OCP STORAGE : THERMAL WORK GROUP THERMAL METHODOLOGY FOCUS PROPOSAL

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OCP Storage Thermal – Original Problems to Solve

- **2019: What form factor? (E1.S example but not limited to)**

OR

What does it mean to system???

OCP Storage Thermal – the result?

- **Through system level methodology this led to 15mm E1.S**
  - + understanding of extensibility in the system (# drives, max pwr, T-rise to downstream components, impedance implications, fan power sensitivities, how a system “sees” the drive)

OCP Storage Thermal – Goals?

- **We can choose which level to think at, but the result is very different??**

SSD

Without system context, were very limited ~ support 2CFM at 35C

System

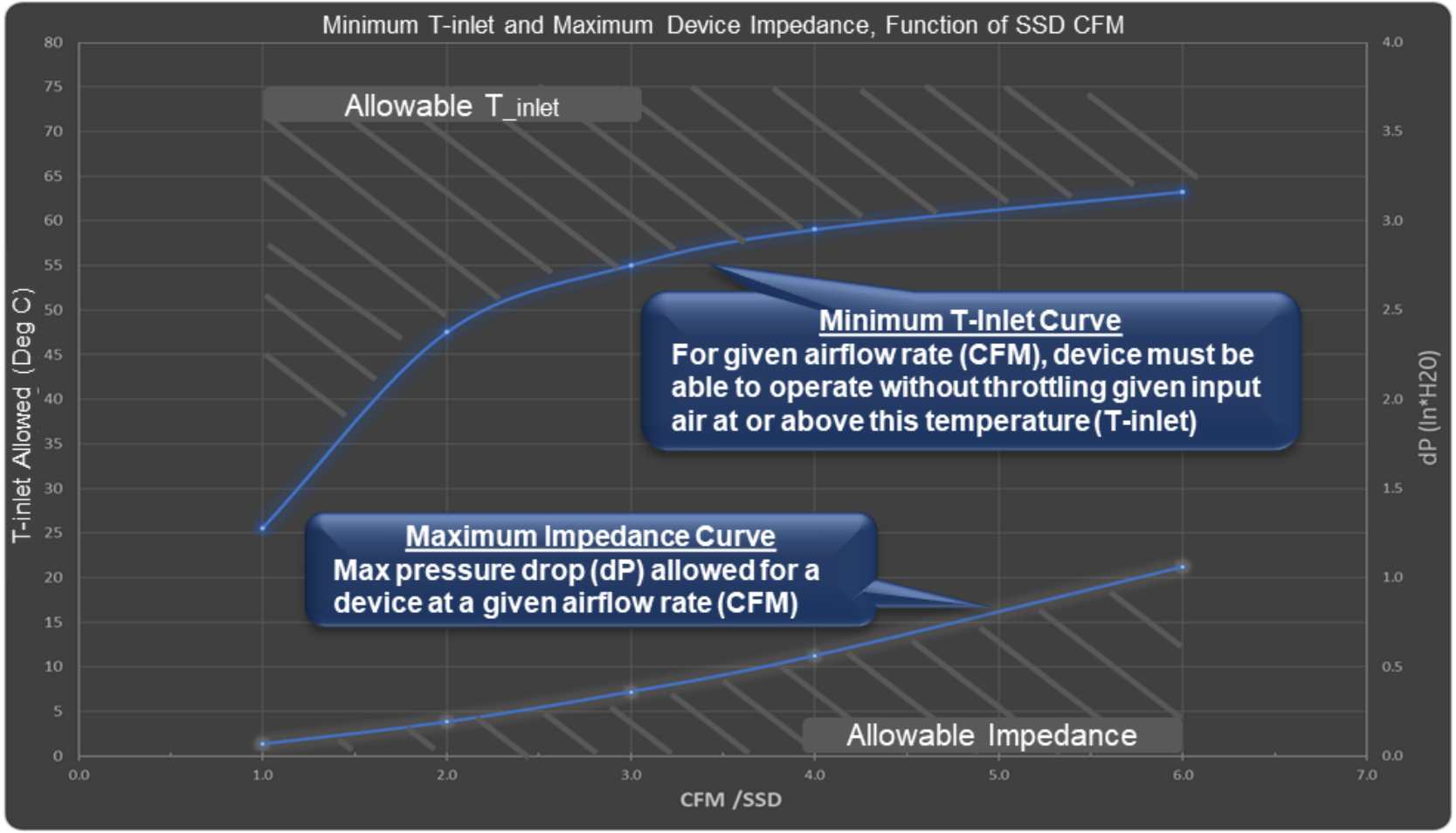
System + Methodology Used:
Meet system efficiency requirements
Requirements that help SSD vendors design
Collaboration System OEM/SSD vendor
Is this the right direction for a form factor?

OCP Storage – So what level do we want to think at?

- The **OCP Storage methodology is how we get there**.
- The **characterization** is a subpart of it, needed, but **how we measure it**.
- **System analysis (methodology) - 2 key parts**
  - **Allows us to be sure about what were proposing** as a form factor. An example E.1S 15mm
  - **Allows good requirements, collaboration, meeting efficiency requirements now to future.**

We need to “keep this methodology”

Backup


Minimum T-inlet and Maximum Device Impedance, Function of SSD CFM
Allowable T_inlet
Minimum T-Inlet Curve
For given airflow rate (CFM), device must be able to operate without throttling given input air at or above this temperature (T-inlet)
Maximum Impedance Curve
Max pressure drop (dP) allowed for a device at a given airflow rate (CFM)
Allowable Impedance
T-inlet Allowed (Deg C)
dP (In*H20)
CFM /SSD
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
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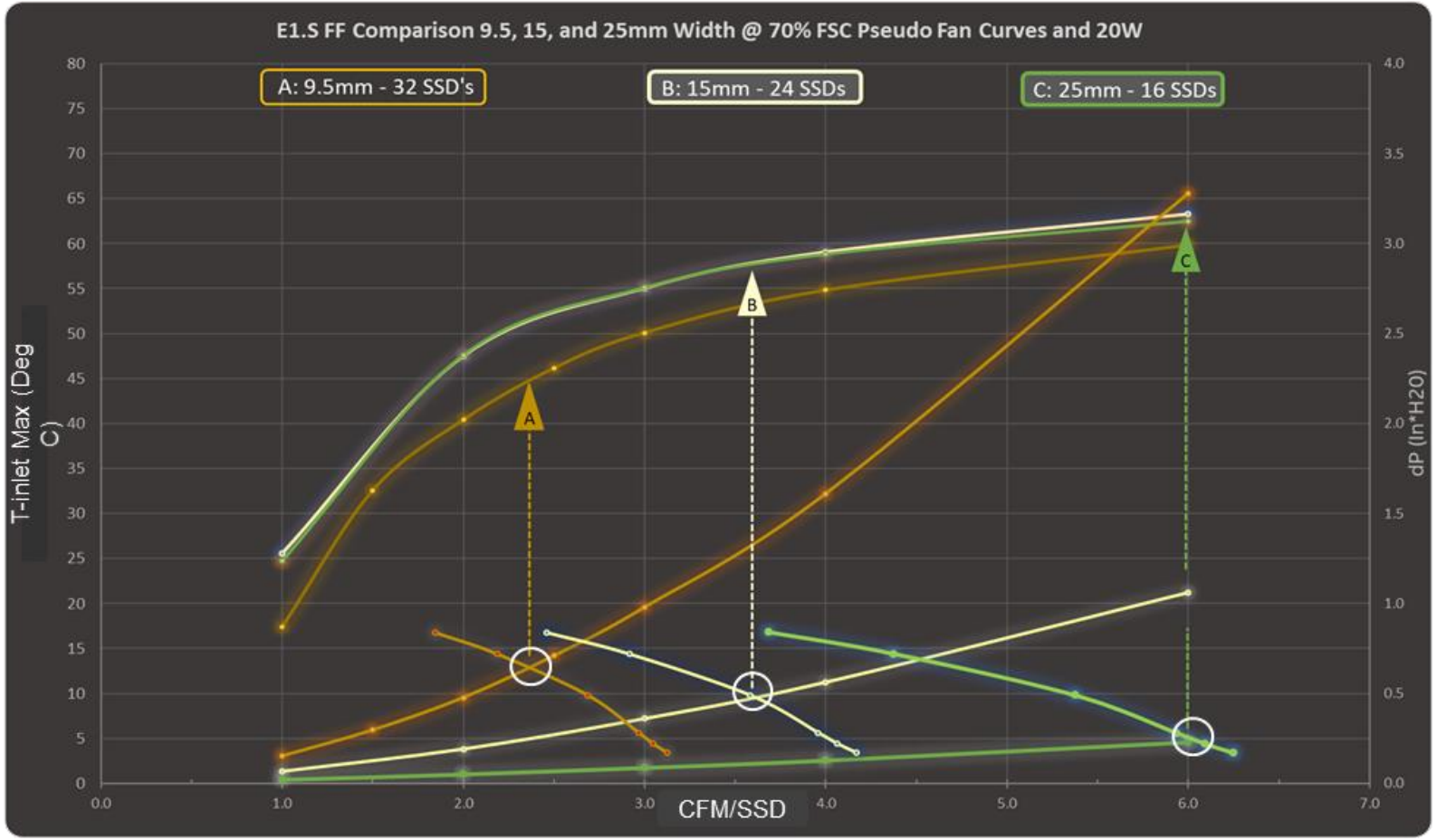
E1.S FF Comparison 9.5, 15, and 25mm Width @ 70% FSC Pseudo Fan Curves and 20W
A: 9.5mm - 32 SSD's
B: 15mm - 24 SSDs
C: 25mm - 16 SSDs
T-inlet Max (Deg C)
dP (In*H2O)
CFM/SSD
A
B
C
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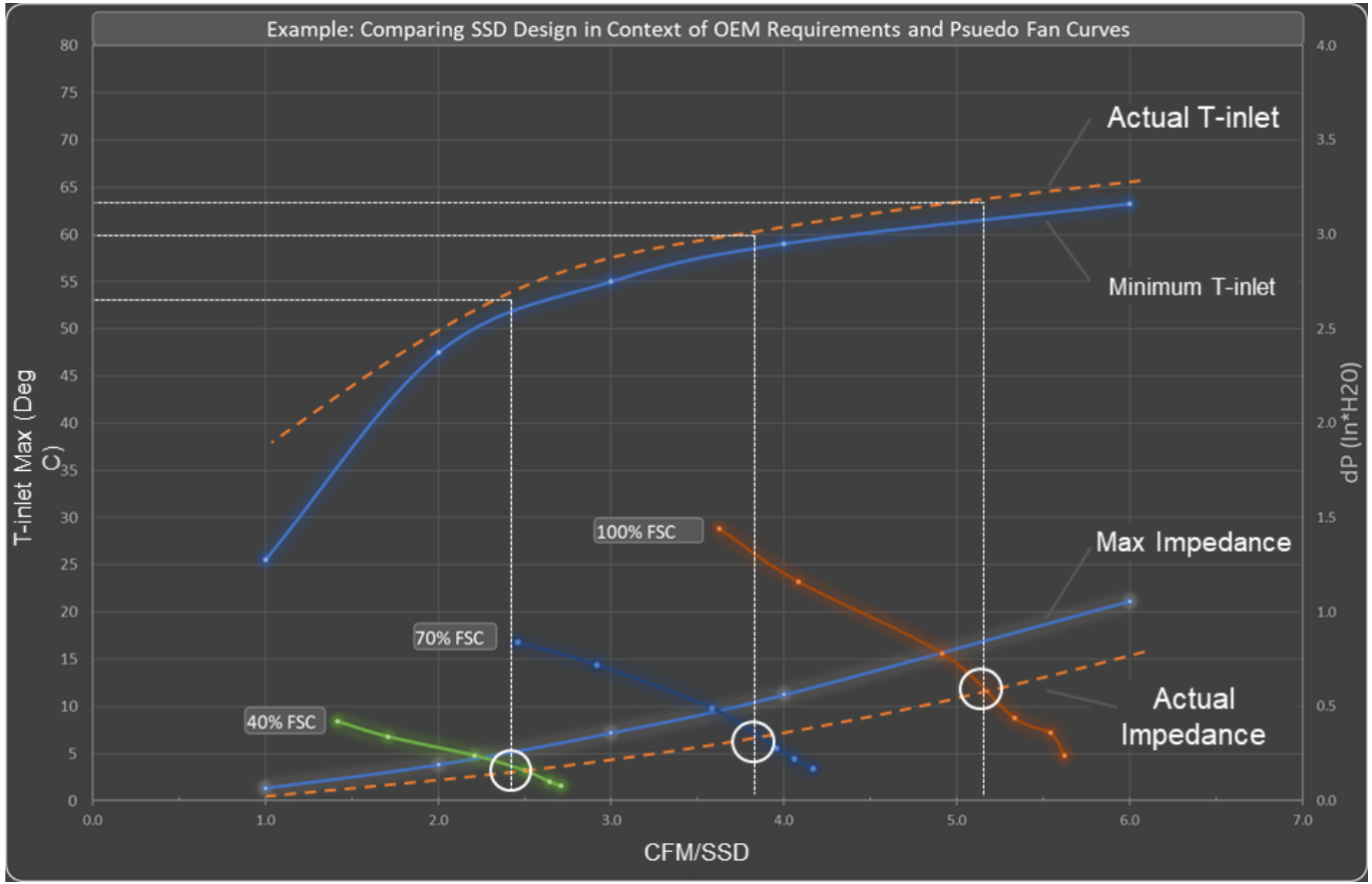
Comparison Metrics: T-inlet and Flowrate
- How do Designs Compare @ fixed 20W SSD PWR

	Width	SSDs / Platform	CFM/SSD	T-inlet "max air temp allowed"	dP SSD (in-H2O)	Platform CFM	PWR/SSD*	Total SSD PWR	Air T-rise
A	9.5	32	2.4	45	.62	76.8	20	640	16.3
B	15	24	3.6	57	.5	86.4	20	480	10.8
C	25	16	6.0	62	.24	96	20	320	6.5

- Metrics provide understanding of an SSD form factor's ability to scale capacity, performance, and cooling when integrated to a platform.
- It also provides insight to which form factor may benefit a platform thermally and or achieve fan power efficiency targets.


Example: Comparing SSD Design in Context of OEM Requirements and Psuedo Fan Curves
Actual T-inlet
Minimum T-inlet
Max Impedance
Actual Impedance
100% FSC
70% FSC
40% FSC
T-inlet Max (Deg C)
dP (In*H20)
CFM/SSD
0
5
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