



# Ultra Compact Refrigeration System - Project DT112

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Cooling  
SOLUTIONS



# A breakthrough on compact refrigeration systems

- A competitive solution on active cooling for application with size, weight and autonomy constrains



Portable coolers



Defense application



Automobile cooling

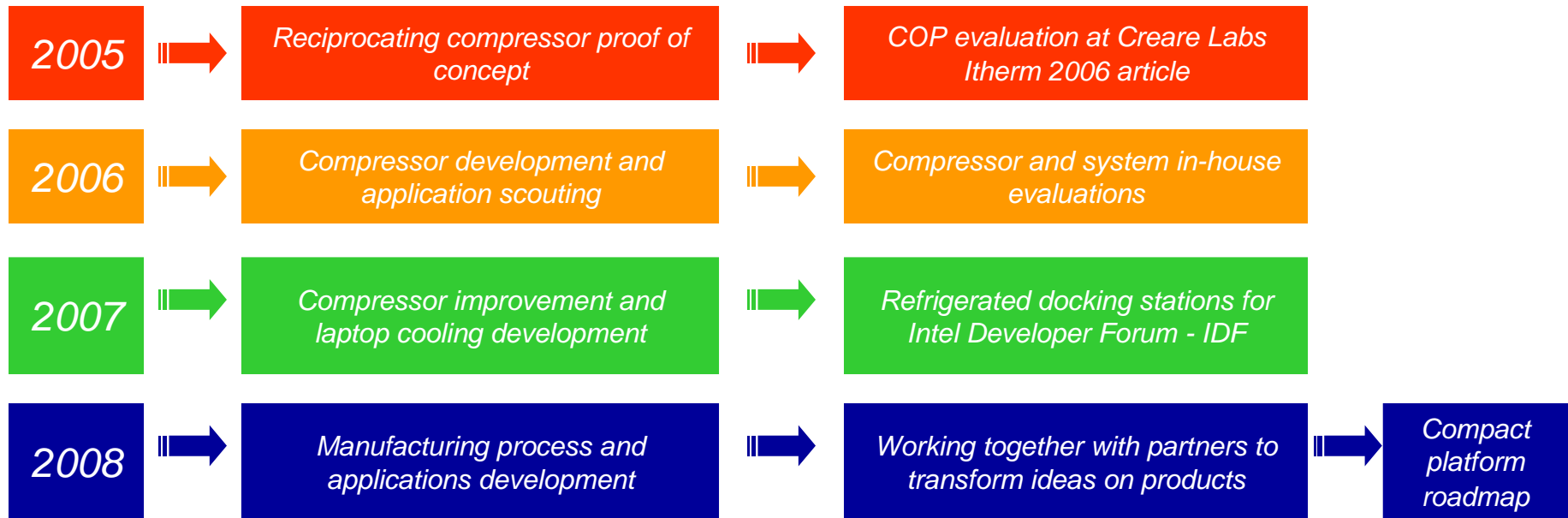


Electronic cooling





# Timeline



## Conversion phase



2008

Preliminary samples

## Execution phase



2009

2Q - Pilot run 10k/y

\* 7 patents generated





## Application: laptop cooling

- Docking Station for extreme edition gaming laptops cooling

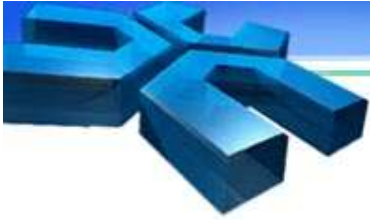


- Current design provides 30W of cooling by supplying 4 CFM air flow at 15C for a 25C ambient air temperature

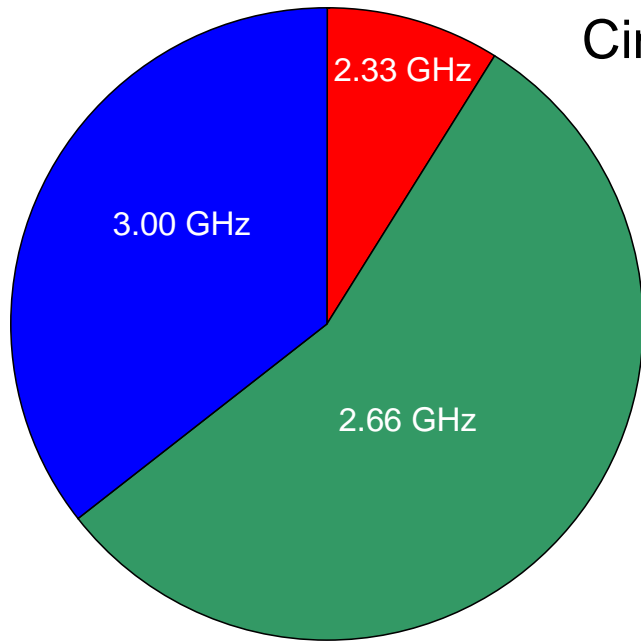
More details on

<http://tinyurl.com/255wfu>

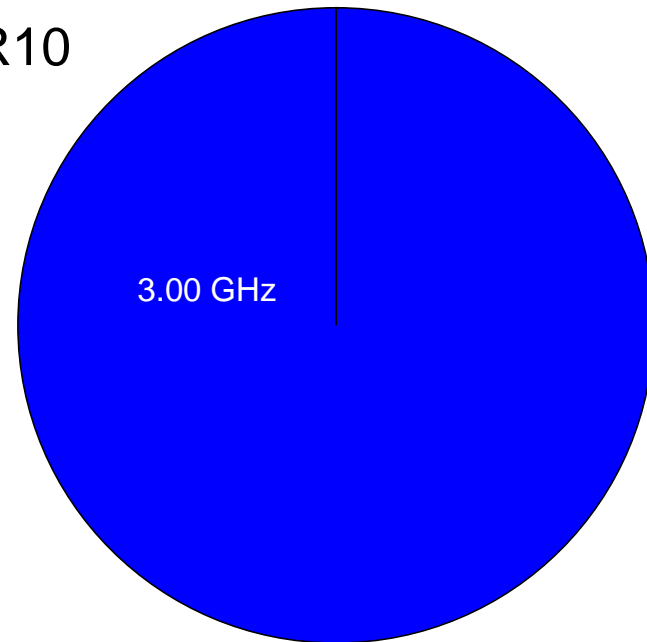




# Chilled Dock Notebook Testing



Cinebench R10



Render time Undocked  
3:03

Render time Docked  
2:44

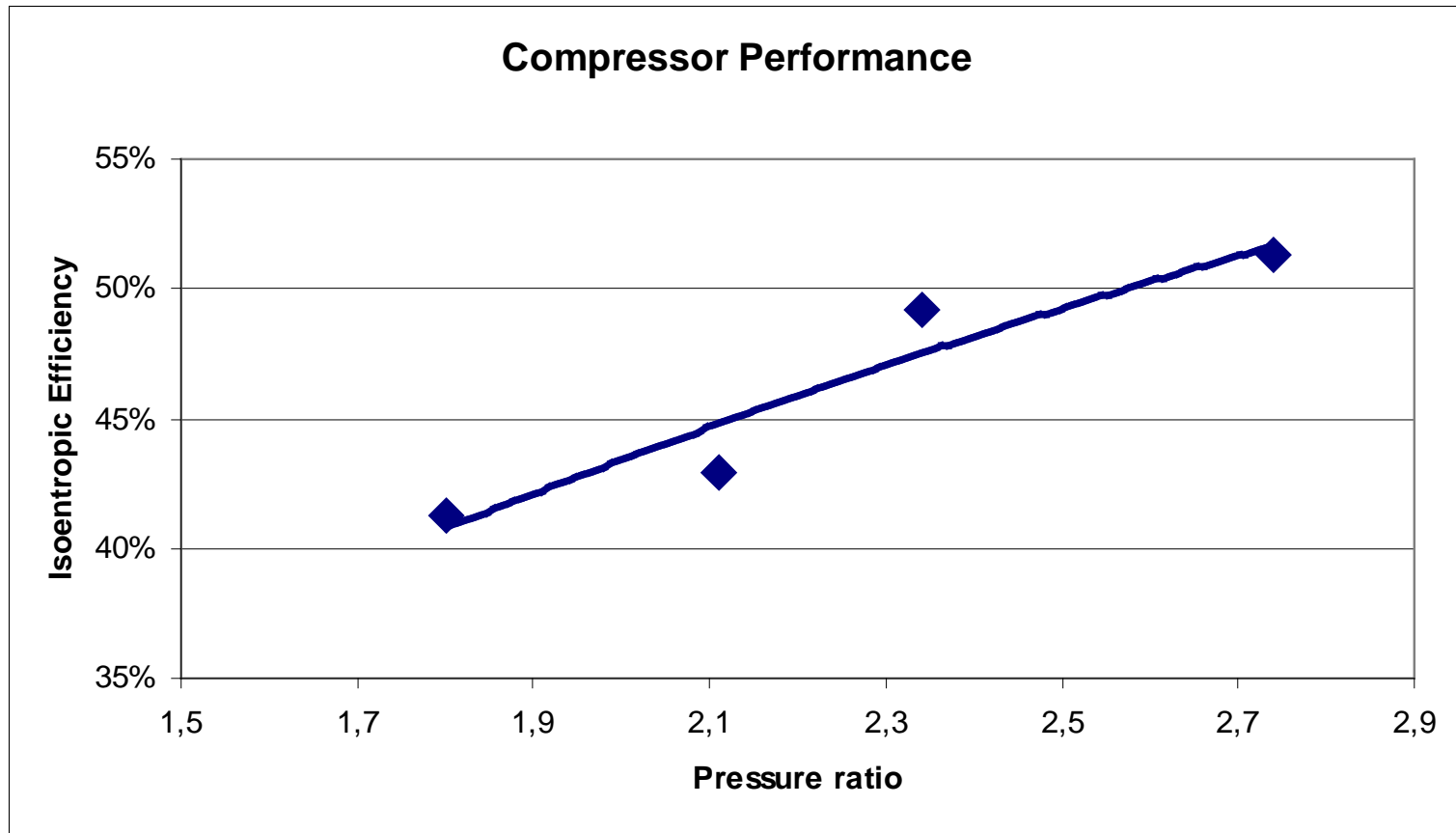
Test conditions:  
Cinebench R10 -- 3 Tests  
Notebook Overclock frequency: 3.00 GHz  
Data shown is for run closest to average

***Higher CPU Performance When Docked***



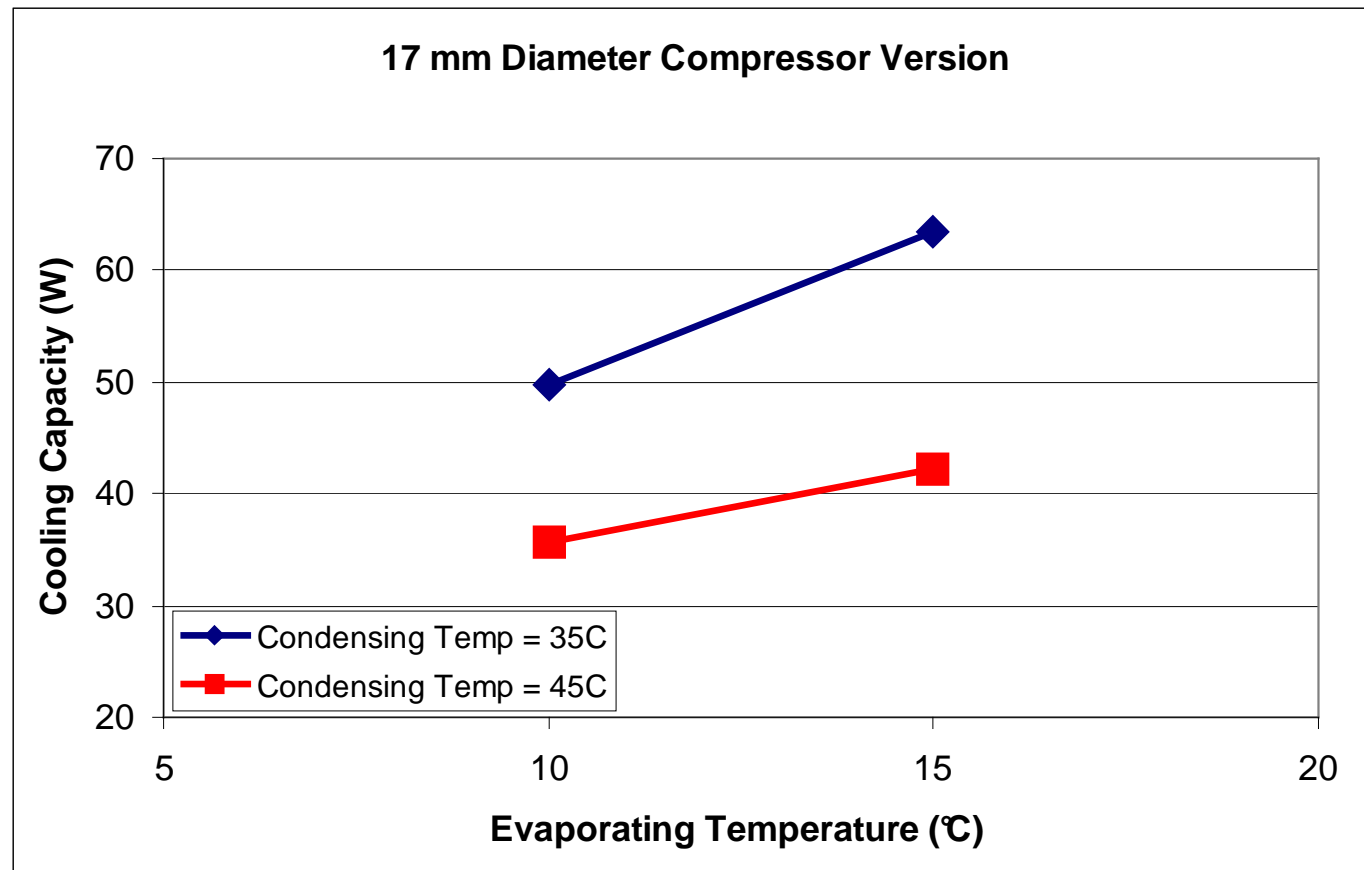


# Compressor Performance





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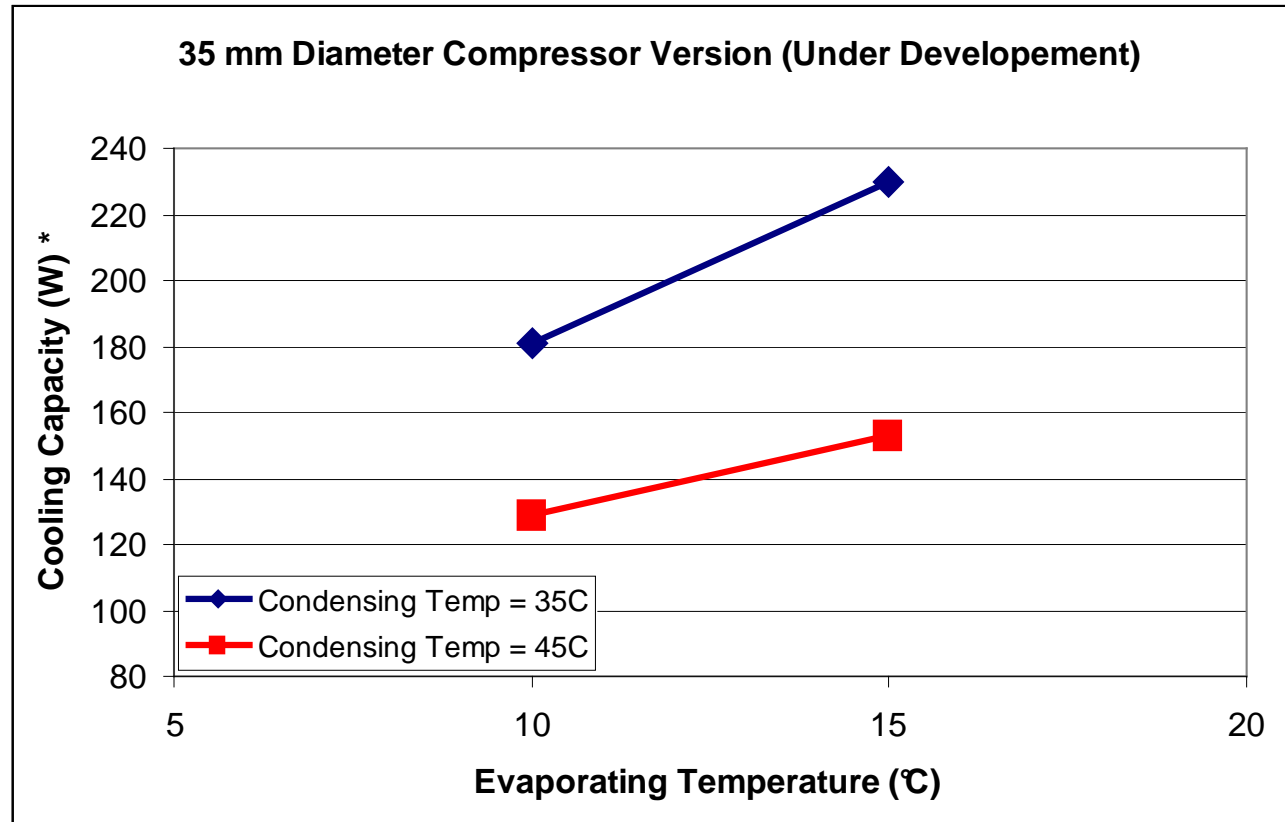


Note: Values measured in calorimeter



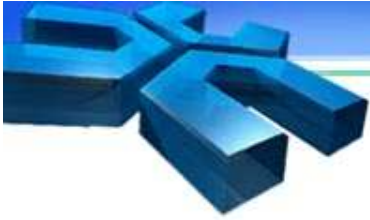


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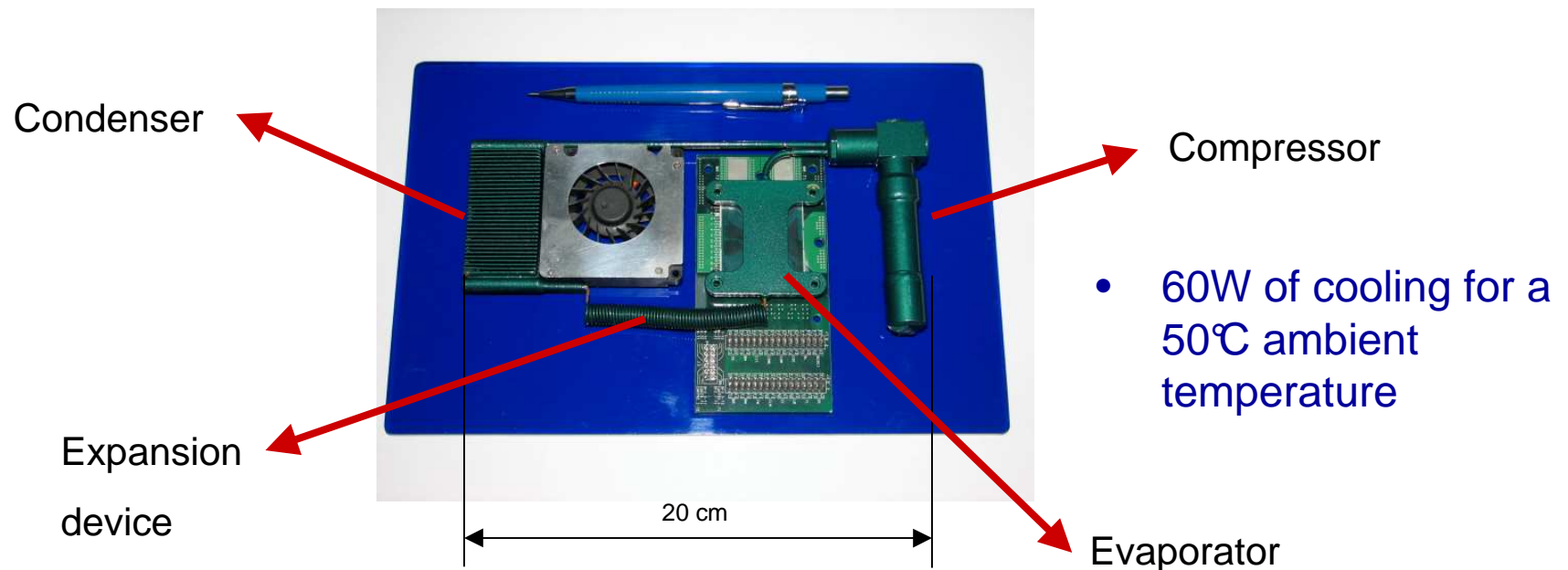
\* Estimated cooling capacity

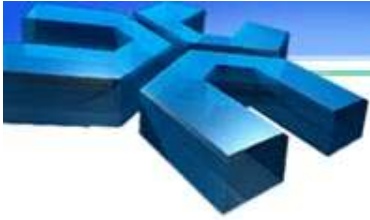




# Embedded Possibilities

- Miniature refrigeration systems may also be direct applied to high power density electronics





- Would this technology address your cooling challenges?

