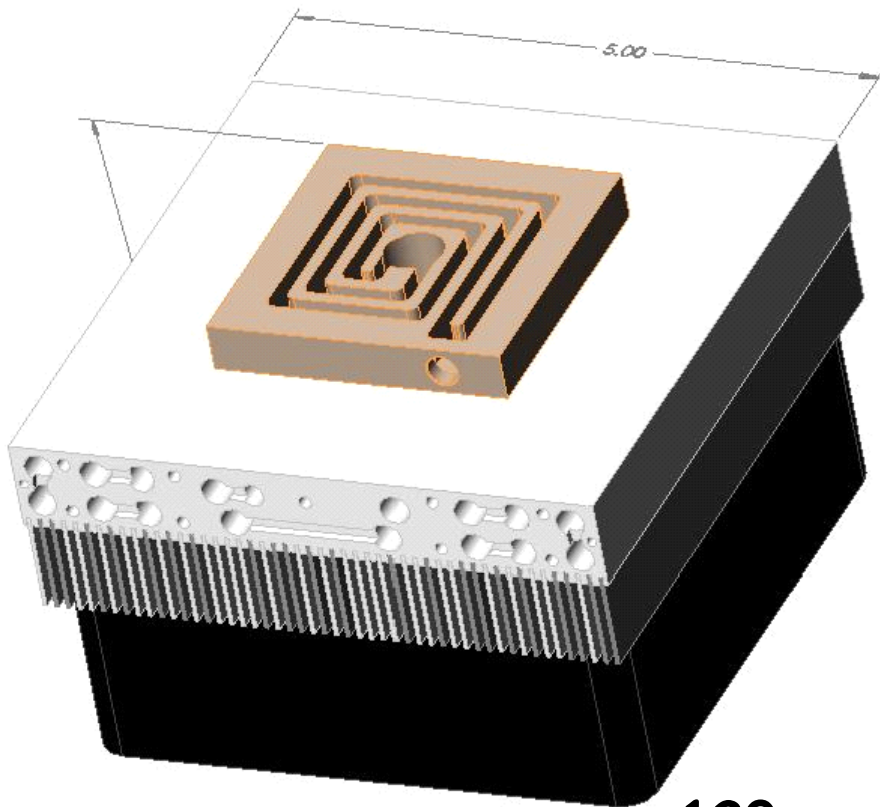
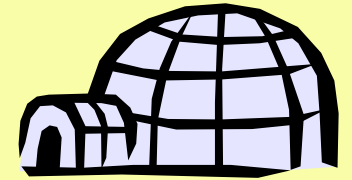
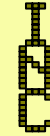
ARTECH



120mm Integrated Cooling System

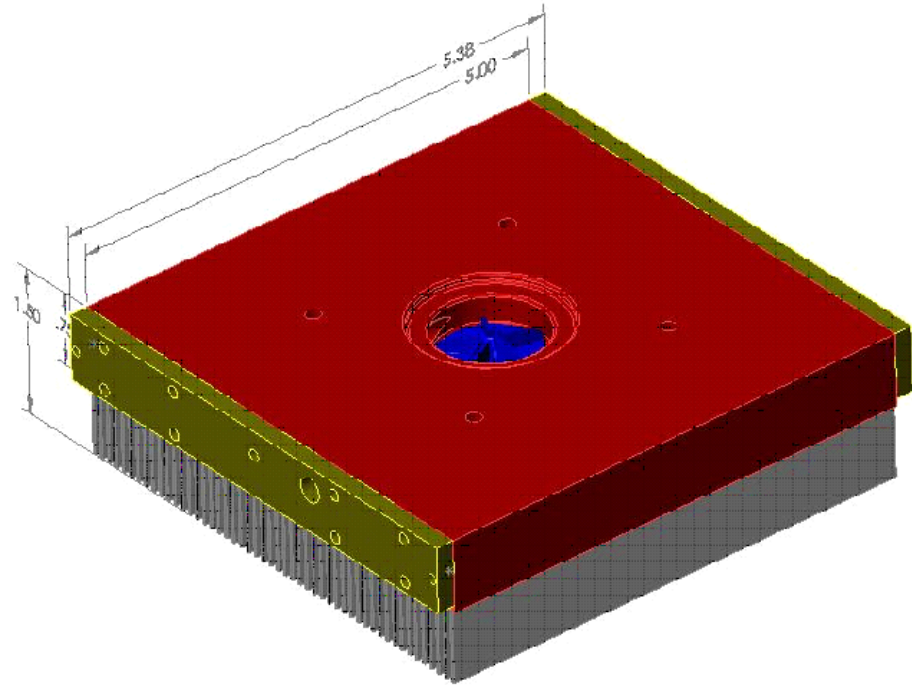
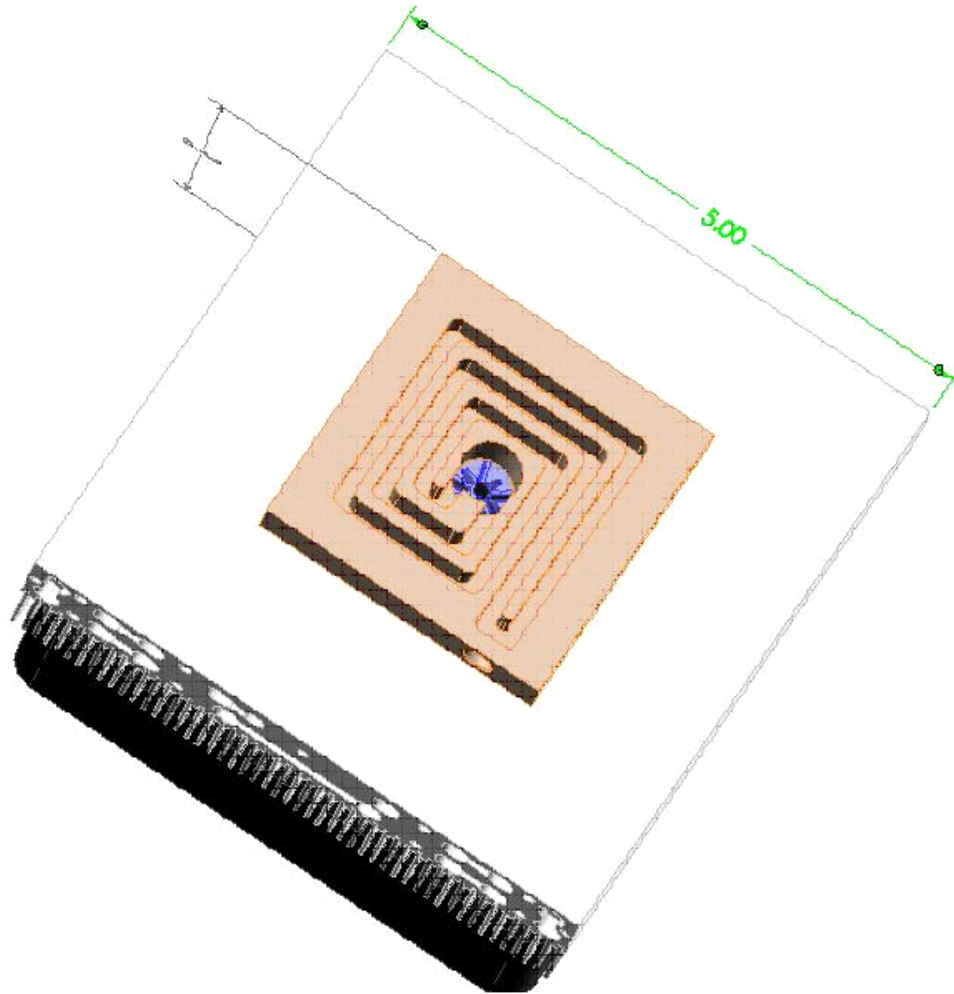
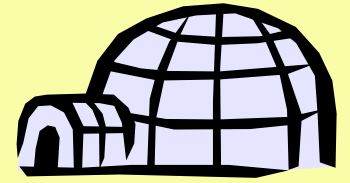


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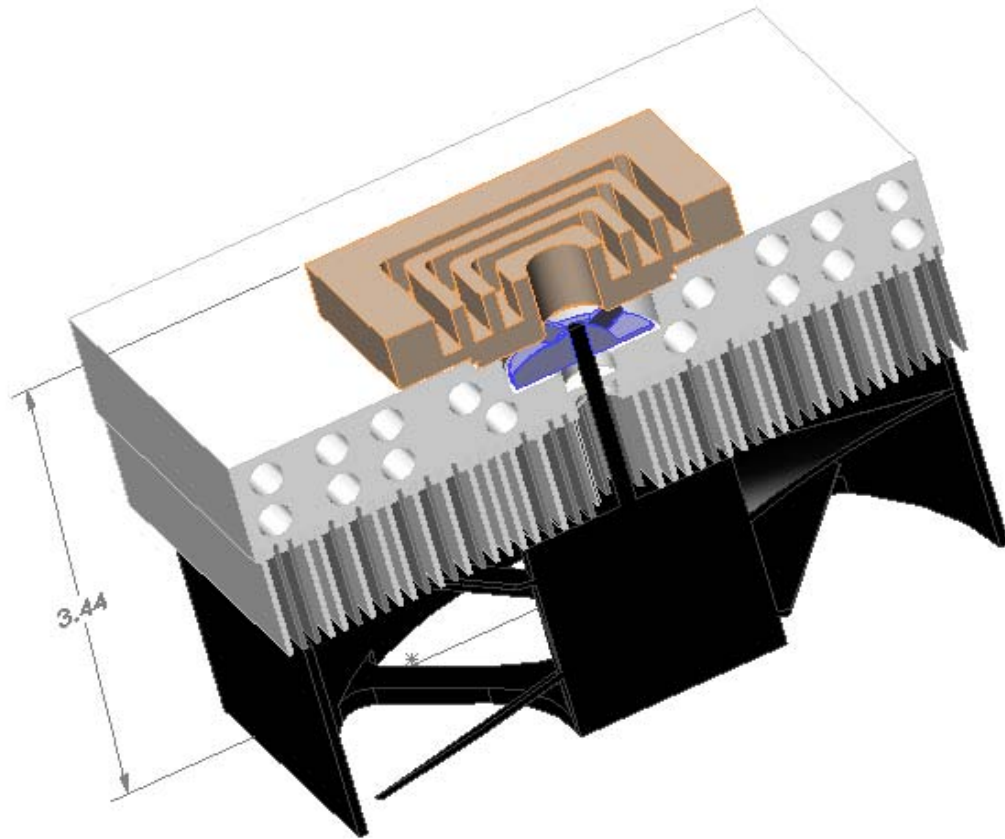
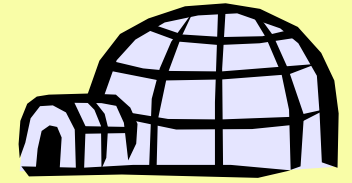


**120mm Integrated
Cooling System**

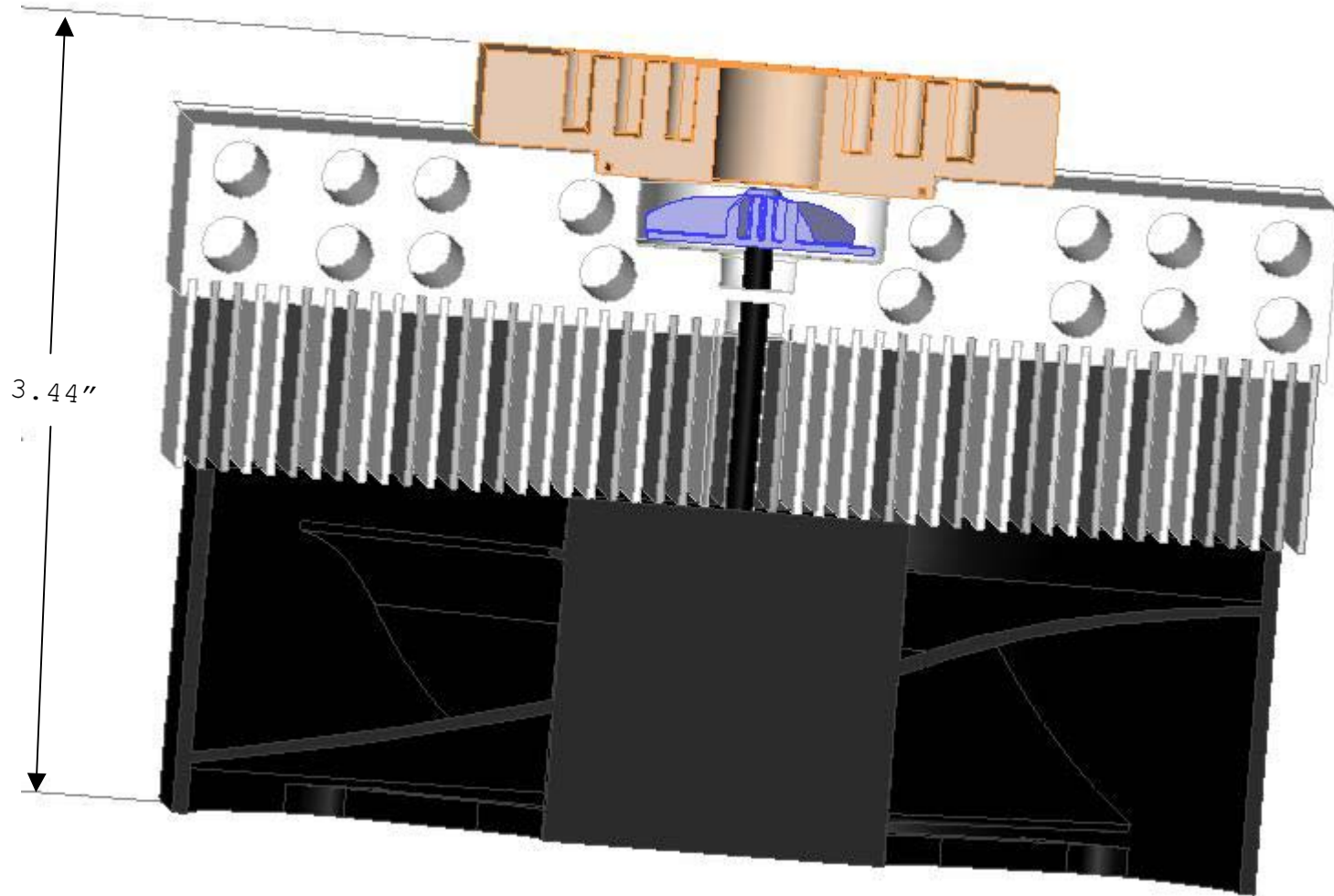
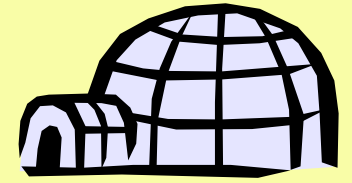
ARTECH



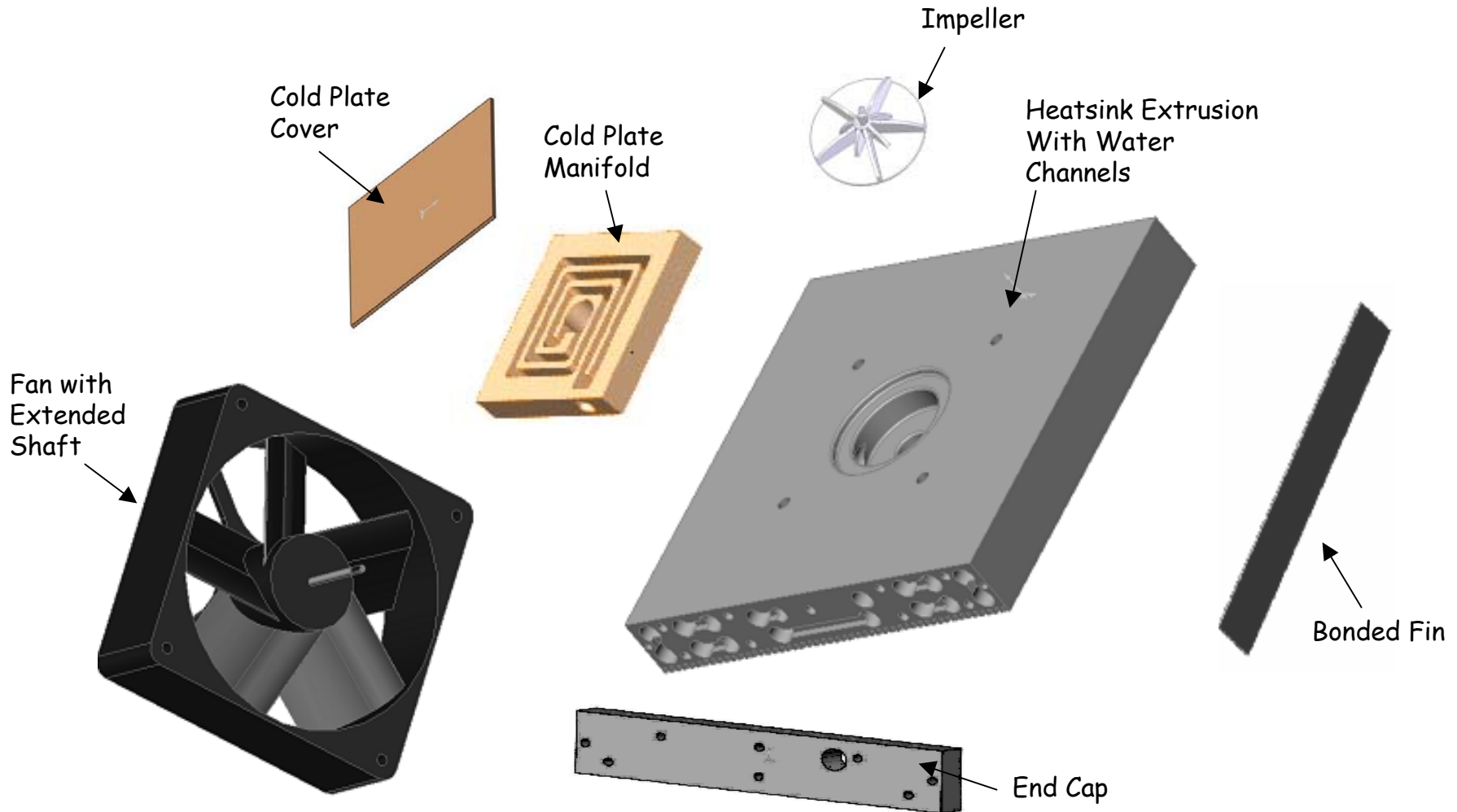
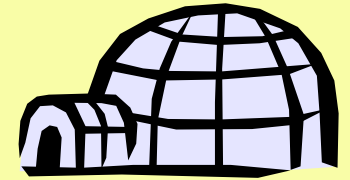
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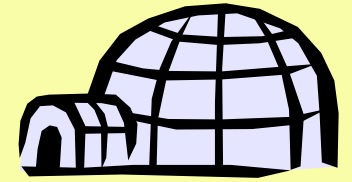
ARTECH



ARTECH



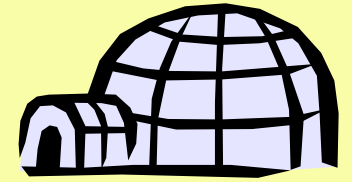
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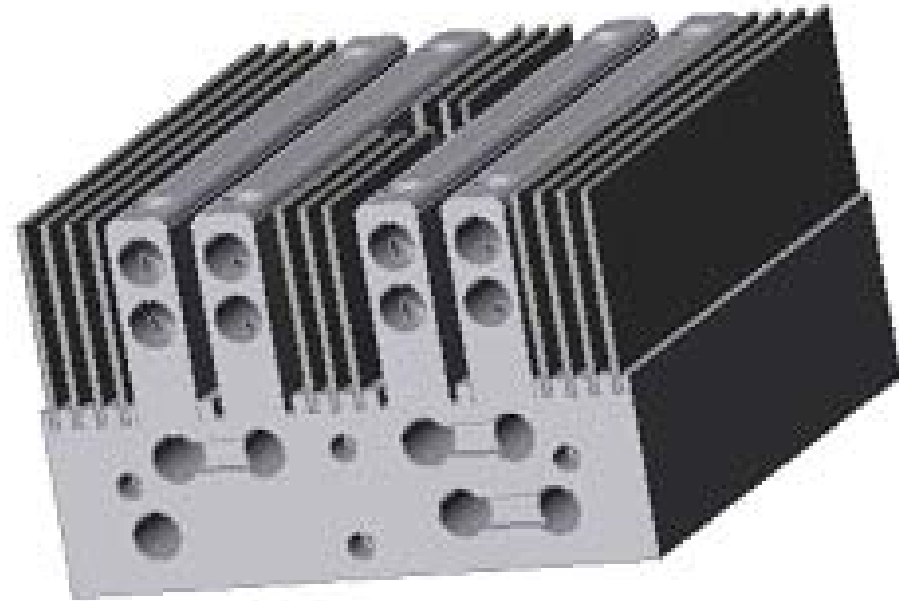
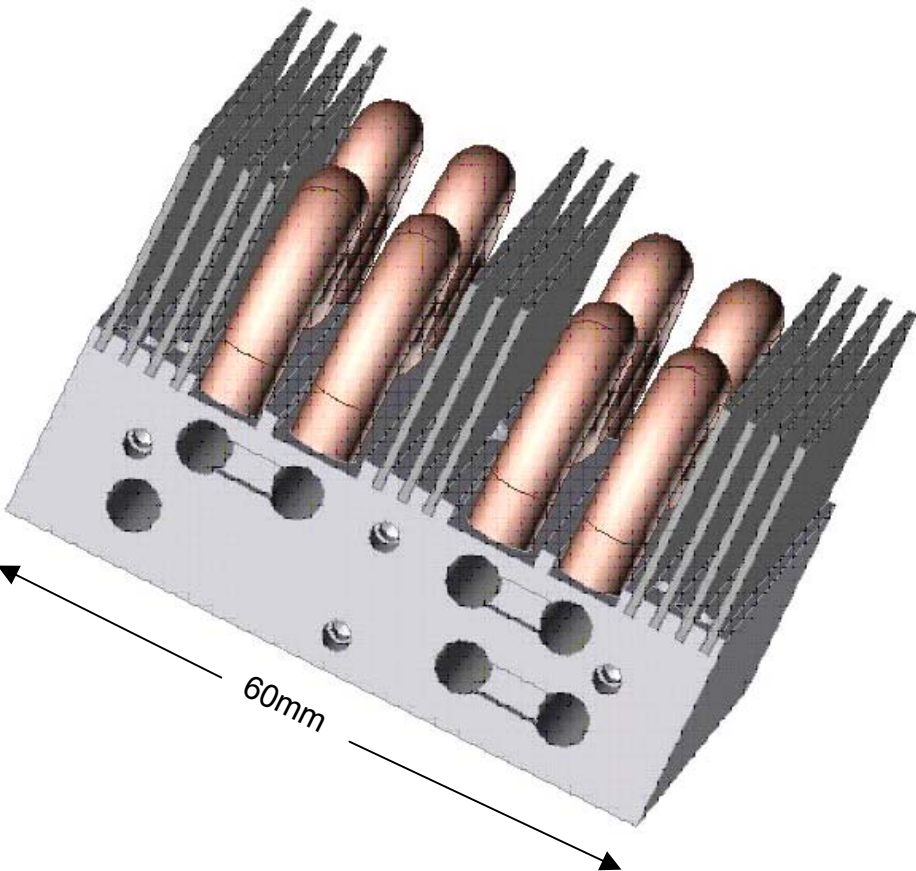
60mm Integrated Cooling System



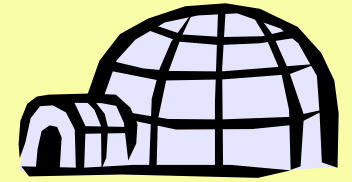
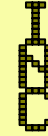
ARTECH



60mm Integrated Cooling System Extrusions



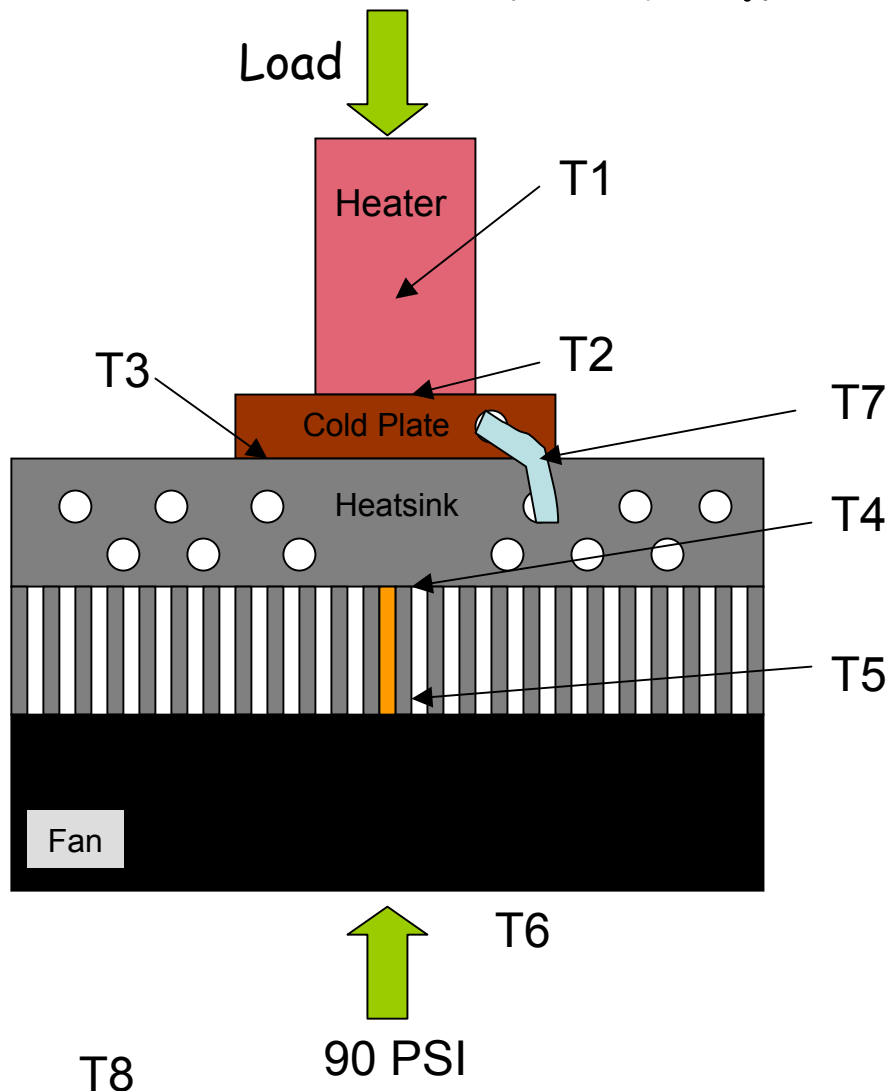
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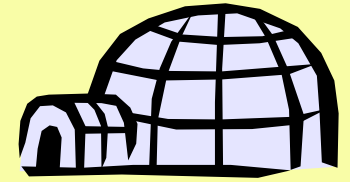
**How well does the Artech
Integrated Cooling System
work ?**

Technical Data

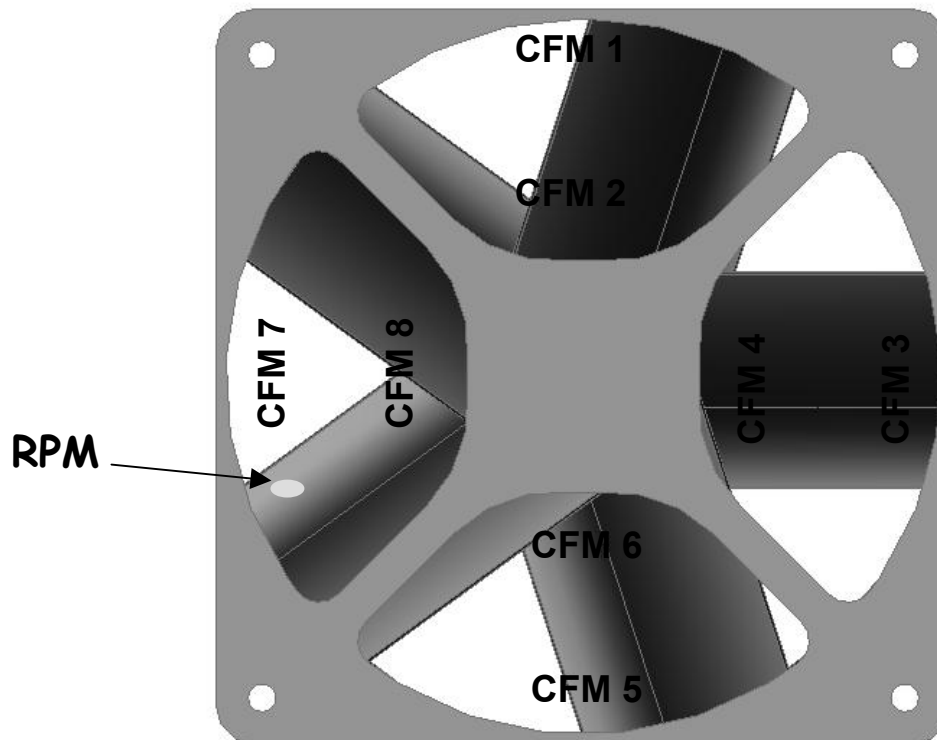
Measurements Points



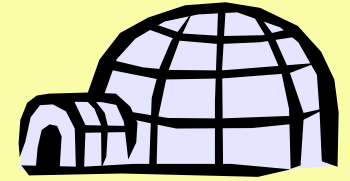
- T1 - Heat Source 250 Watts
- T2 - Top of Cold Plate
- T3 - Top of Aluminum Heatsink
- T4 - Base of Heatsink Fins
- T5 - Top of Heatsink Fins
- T6 - Fan Outlet
- T7 - Return Fluid
- T8 - Ambient



$$CFM_{avg} = \frac{\sum_{CFM\ N}^{CFM\ 1}}{N}$$



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120mm System PUMP FLOW RATE

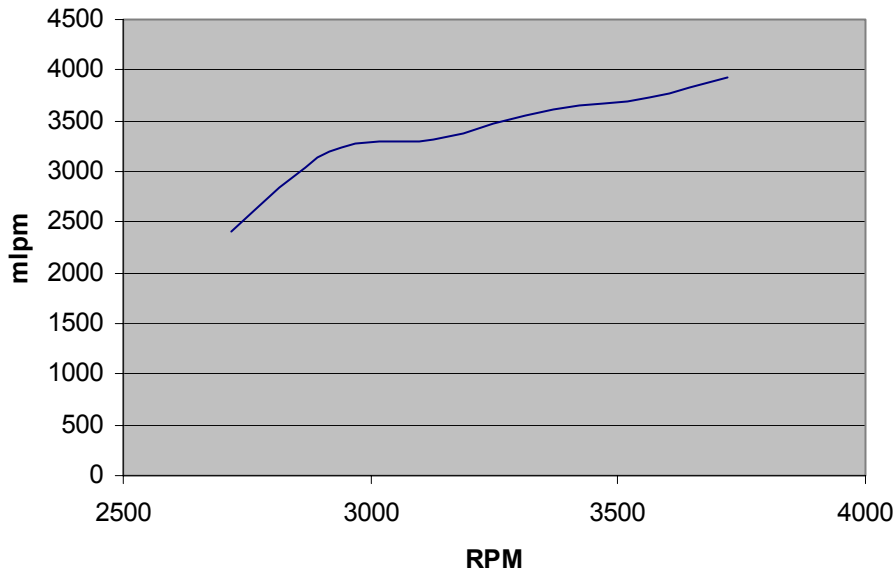
Fan 1238X 12.0 Volts @ 0.8 Amps

Water Volume 3.0 oz / 90ml

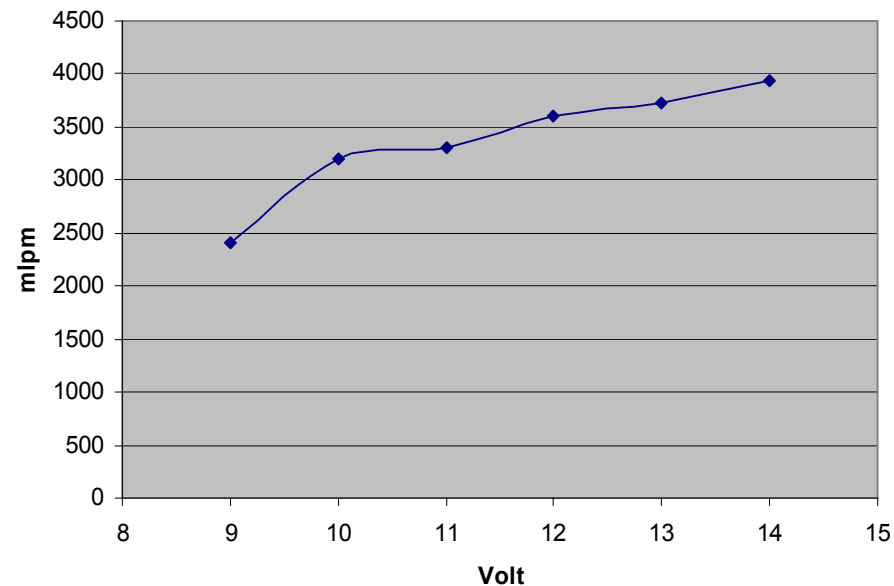
2700rpm --- 2400mlpm (0.60gpm)

3700rpm --- 3950mlpm (1.04gpm)

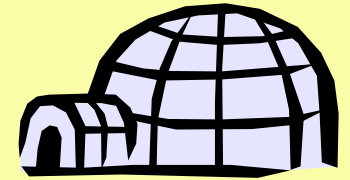
Pump Flow



Pump Flow



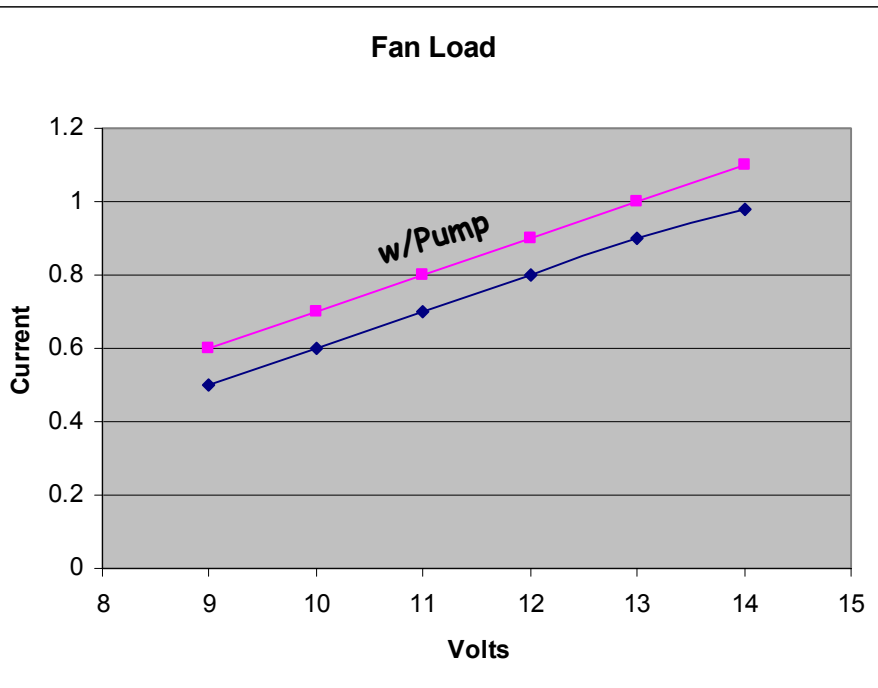
ARTECH



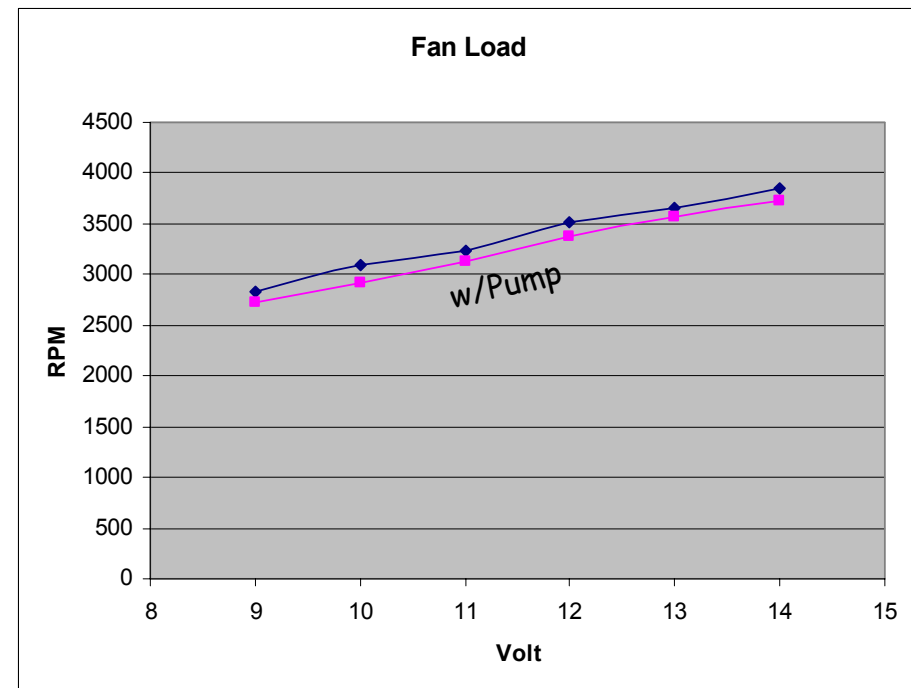
FAN Motor Loading with PUMP

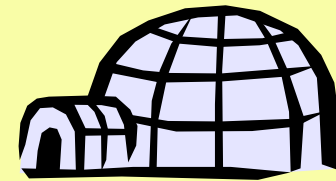
Fan 1238X 12Volts @ 0.80amps

Increased Current < 20%

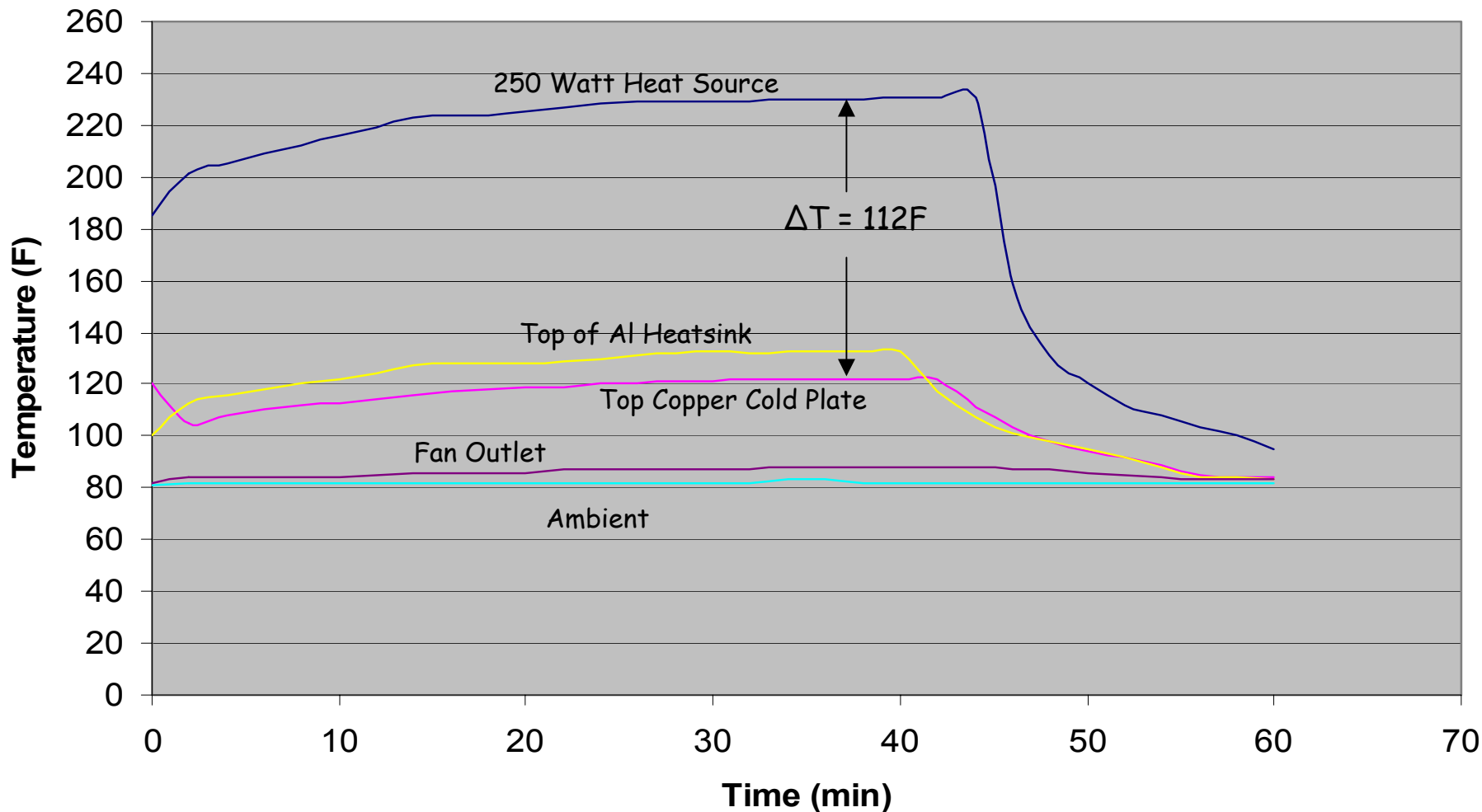


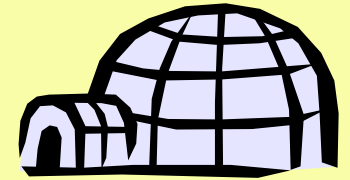
Decreased RPM < 3.5%



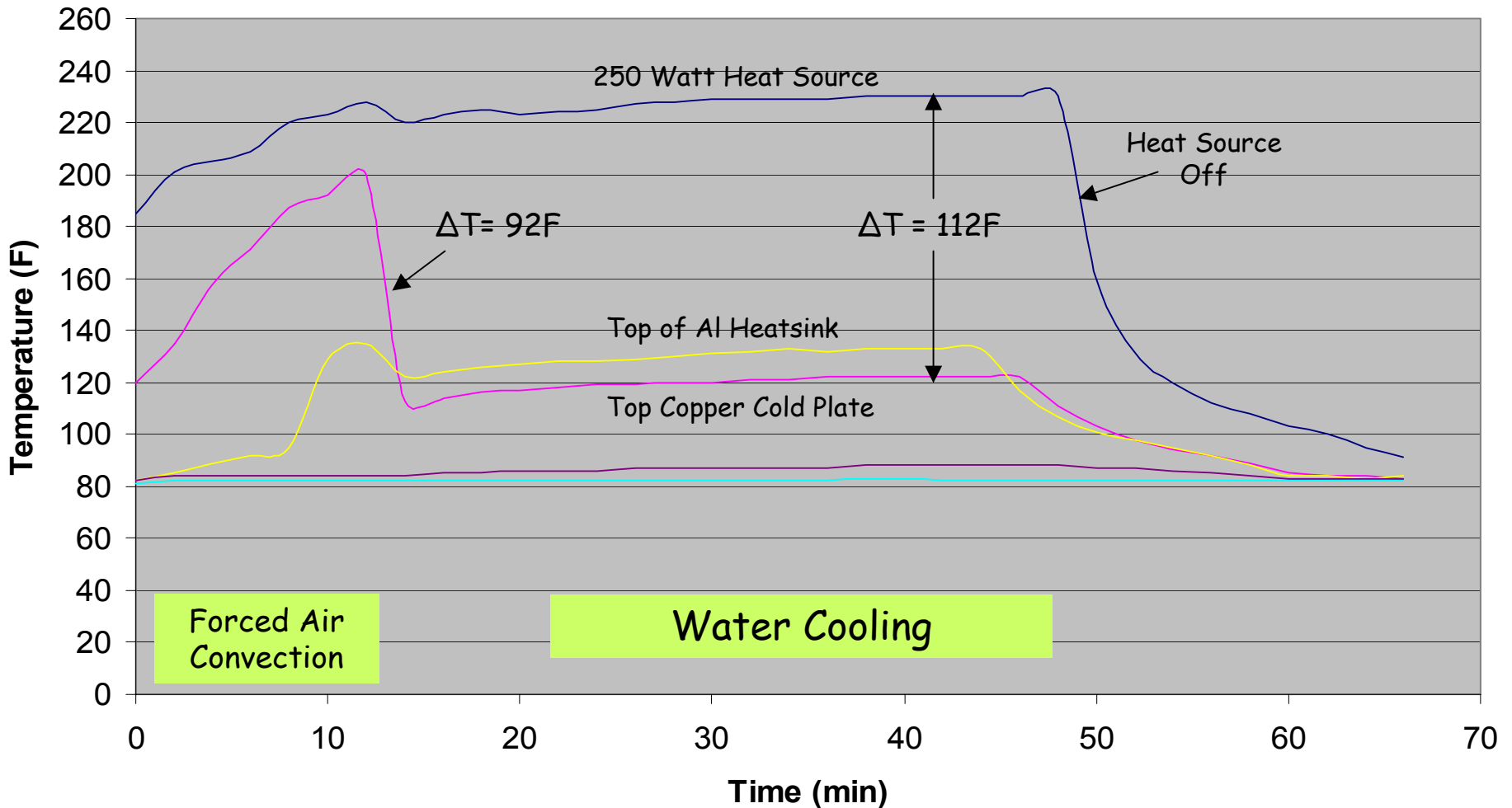


Liquid Cooled Integrated Heatsink 120mm System

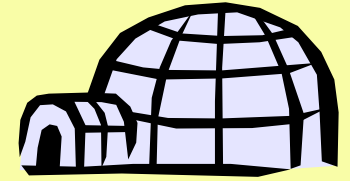




120mm Integrated Heatsink Thermal Testing



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60mm System PUMP FLOW

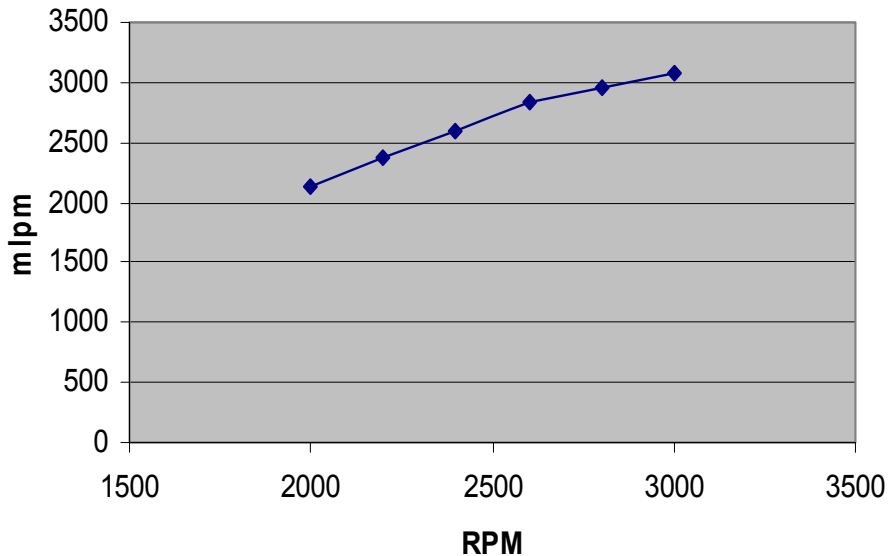
Fan 6025E 12.0 V @ 0.23 amps

Water Volume = 1.2oz / 36ml

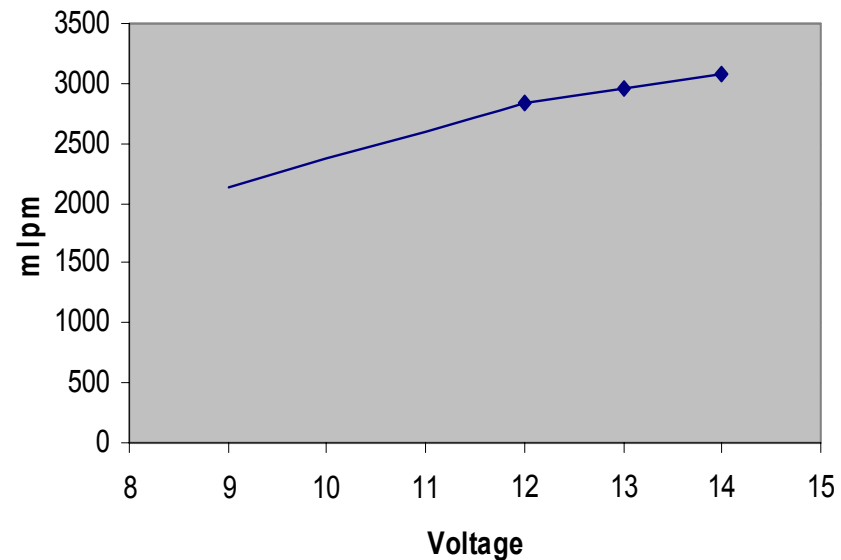
2000rpm --- 2000mlpm (0.53gpm)

3000rpm --- 3076mlpm (0.86gpm)

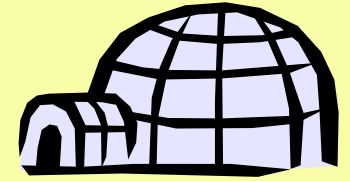
Pump Flow 60mm



Pump Flow 60mm



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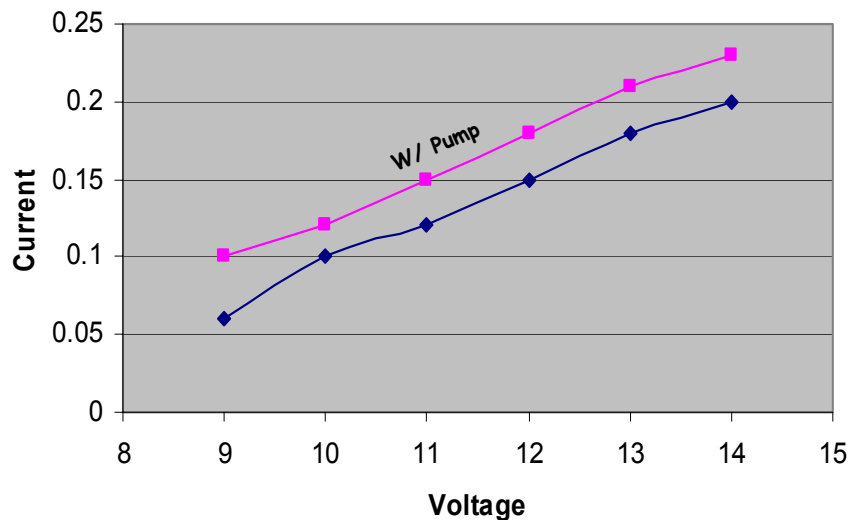
FAN Motor Loading with PUMP

Fan 6038E 12.0Volts @ 0.23Amps

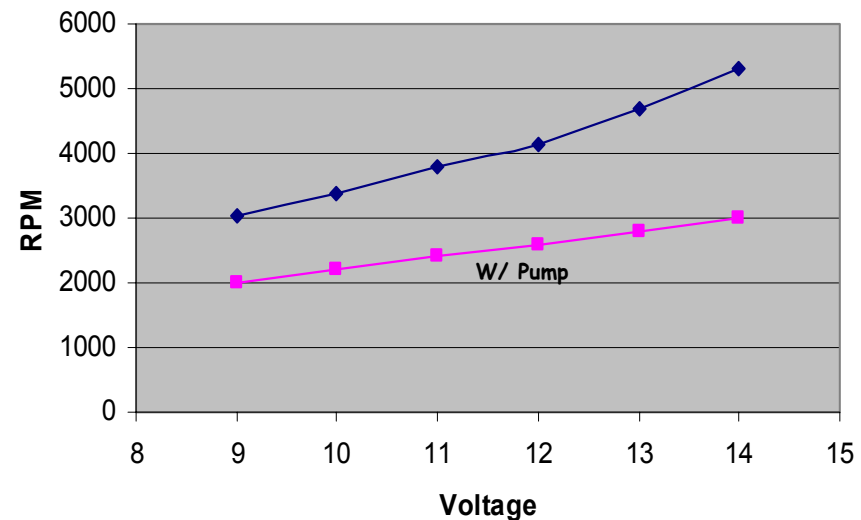
Increased Current < 20%

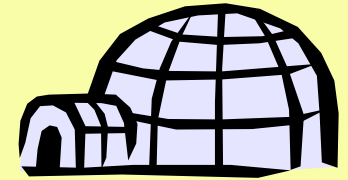
Decreased RPM < 40%

Fan Load 60mm

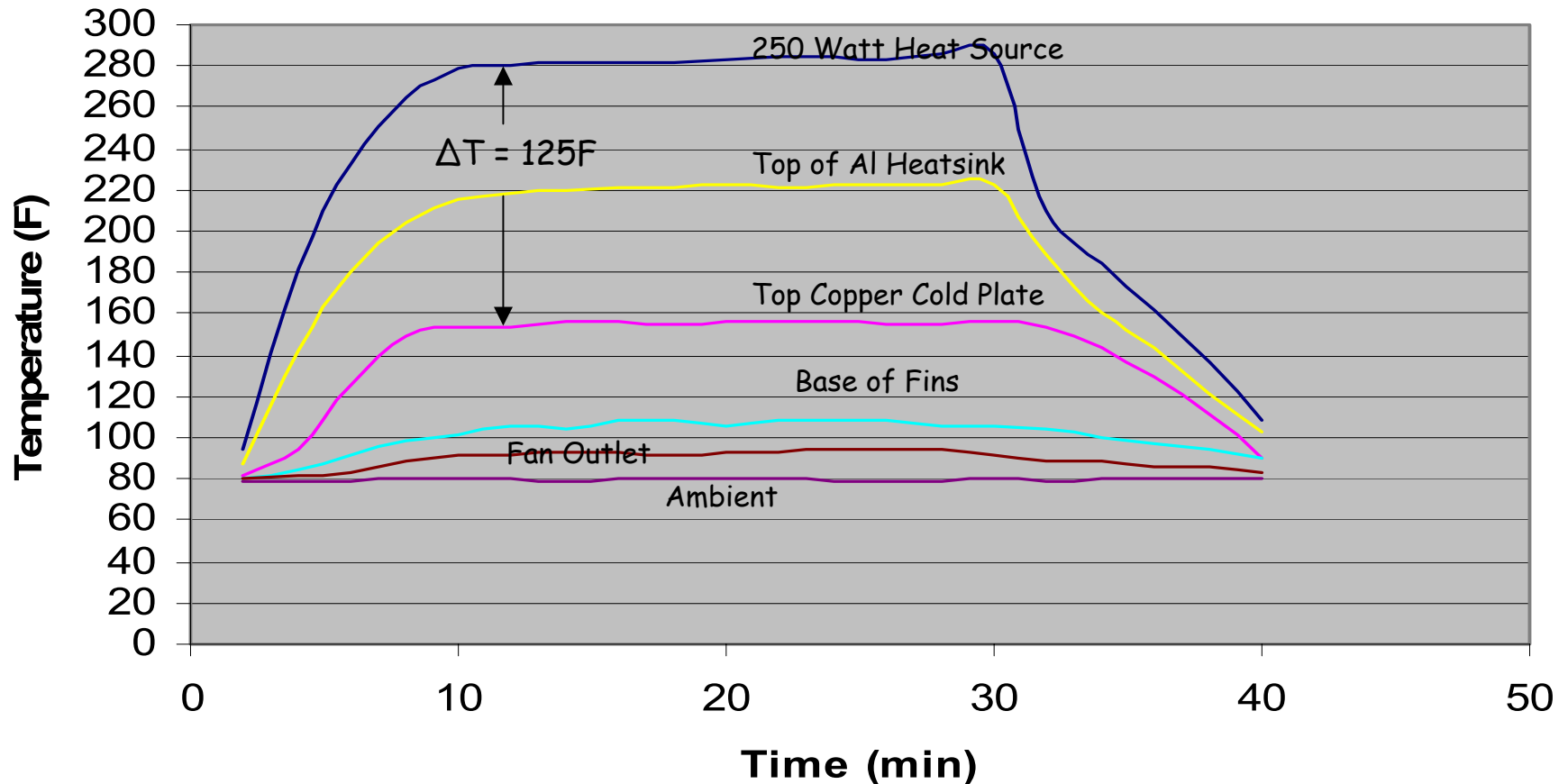


Fan Load 60mm

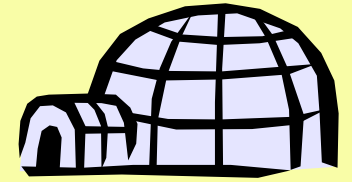
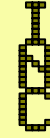




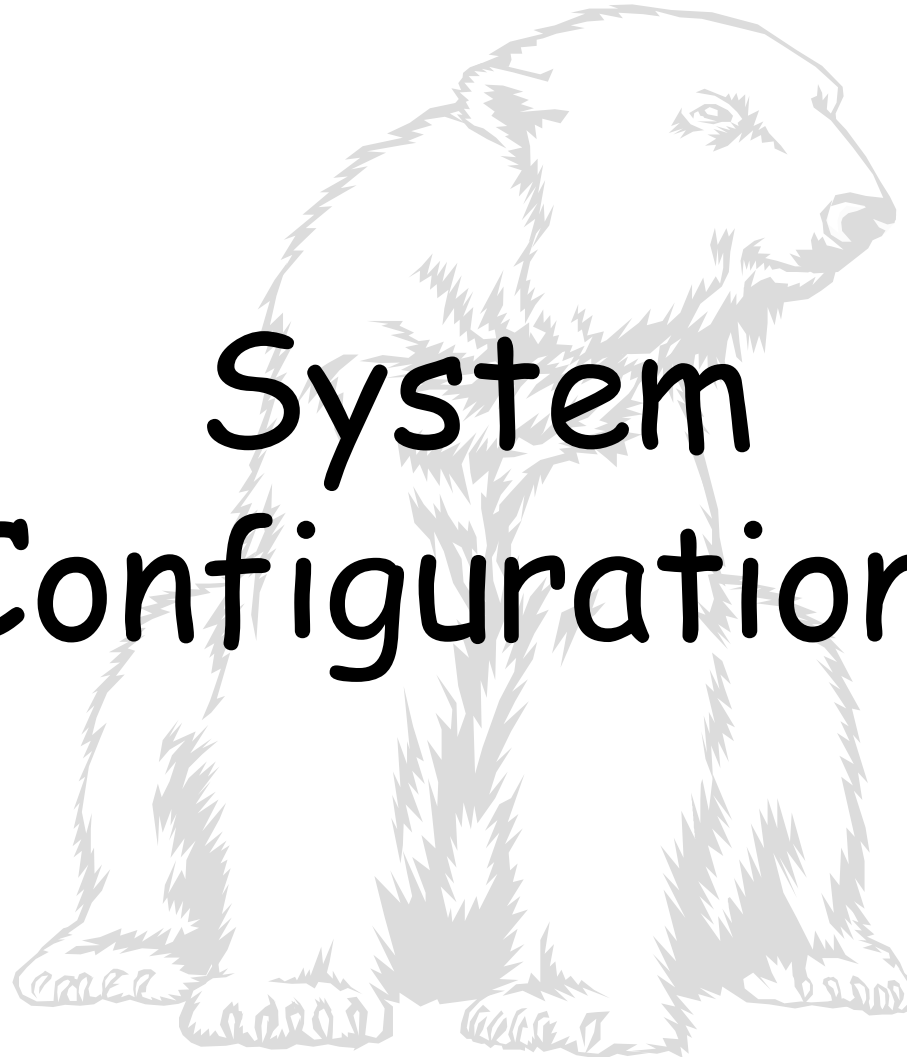
60mm Integrated Heatsink Thermal Test



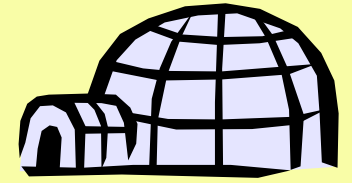
ARTECH



System Configurations



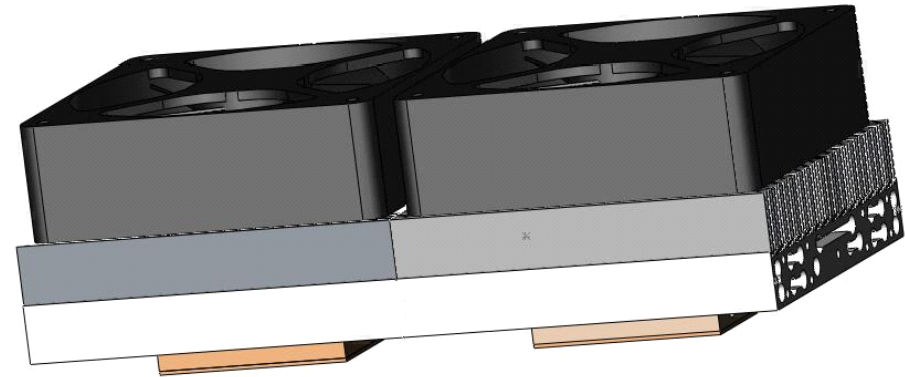
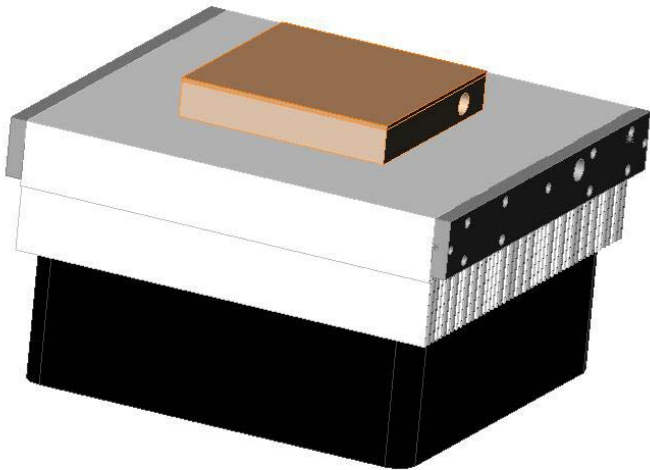
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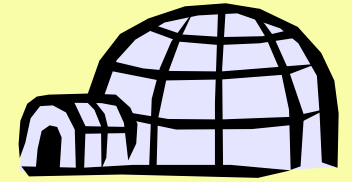
Single System in Various Sizes

Multiple Systems in One Extrusion

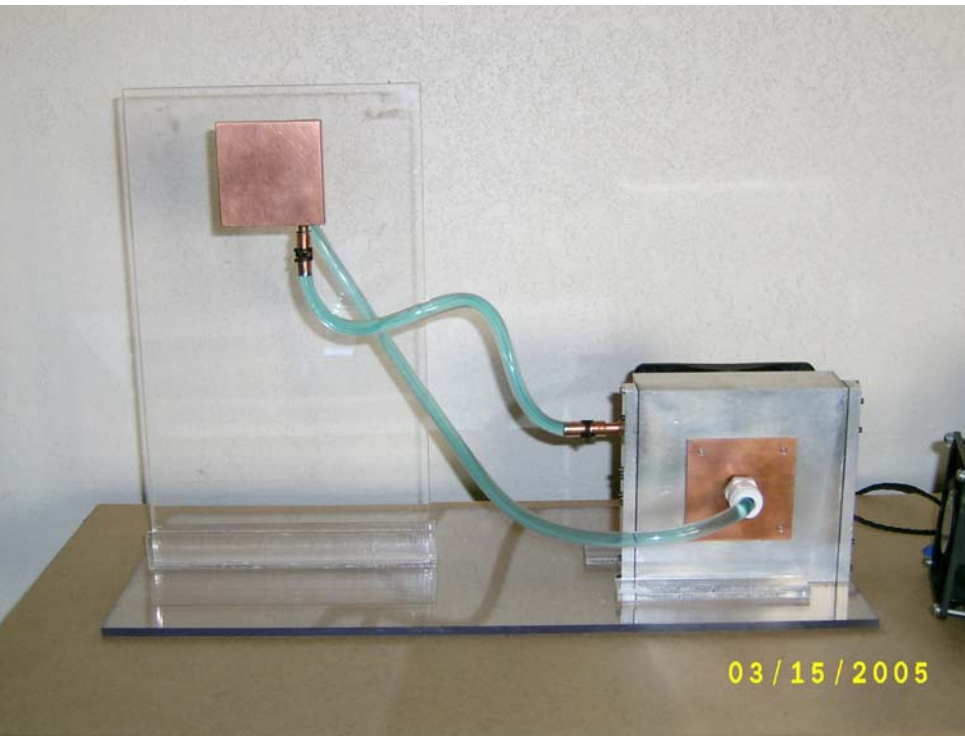
60mm, 80mm, 92mm, 120mm



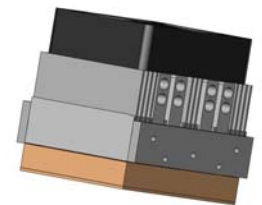
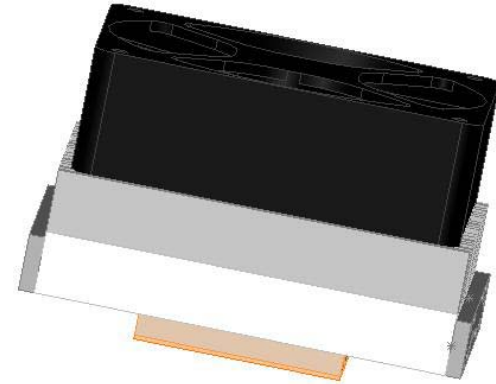
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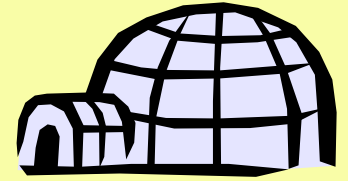
Remote Cold Plate



System to System



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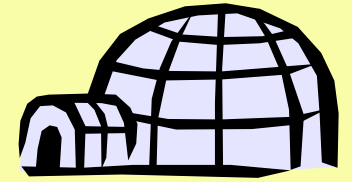
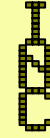
Reliability

- Reduced Components vs Traditional Water Cooling System
- Completely Self Contained
- No Leakage
- No Hose Connections
- No Refill Necessary
- One Well Tested Muffin Type Motor for Fan & Pump

Cost

- Low Cost when Compared to Traditional Water Cooling System
- Simple Construction
- One Low Cost Muffin Type Motor for Fan & Pump
- Heatsink Type Extrusion for Pump Body & Heat Exchanger

ARTECH



Thank You

We're located at

Booth 318

