

Innovative Thermal Management in HPEC VPX systems



COMETH
Ethernet Switches, IP Routers

PREMIUM
SBCs Processor and FPGA

I/O Boards
Analog and Digital I/O functions

LINES
Open Serial
Communication Platforms

IC **INTERFACE
CONCEPT**
ADVANCED ELECTRONIC SOLUTIONS



More processing power in each VPX slot

- Customer demand for ever increasing processing power in each High Performance Embedded Computer (HPEC) VPX System
- Essential to find new ways for extracting the heat out of each system slot
- Thermal management cannot be considered anymore as an afterthought
- It has become as important as designing reliable hardware and efficient firmware



Thermal simulation at the design time

- IC has developed fluid and thermal simulation models verified through experiment
- High precision simulation for component placement and thermal interface design
- Allow in particular improvement of air cooled solution

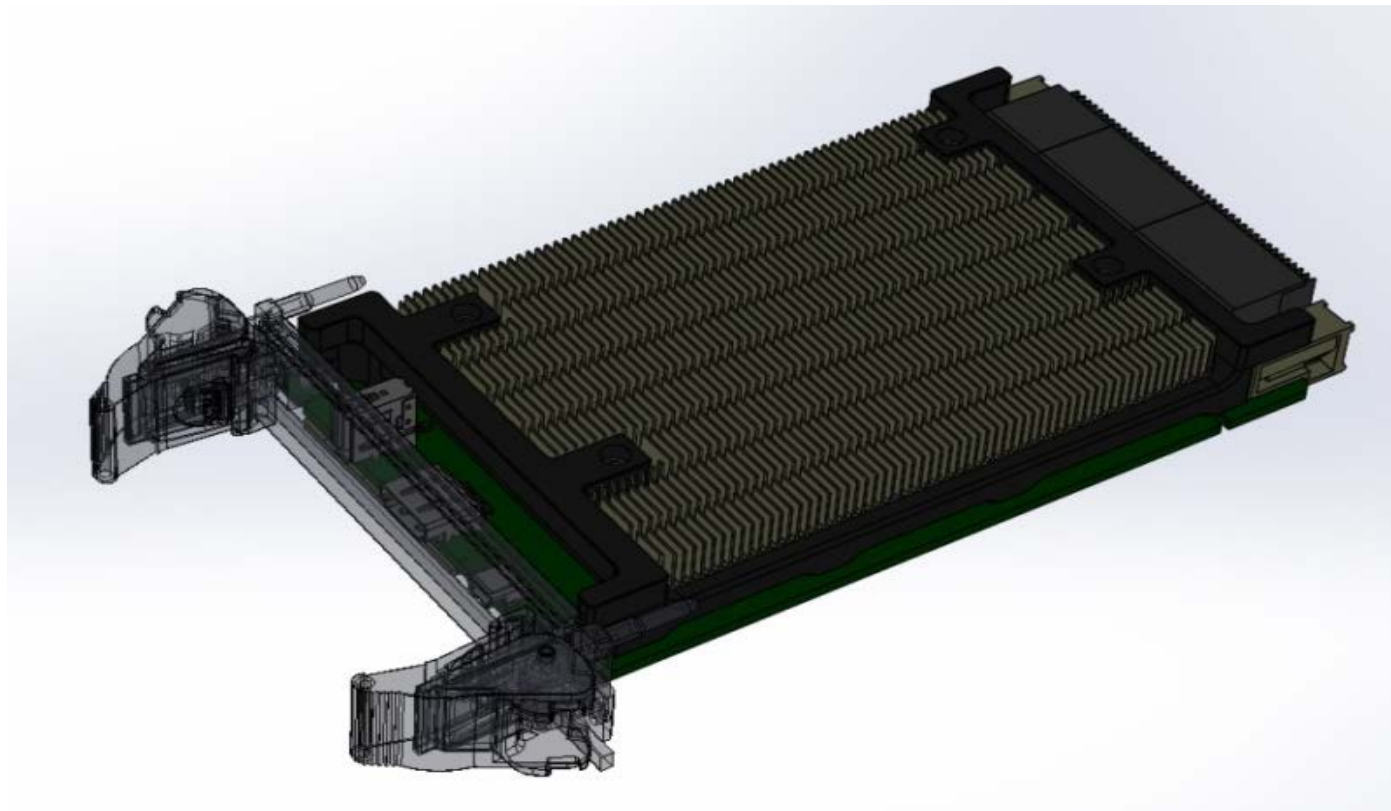


VITA 48.1

- The VITA 48.1 open standard defines the mechanical specifications of air cooled VPX plug-in units
- Improve the cooling of VITA 48.1 compliant products to extend the temperature range of operation
 - to drive the costs down
 - To keep the weight low
 - to avoid the use of other less cost effective solutions based for instance on the VITA 48.2 conduction cooled or VITA 48.5 Air Flow Through standards that may prevent the cooling of the PCB itself (Components at the bottom)



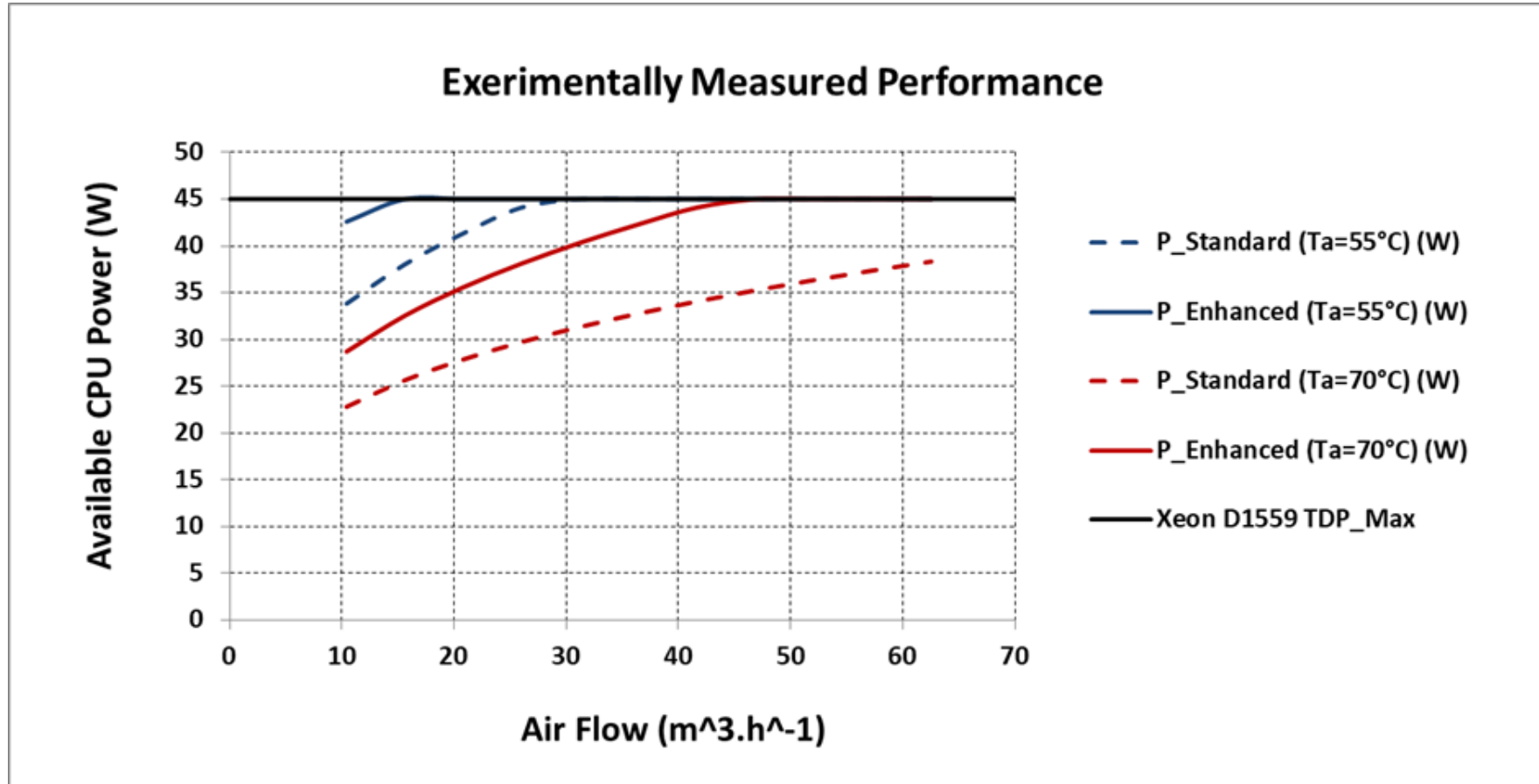
IC-INT-VPX3d with Intel[®] Xeon D-1559 processor



IC-INT-VPX3d equipped with enhanced air cooled mechanical solution

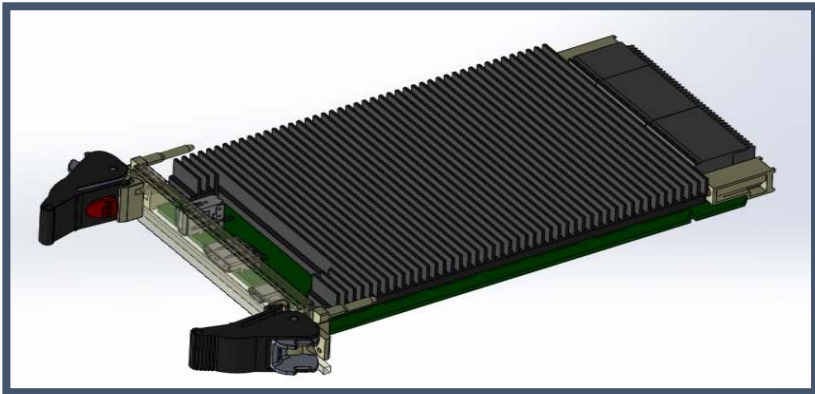


Comparison standard/enhanced air cooled solutions

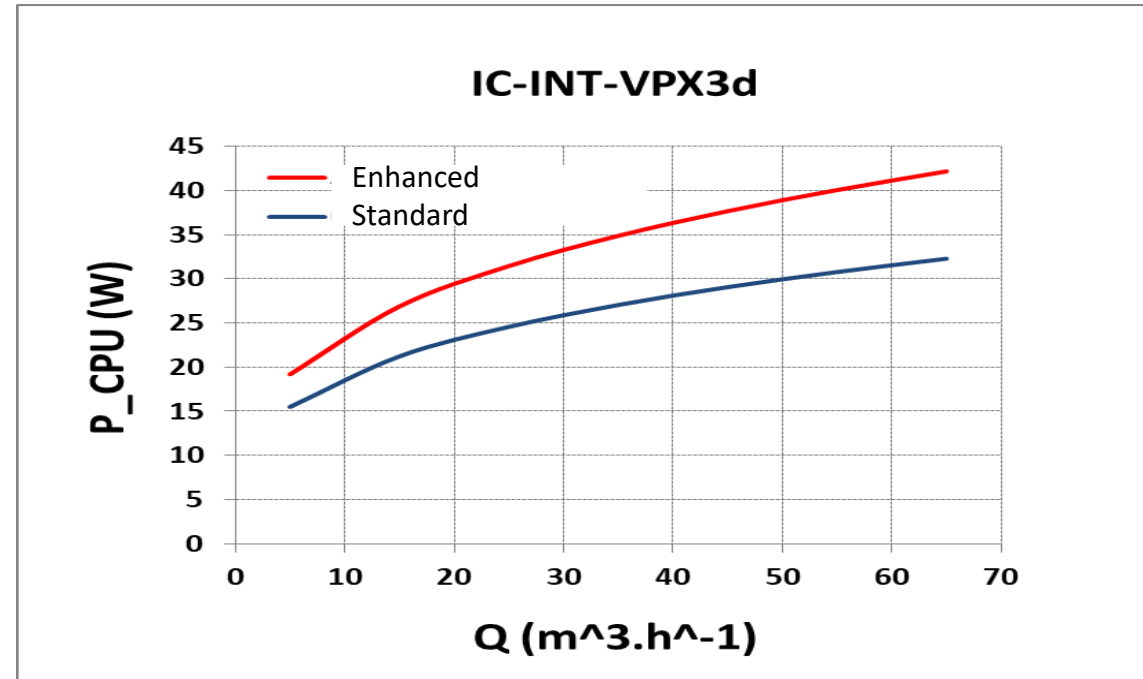
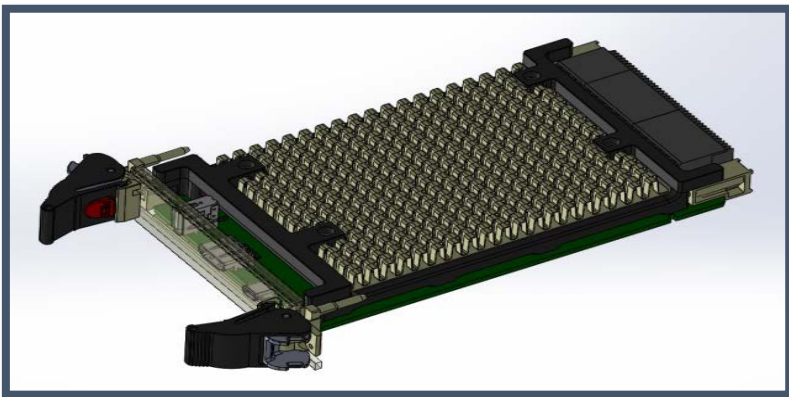


IC-INT-VPX3d Ta = 75°C

Standard solution



Enhanced solution

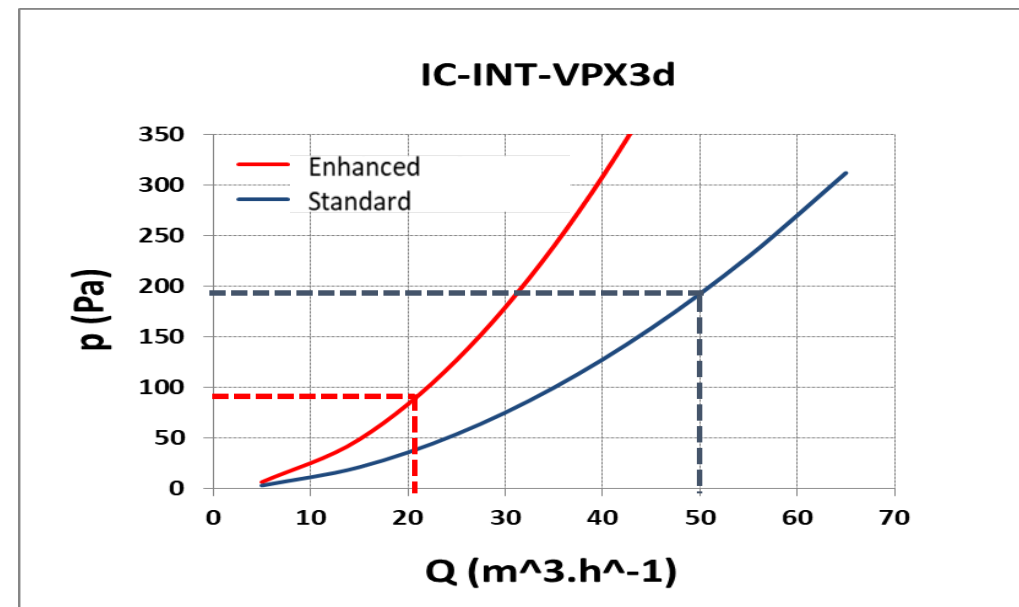
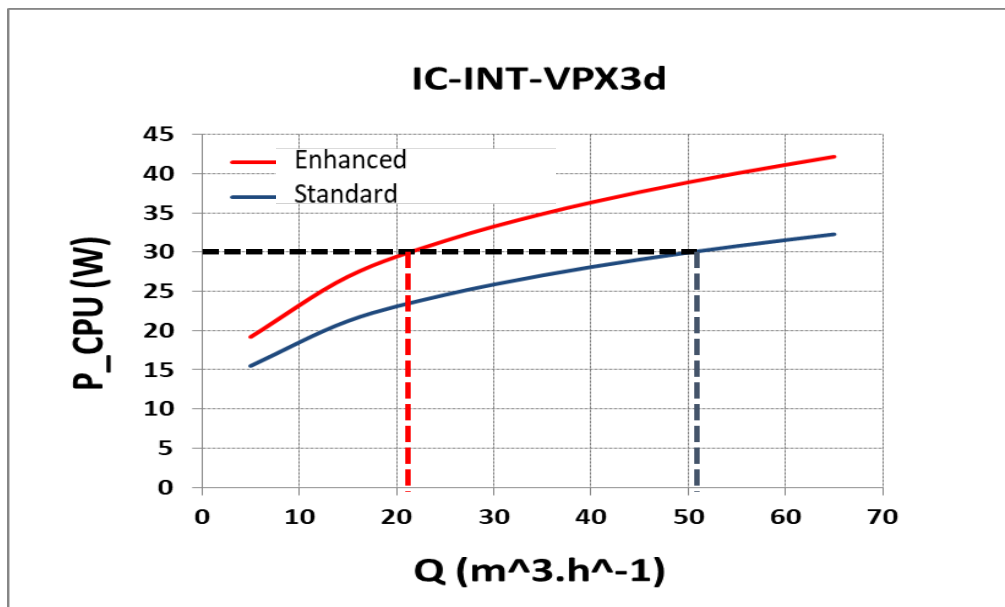




Comparison standard/enhanced air cooled solutions

IC-INT-VPX3d

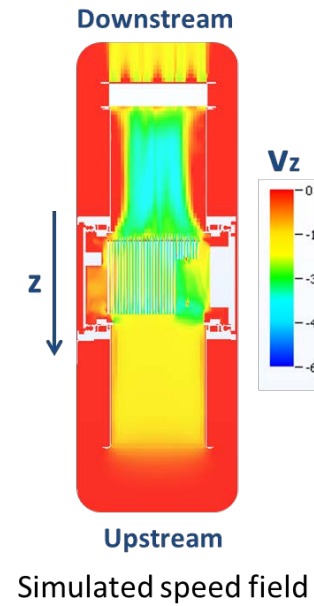
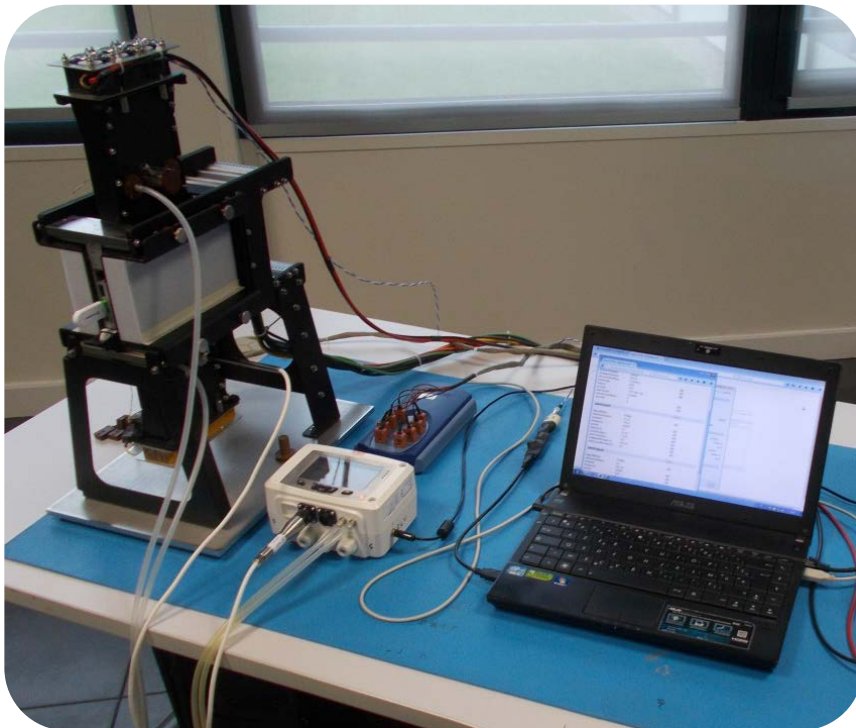
operating point $P_{CPU}=30W$ with $T_a=75^\circ C$



Standard solution $\rightarrow Q = 50m^3.h^{-1}$ et $\Delta P = 194Pa$

Enhanced solution $\rightarrow Q = 21m^3.h^{-1}$ et $\Delta P = 94Pa$

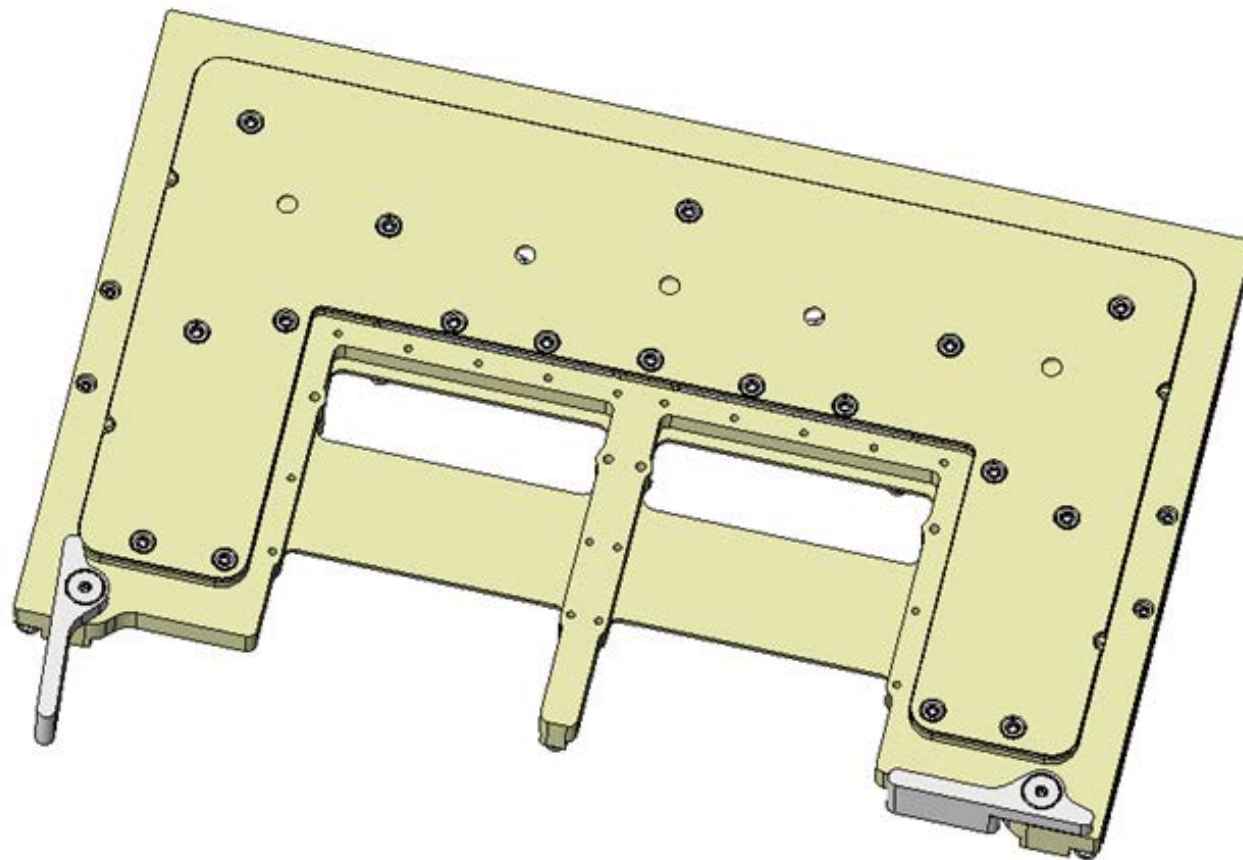
Example of an air cooled test bench



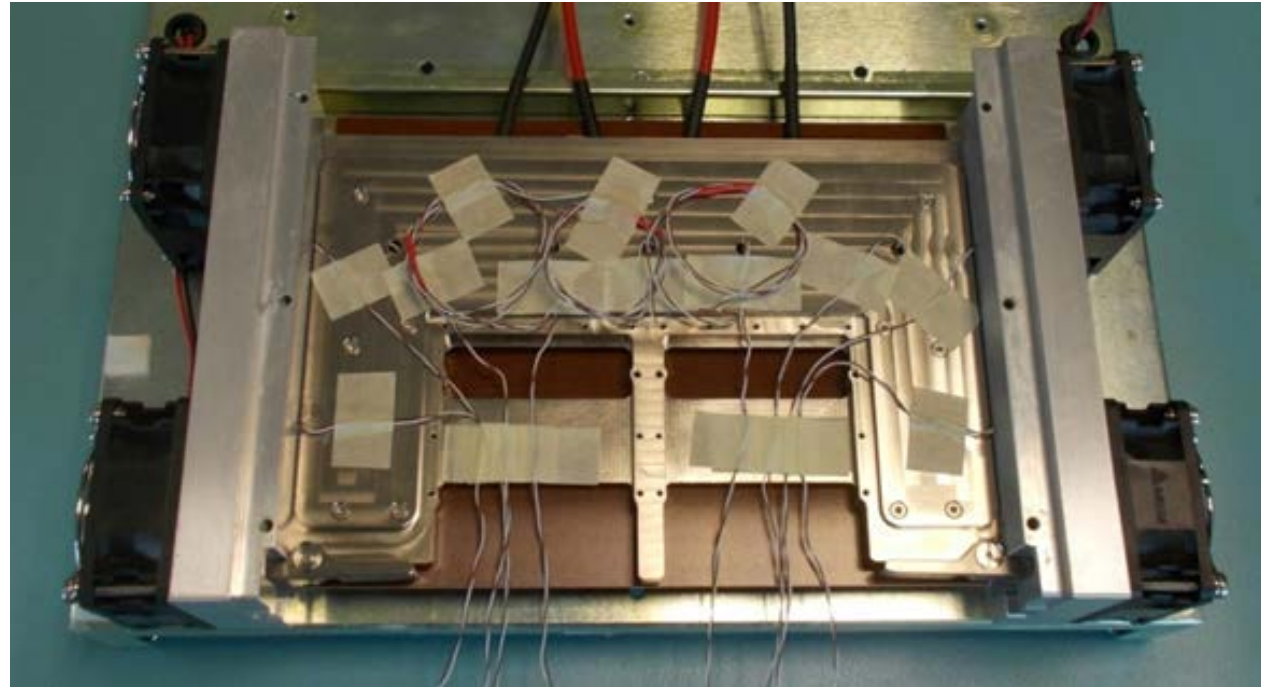
Mico-anemometer



New IC 6U VPX conduction cooling system



Enhanced conduction cooled system



	Test with IC new cooling system	Simulation : IC new cooling system	Simulation: Classical aluminium solution
P_source (W)	45	45	45
T_Bord_Drain (°C)	87,8	86,3	86,02
T_Diffuseur (°C)	91,1	92,1	107,55
Delta_T (°C)	3,3	5,8	21,53
R (°C/W)	0,07	0,13	0,48

Test with the new IC cooling system better than the aluminium classical conduction cooled approach by a factor of 7