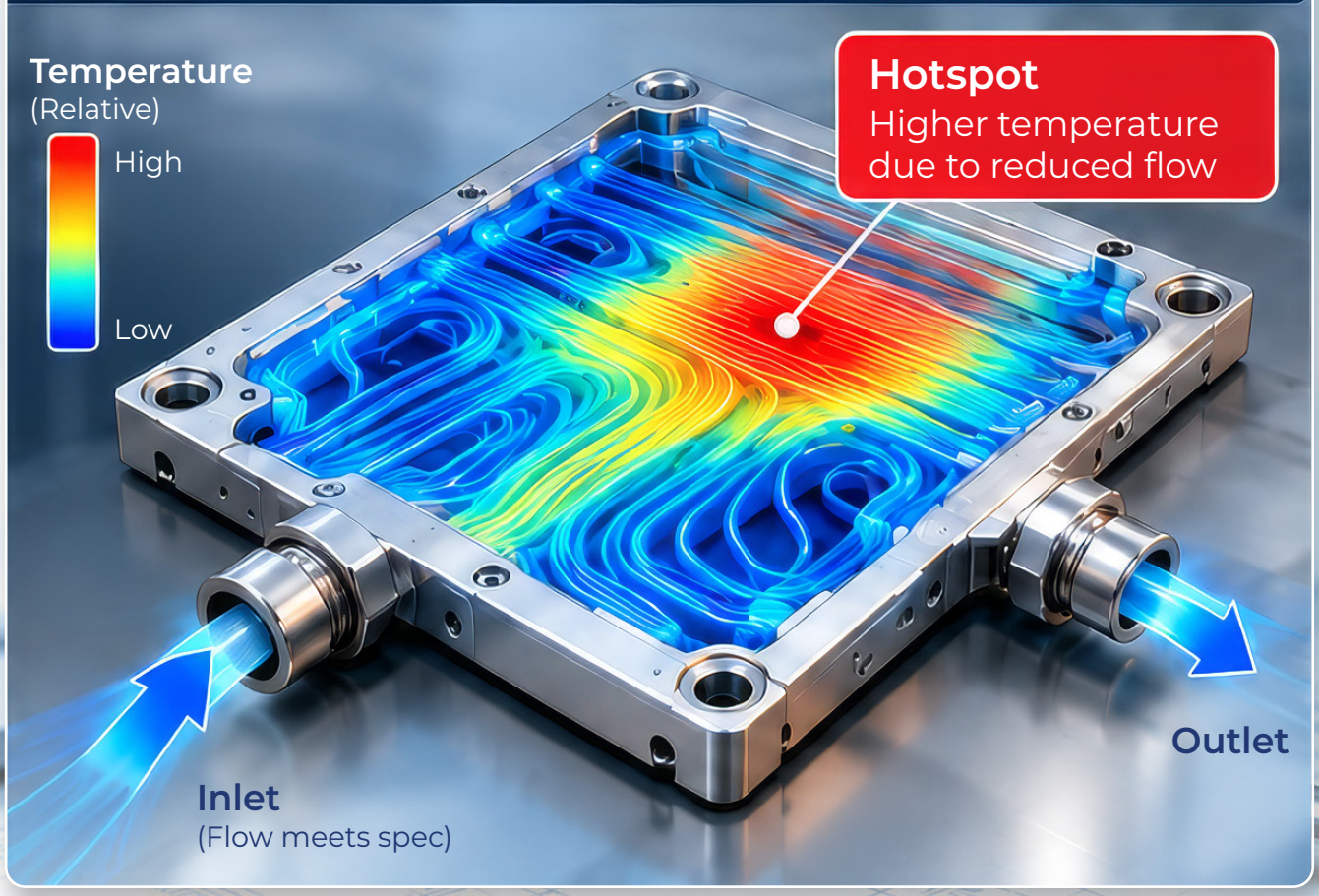
A Cold Plate Can Meet Its Flow Spec and Still Have a Hotspot!

Total flow rate does not guarantee uniform cooling. Flow distribution, channel design and manufacturability all determine whether coolant actually reaches the highest heat load regions.

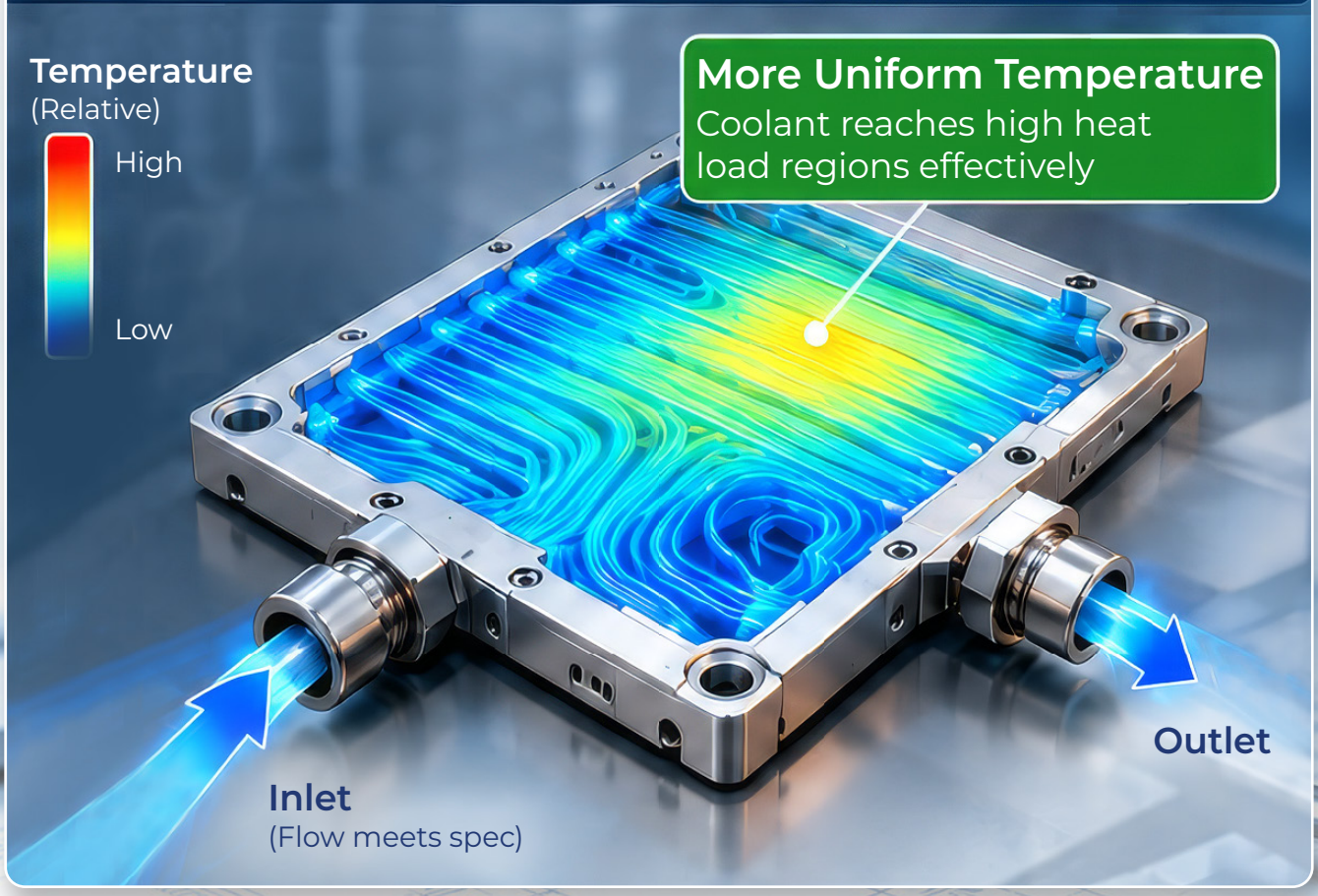
Meets Flow Spec but Still Has A Hotspot

Total inlet flow is within specification, but uneven flow distribution leads to higher temperatures in some areas.



Improved Flow Distribution

Channel and manifold design direct coolant more effectively to high heat load areas, reducing temperature variation.



Key Design Considerations







FLOW DISTRIBUTION

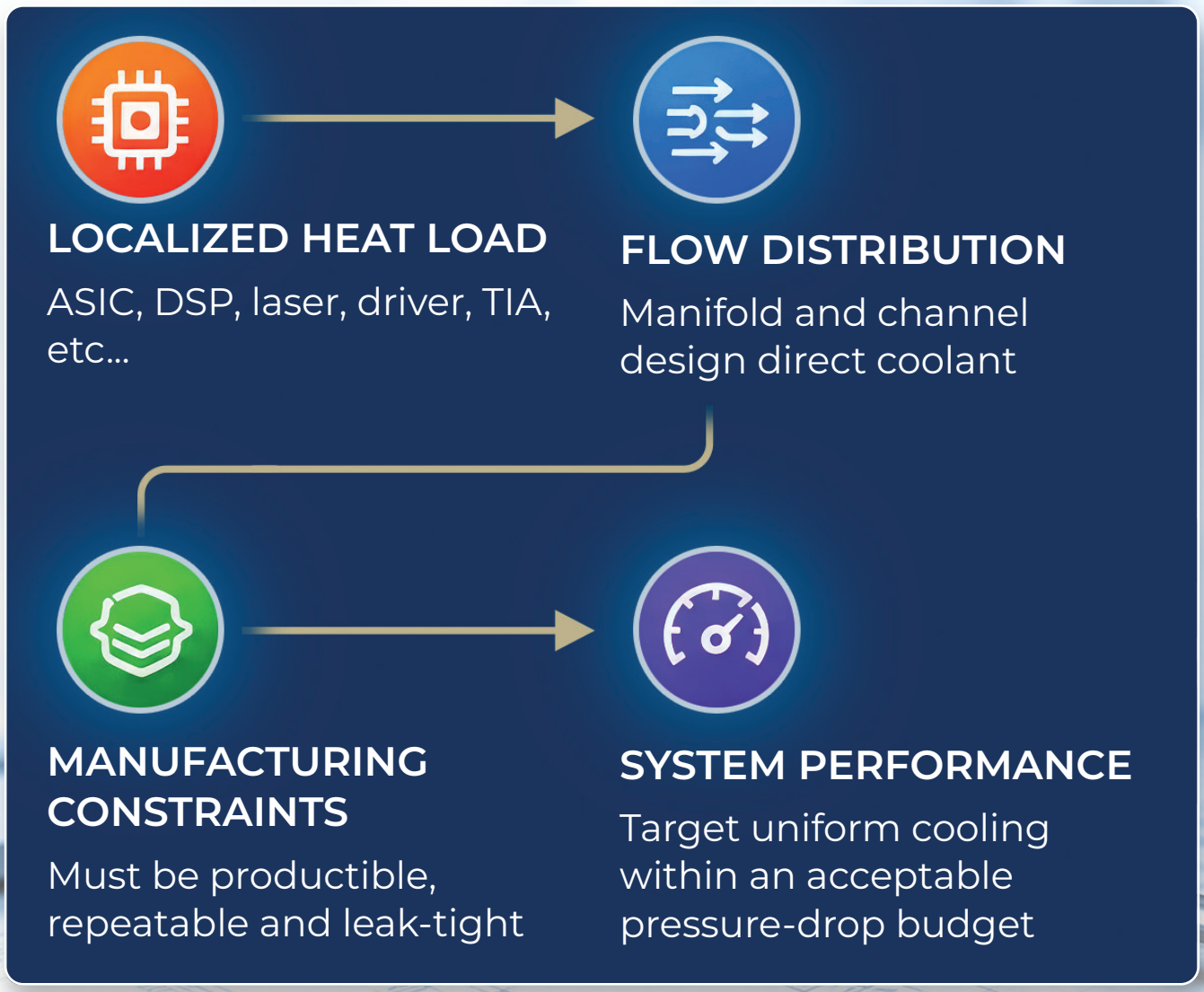
Inlet, manifold and channel design must deliver coolant to the highest heat load areas, not just achieve total flow rate.

MANUFACTURABILITY

Channel geometry, joining method and tolerances must be producible, repeatable and leak-tight at volume .

NPI INTEGRATION

Thermal performance, pressure drop, manufacturability and cost must be balanced early in the NPI process.


LOCALIZED HEAT LOAD
ASIC, DSP, laser, driver, TIA, etc...
FLOW DISTRIBUTION
Manifold and channel design direct coolant
MANUFACTURING CONSTRAINTS
Must be productible, repeatable and leak-tight
SYSTEM PERFORMANCE
Target uniform cooling within an acceptable pressure-drop budget