

CFdesign Consulting – Femap and NX Nastran

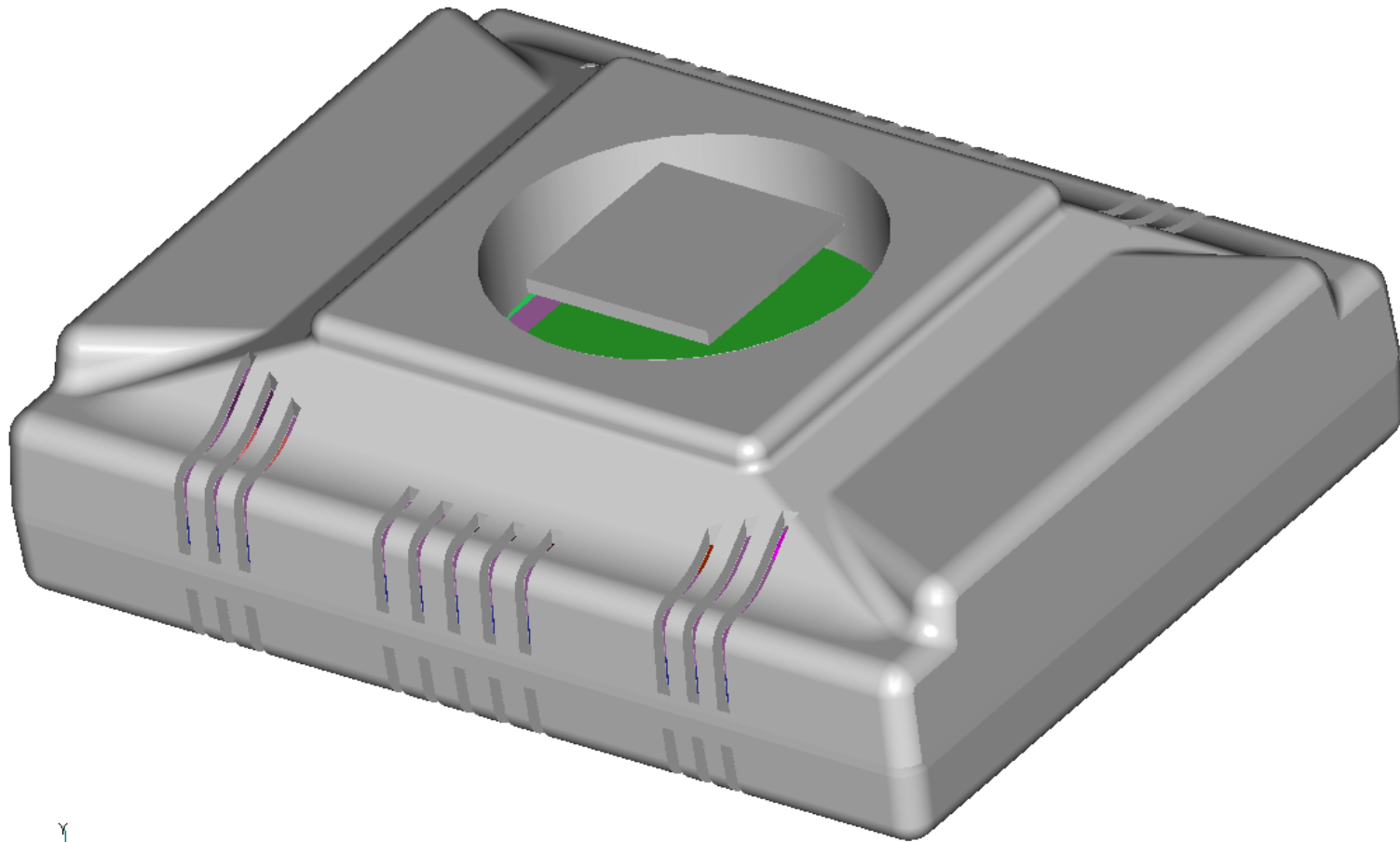
Computational Fluid Dynamics (CFD) Analysis of Cable Assembly

Precision Interconnect: Computational fluid dynamics (CFD) analysis for a world leader in the design and manufacture of complete, turnkey cable assemblies for OEMs of ultrasound, surgical, and high speed data operations. Thermal fluids analysis was performed on a tightly integrated circuit board enclosed within a plastic case. Various cooling scenarios were investigated (forced cooling via a small embedded fan and natural convection) and chip junction temperatures predicted. Based on these CFD predictions, the circuit board chip density was optimized for long term thermal survivability.

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VI



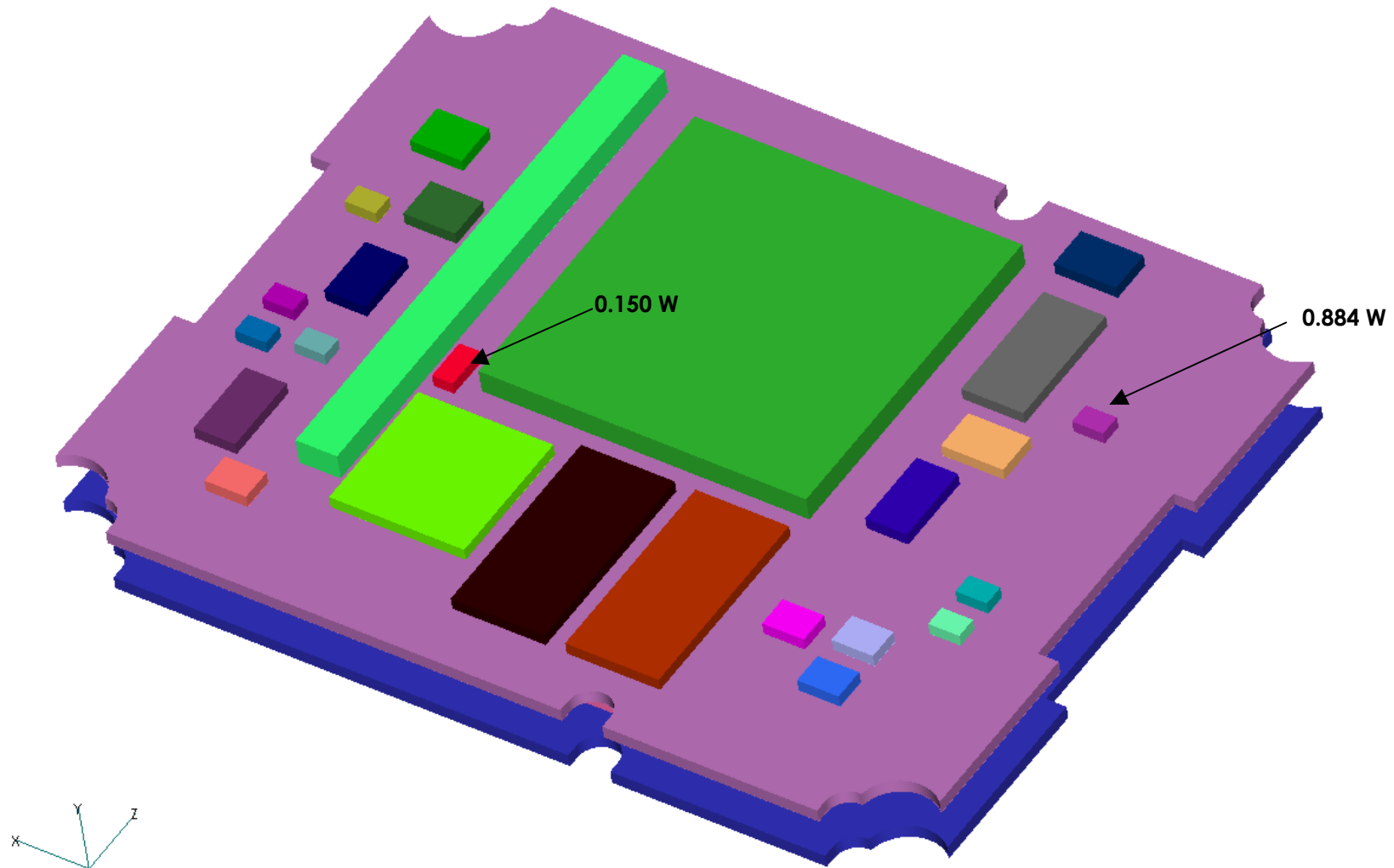
Precision Interconnect Firestorm+ project CFD structure. The outer shell is a plastic part in which two circuit boards are contained. This simulation looks at the structure's ability to shed heat via forced convection by an internal fan (not shown). A fan flow rate of 5 CFM was used in this simulation.



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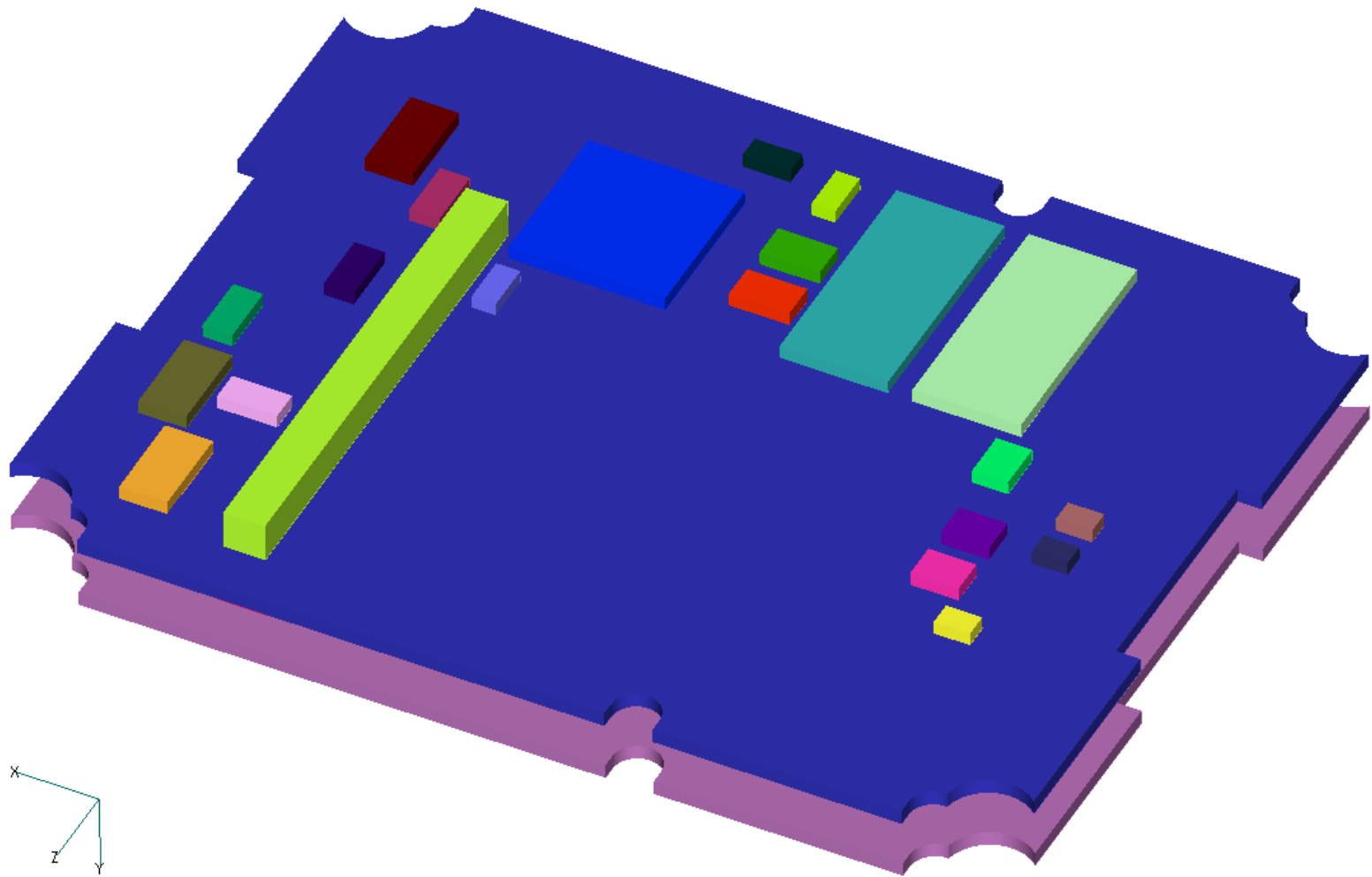
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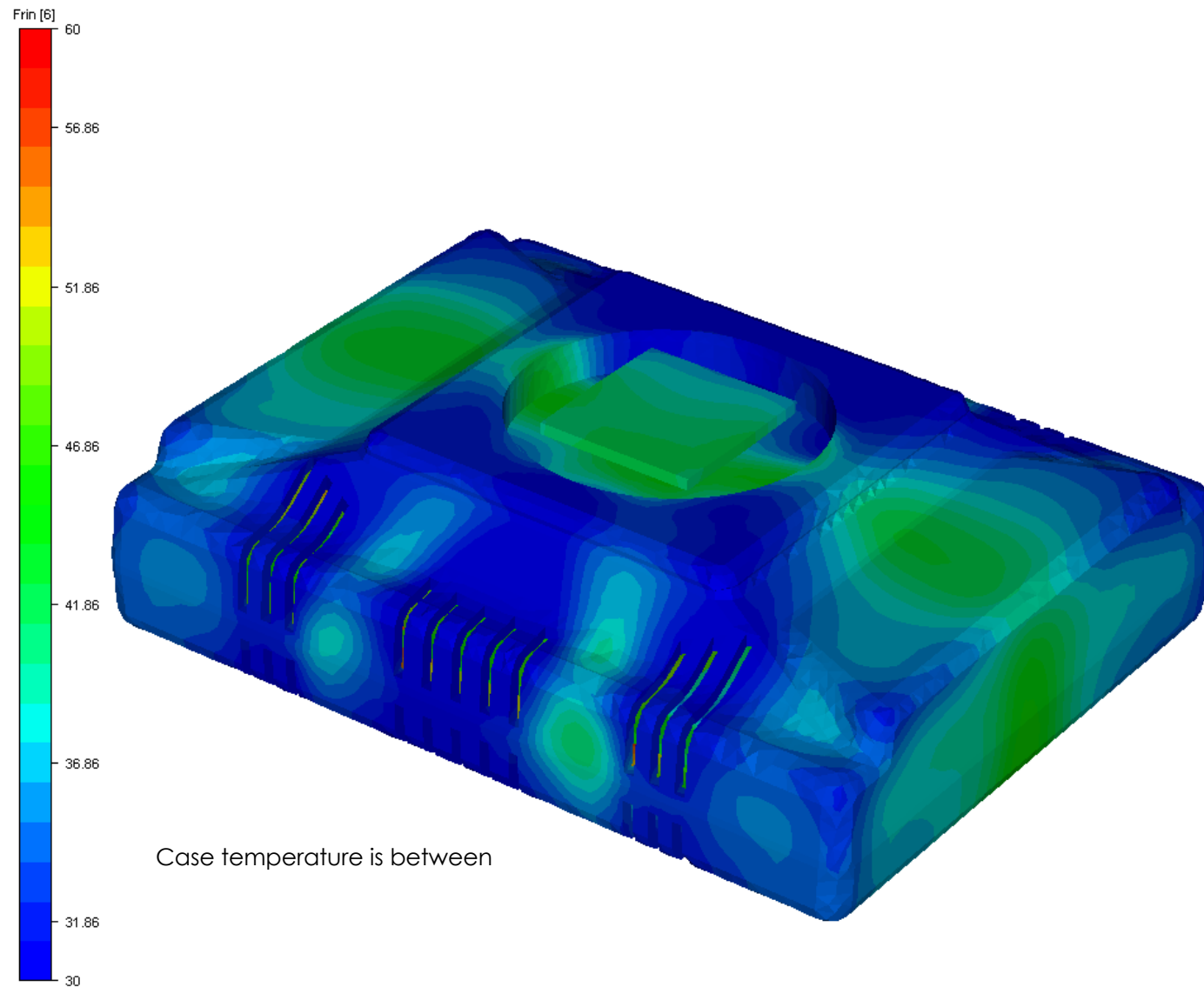


Bottom surface of circuit board. The imprint of the large chip on the other side is left off this model. It was assumed to be quite thin. To capture the general power dissipation throughout the circuit board, a general power consumption of 2 W per board was added to the model.



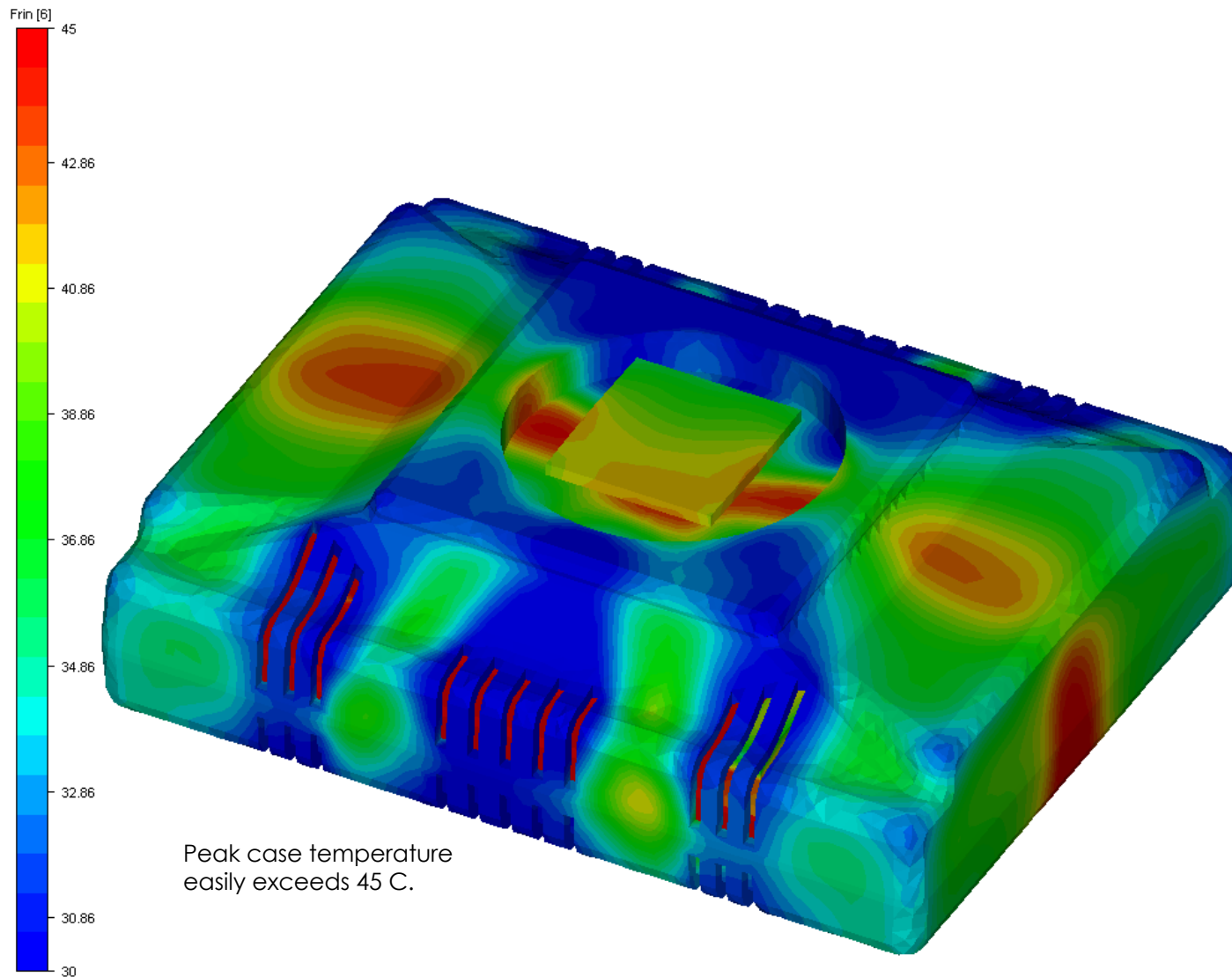
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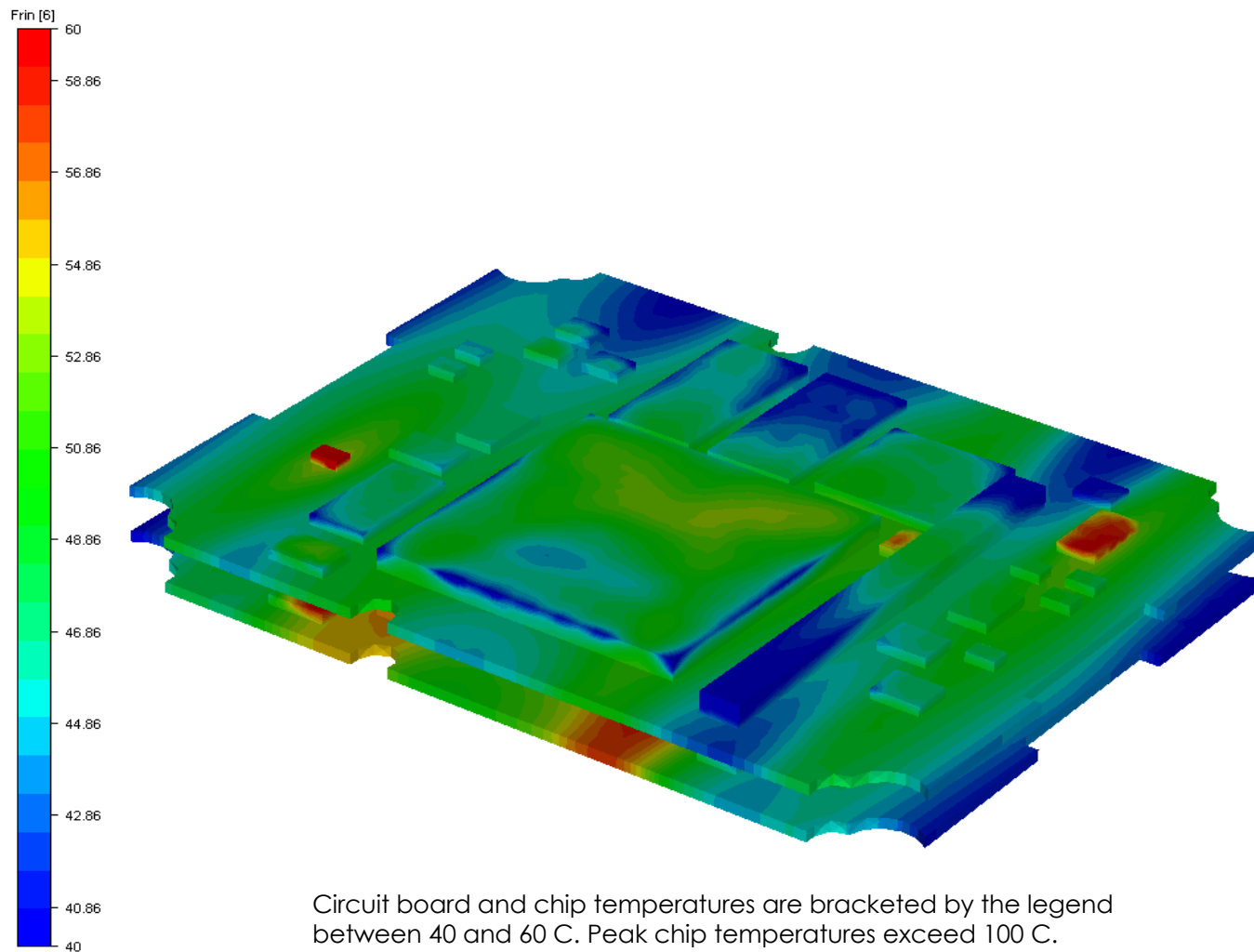
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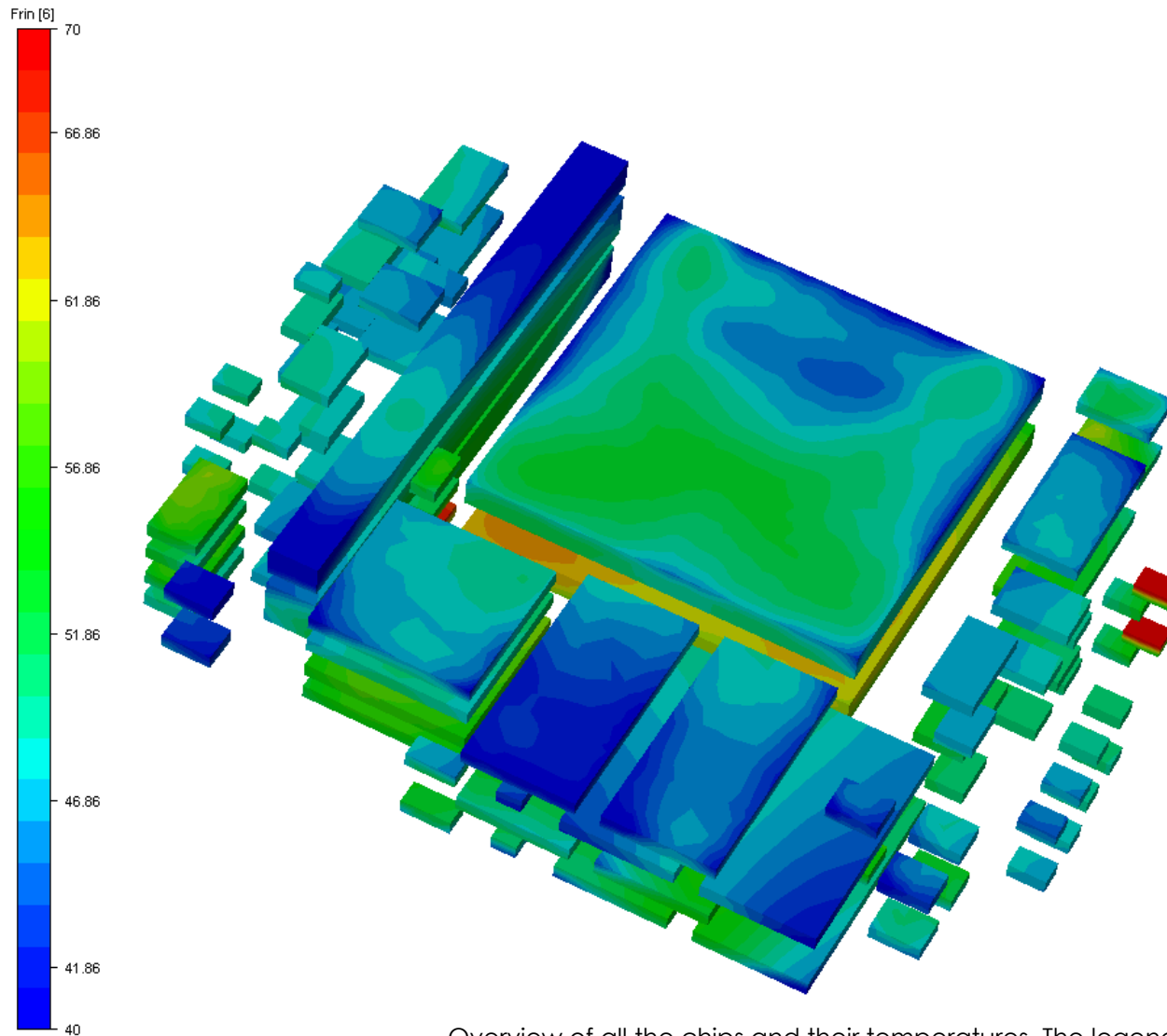


Circuit board and chip temperatures are bracketed by the legend between 40 and 60 C. Peak chip temperatures exceed 100 C.



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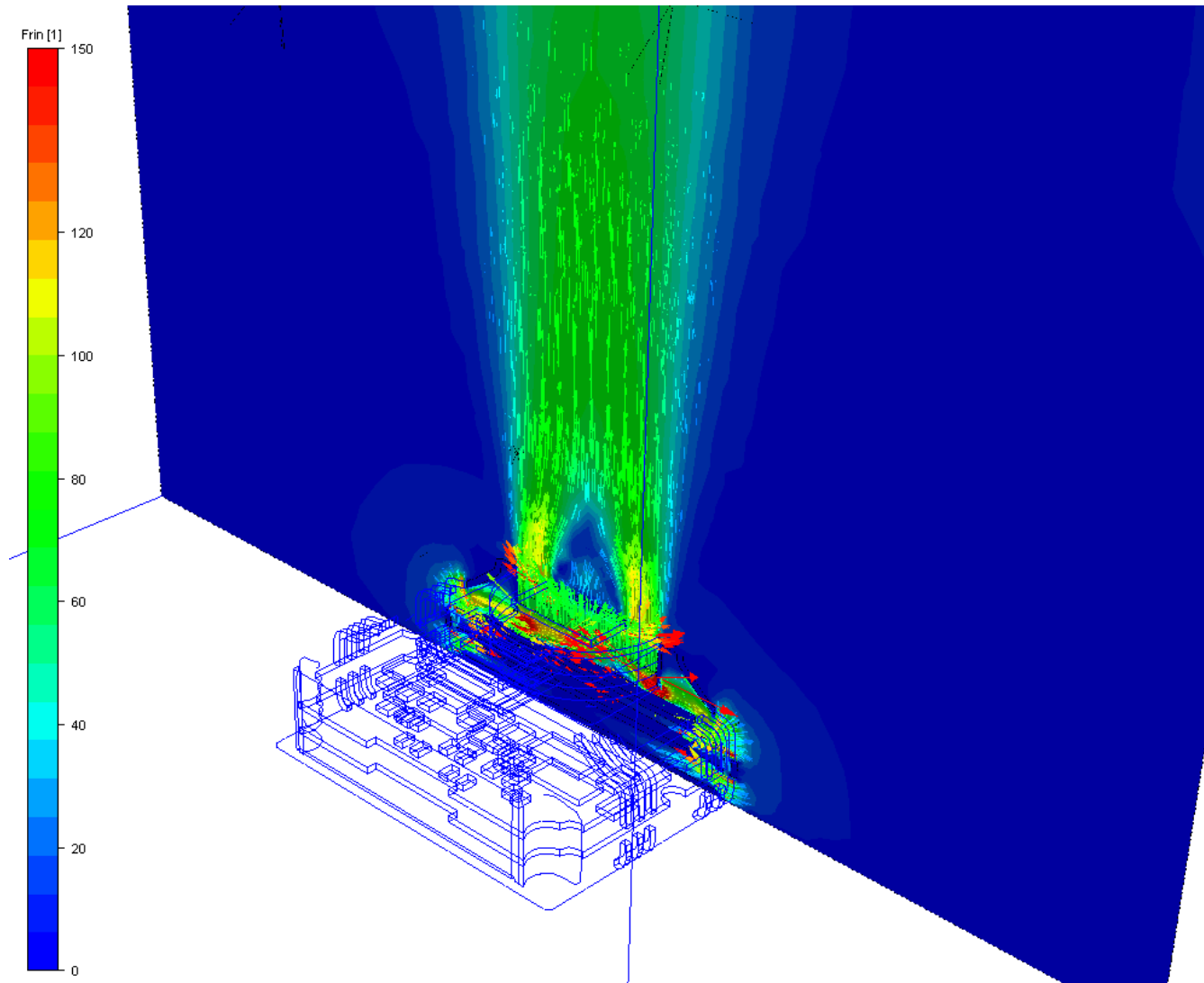


Overview of all the chips and their temperatures. The legend is bracketed between 40 and 70 C to better display the range of temperatures found within the system.



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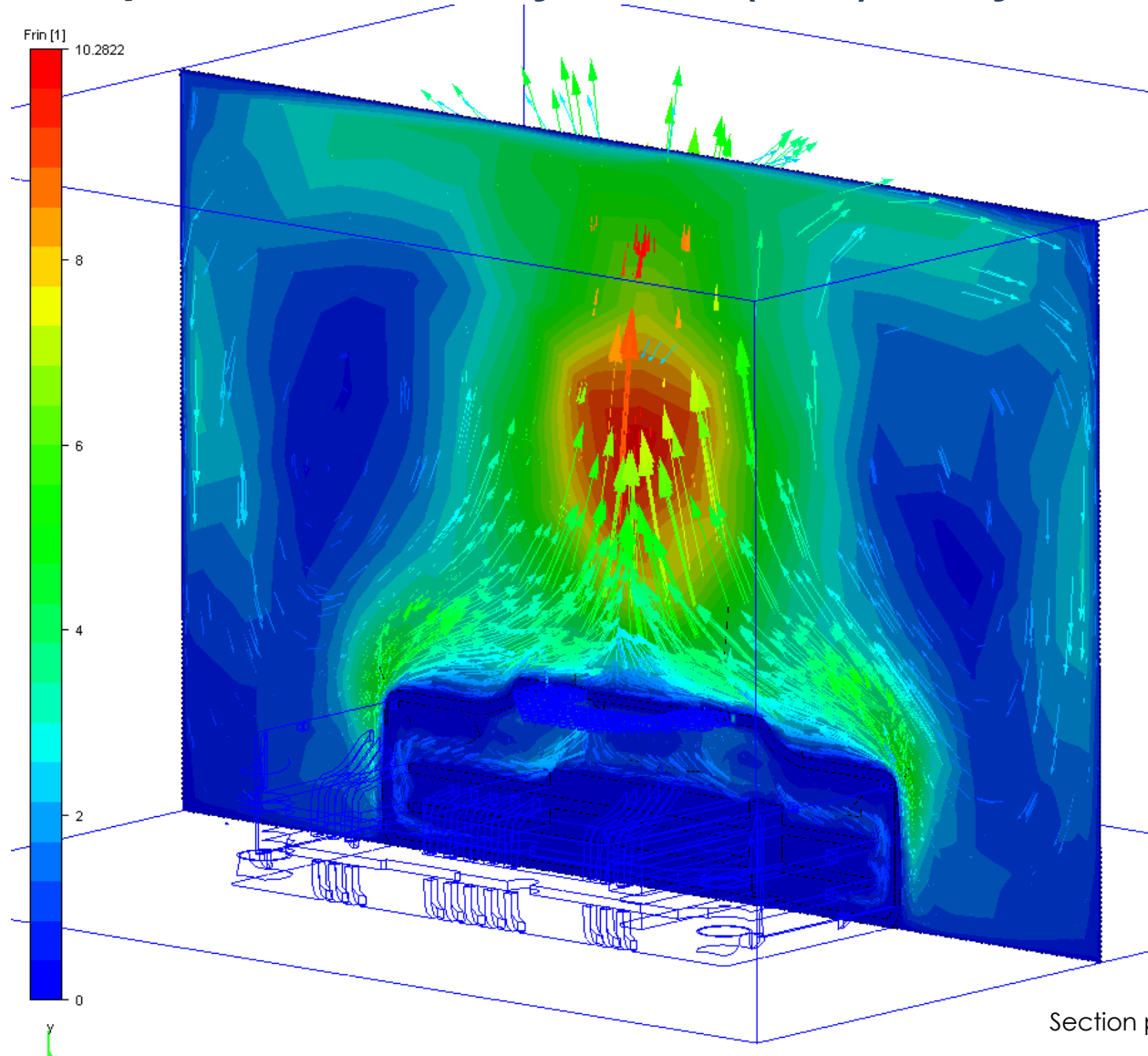
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Section plane showing general flow vectors.

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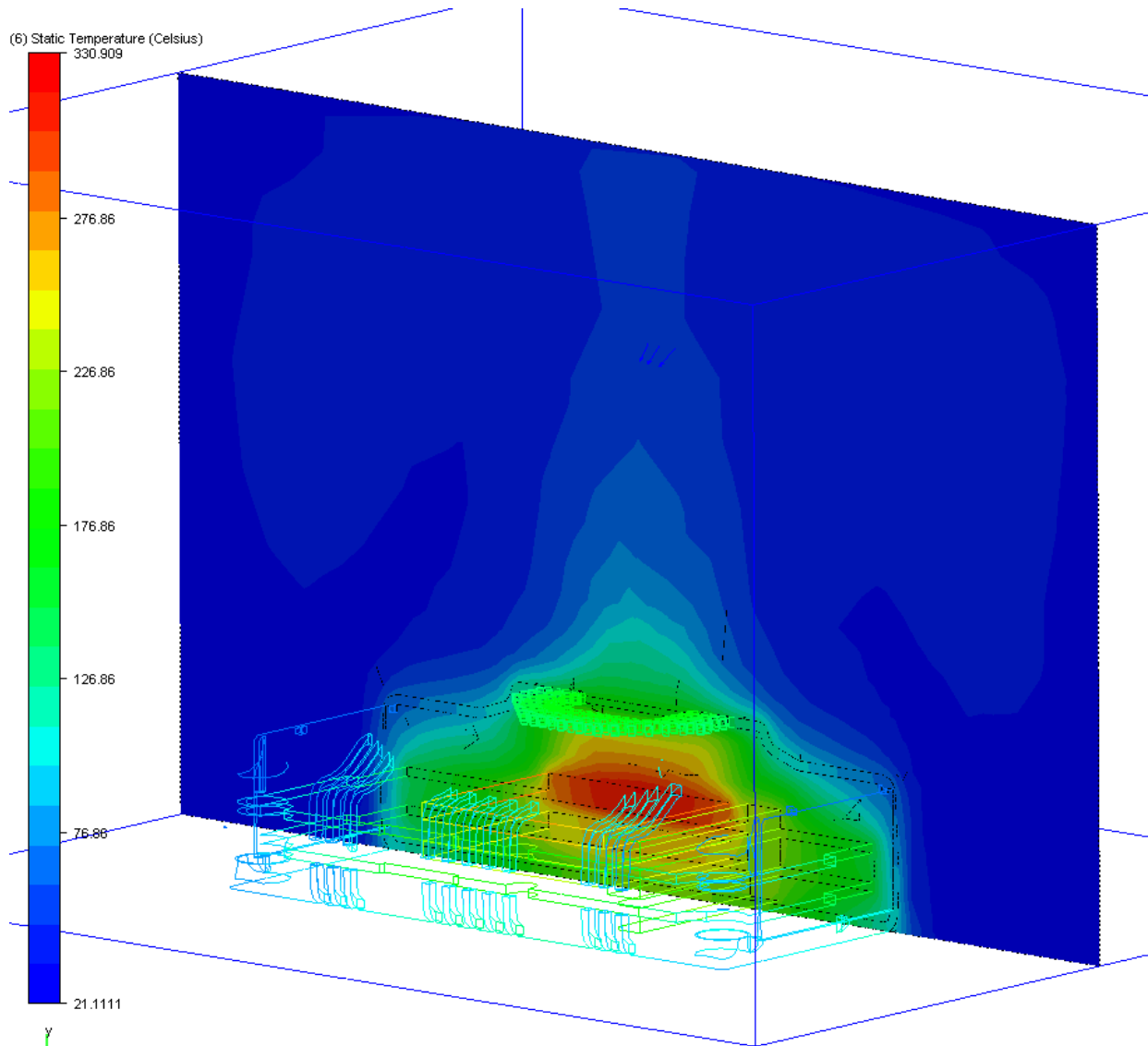


Section plane showing general flow vectors.



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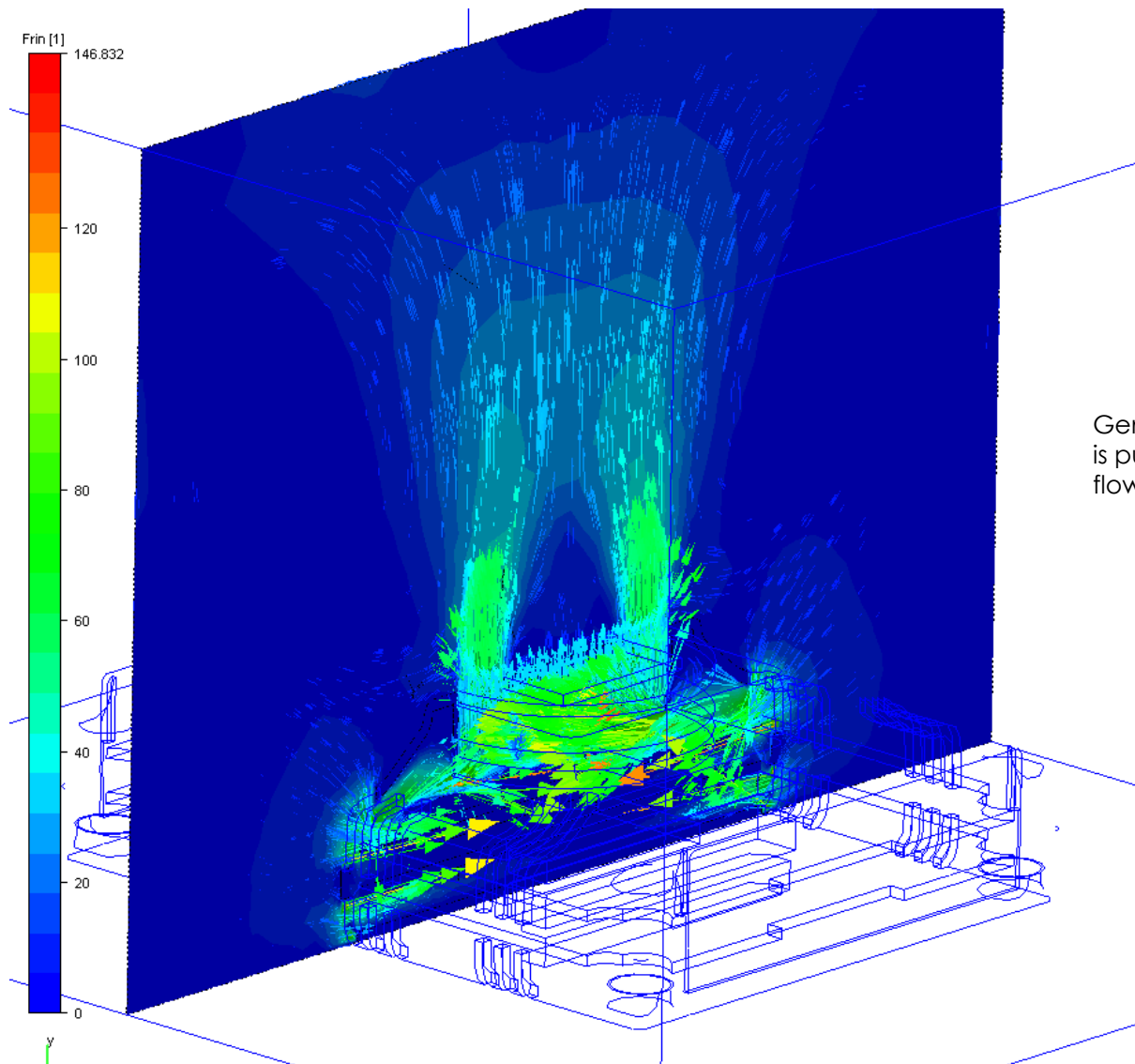
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Cut surface through the model showing the temperatures within the system. Temperatures are in centigrade.

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General flow field in the structure. The fan is pushing 2.5 CFM and creates a strong flow field within the Firestorm+ structure.