

THE ULTIMATE FUSION WORKSTATION

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James Neville

“Simulation Guy”

- Principal Business Consultant for Autodesk Global Consulting Delivery
- Joined Autodesk in 2011 through the Blue Ridge Numerics Acquisition
- Special projects
- Expert in CFD and Generative Design

THE POWER OF ONE

A person in a suit stands on a stage, illuminated by spotlights. Behind them is a large screen displaying the title 'THE POWER OF ONE' in large, white, sans-serif capital letters. The background of the screen is a blue grid of many small, stylized human faces. The stage is dark, and the audience area is not visible.

OTC 2020 - 7 months ago...

A time for reflection and inspiration

|

Collaboration with co-workers

|

Planning for the year

How can we leverage our tools and technologies to inspire?

Design, Optimize & Build The Ultimate Fusion Workstation



3D Modeling

Generative Design

Generative Fluids

Electronic Cooling Simulation

Additive Manufacturing



Photogrammetry



Flow and heat transfer simulation



Lattice generation

CONCEPT
DESIGN
MAKE



Boring



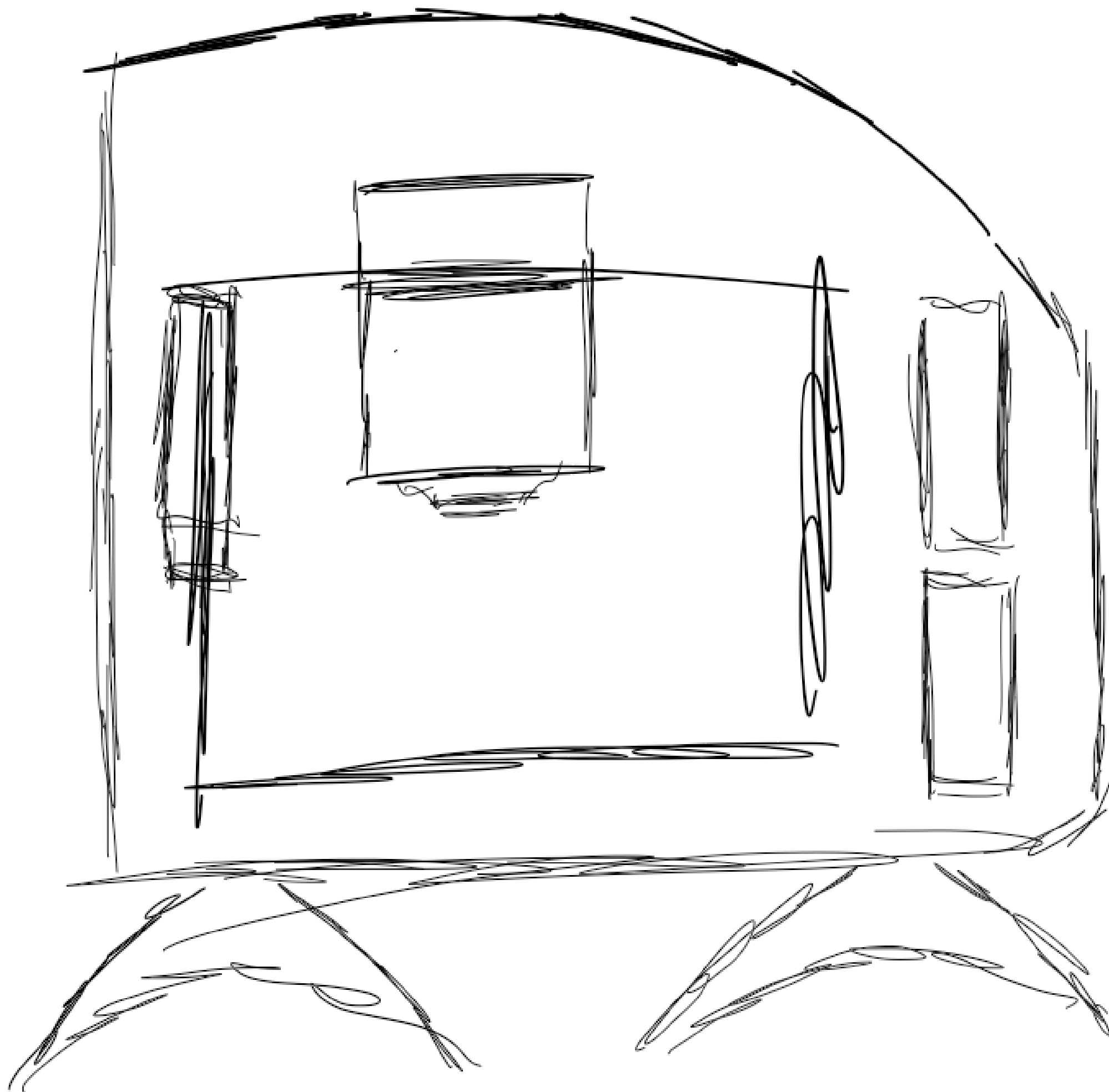
Messy



Interesting



Sketches

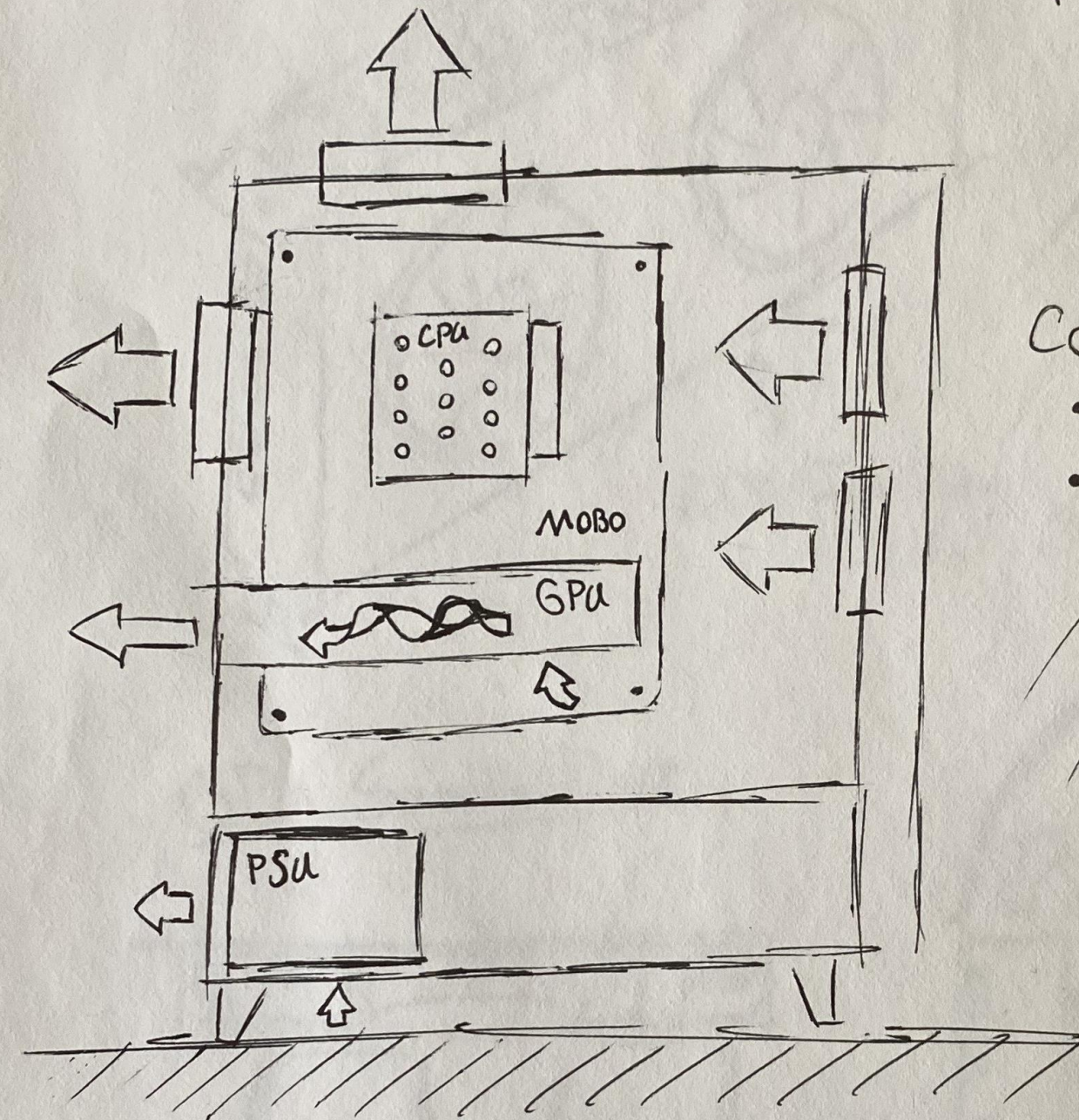


Generative Case Project

9-20-20

JA

Traditional Case Layout



Pros

- Cheap
- Simple

Cons

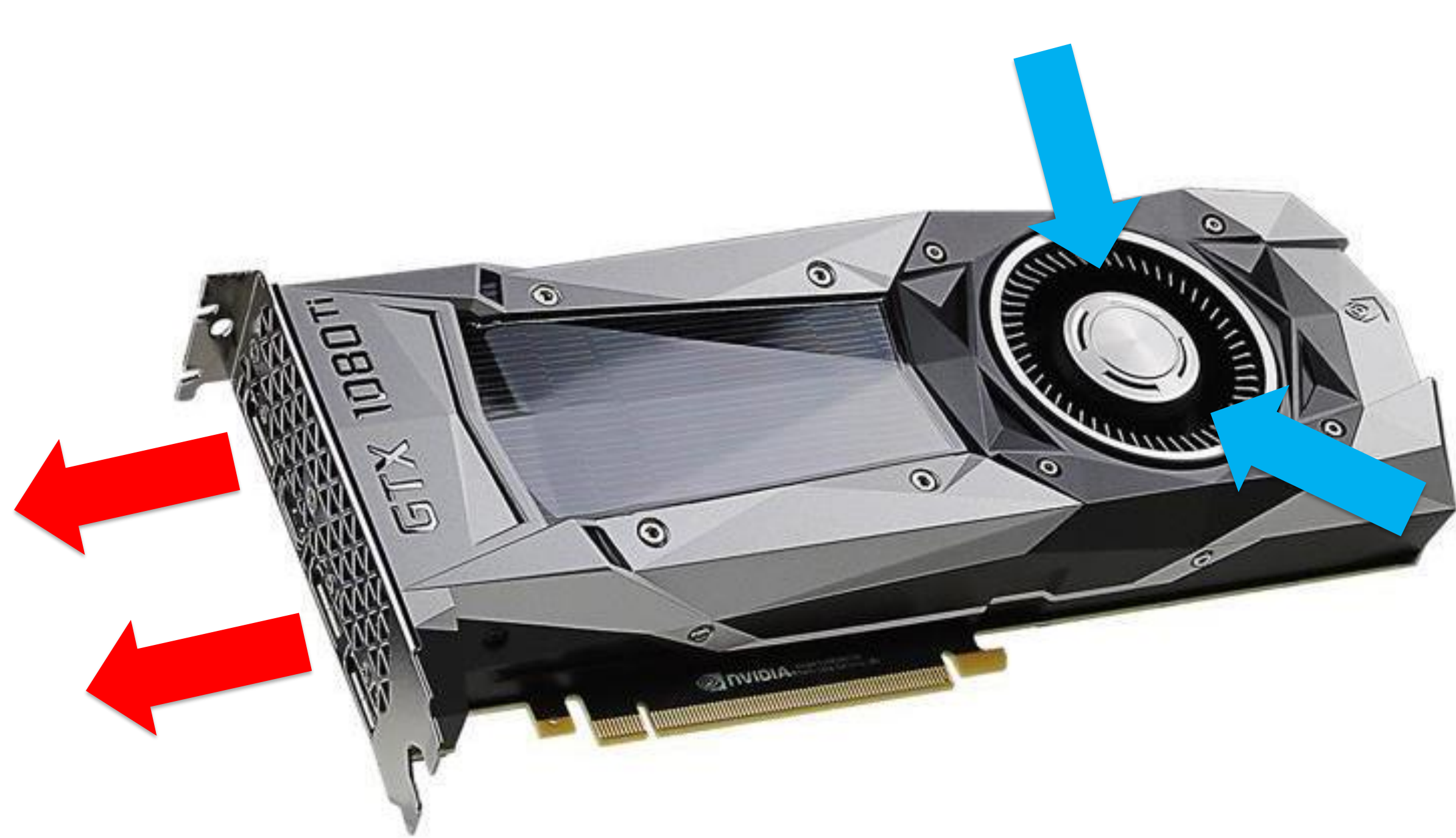
- Inefficient
- Traditional MFG processes

Optimization Areas

- CPU fed hot case air
- GPU fed hot case air
- Cabling is a mess
- Inefficient use of fans

Generative Ideas

- Dedicated CPU and GPU cooling strategy
- Fan flow optimization
- Space recovery

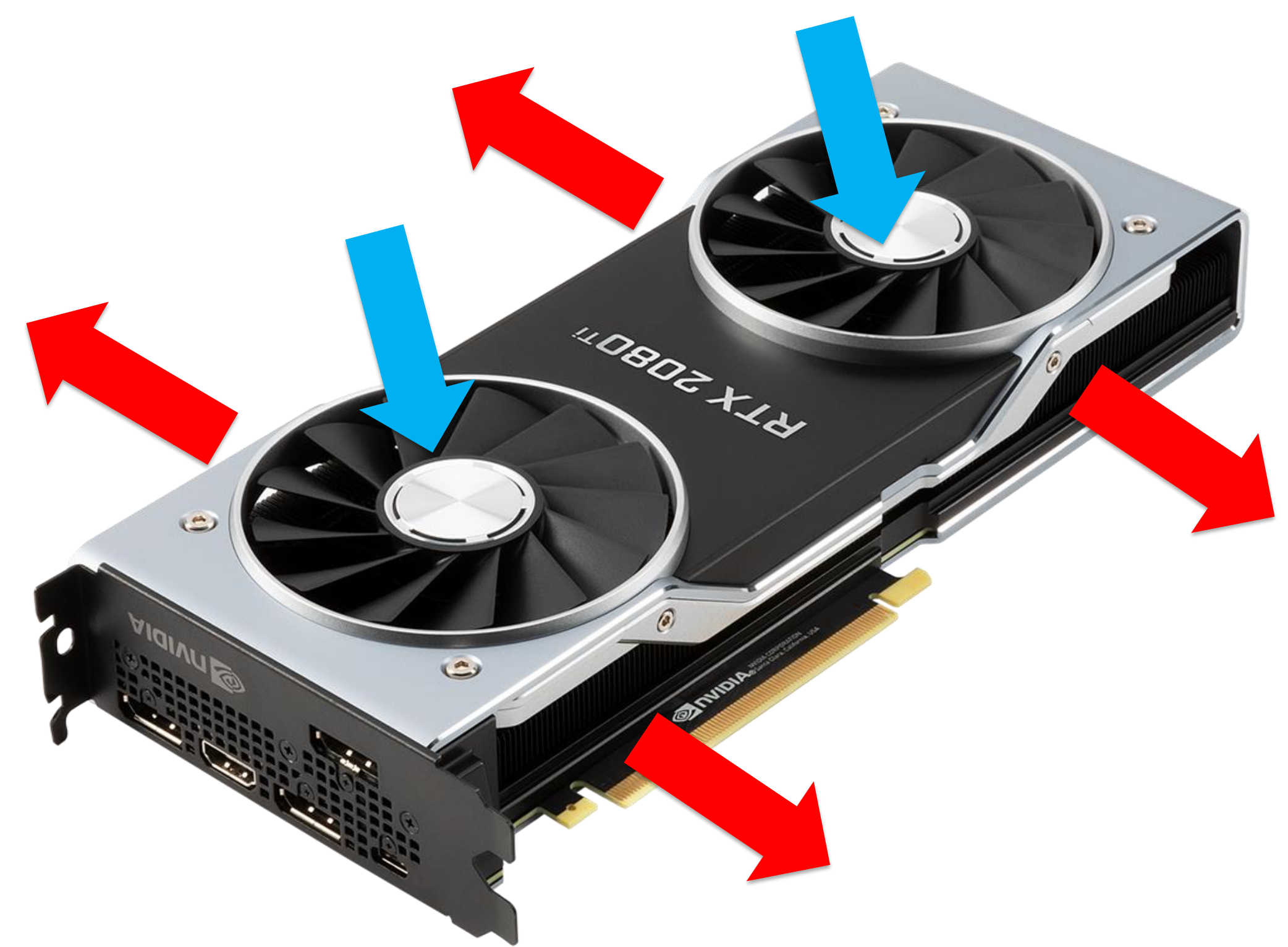


Blower Style Design

One cooling fan

One rear exhaust

- Limited cooling potential
- + Heat exhausted out of case



Open Air Style Design

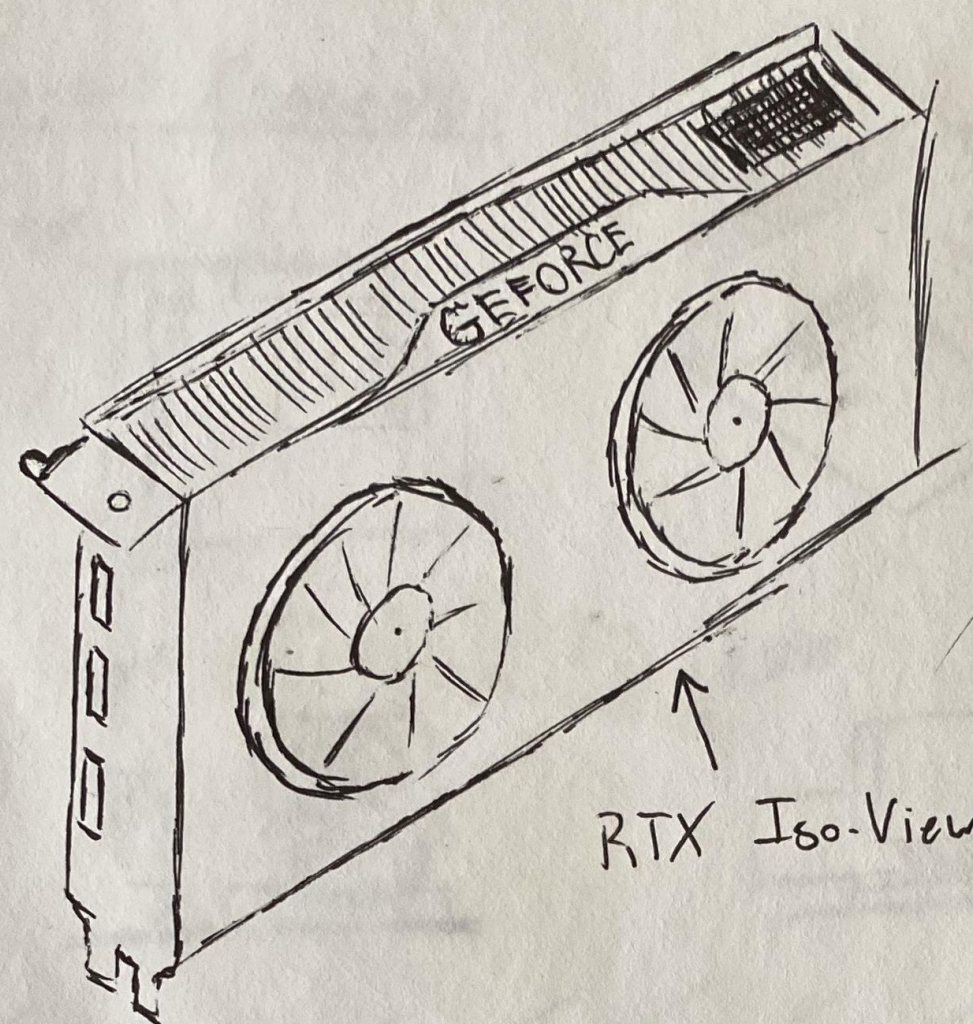
Multiple cooling fans

Open exhaust

- + Maximized cooling potential
- Heat exhausted into case

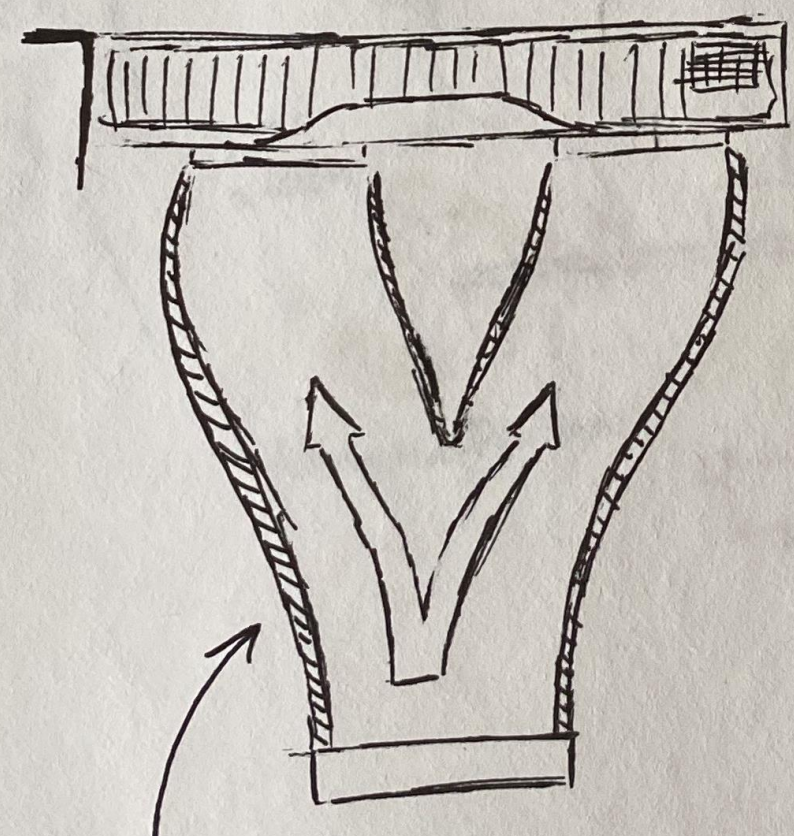
Generative Case Project

2-20-20
JK

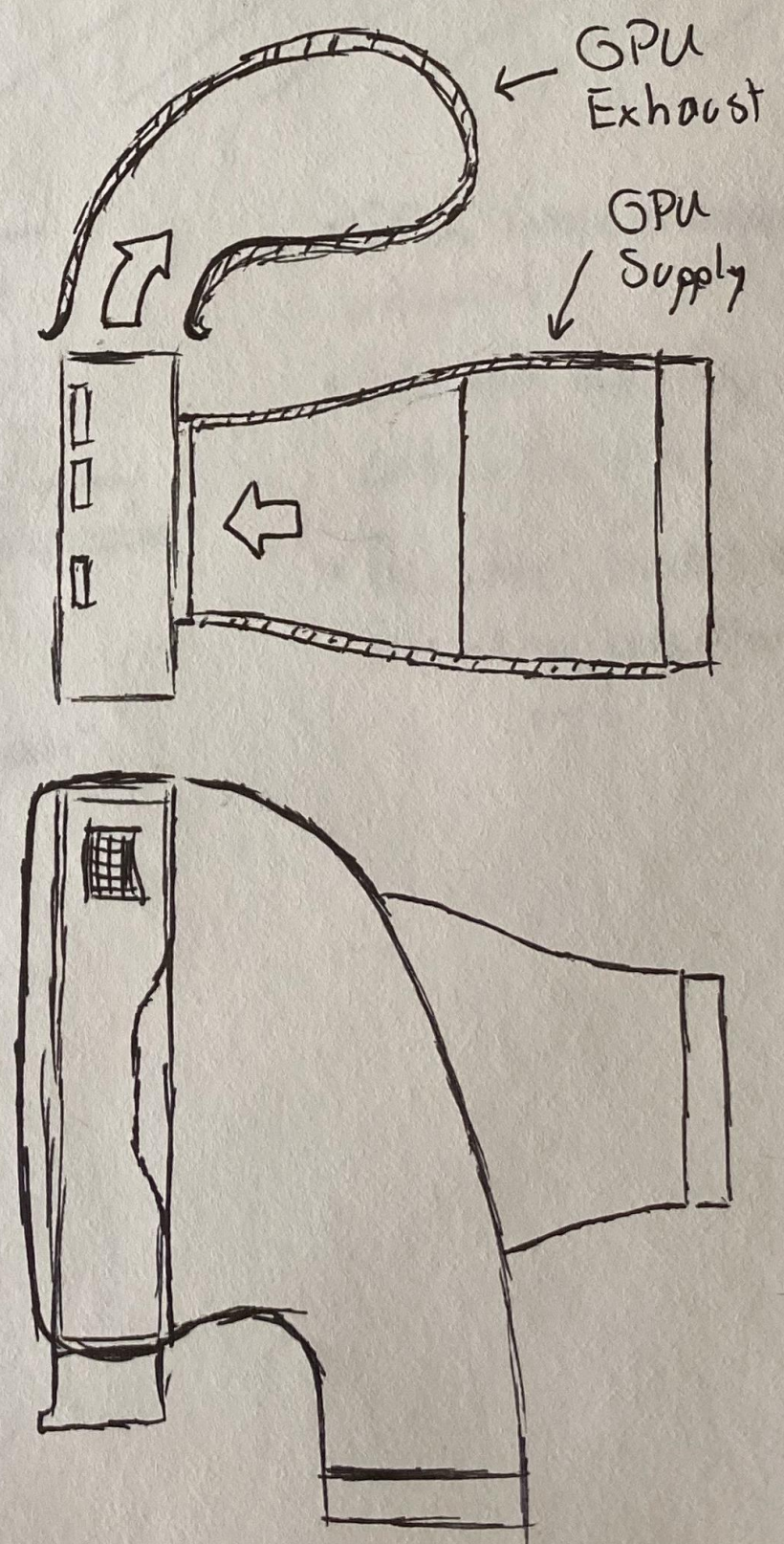


RTX Iso-View

GPU Supply Duct



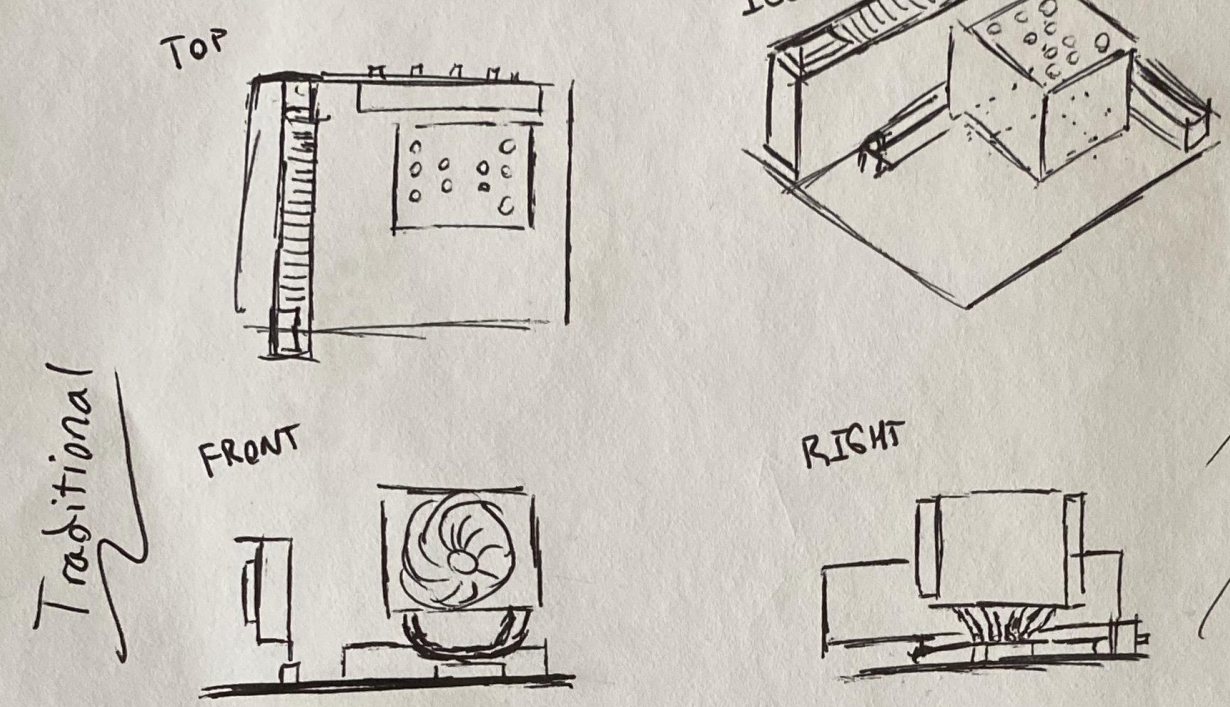
GPU supply duct cross-section



Generative Case Project

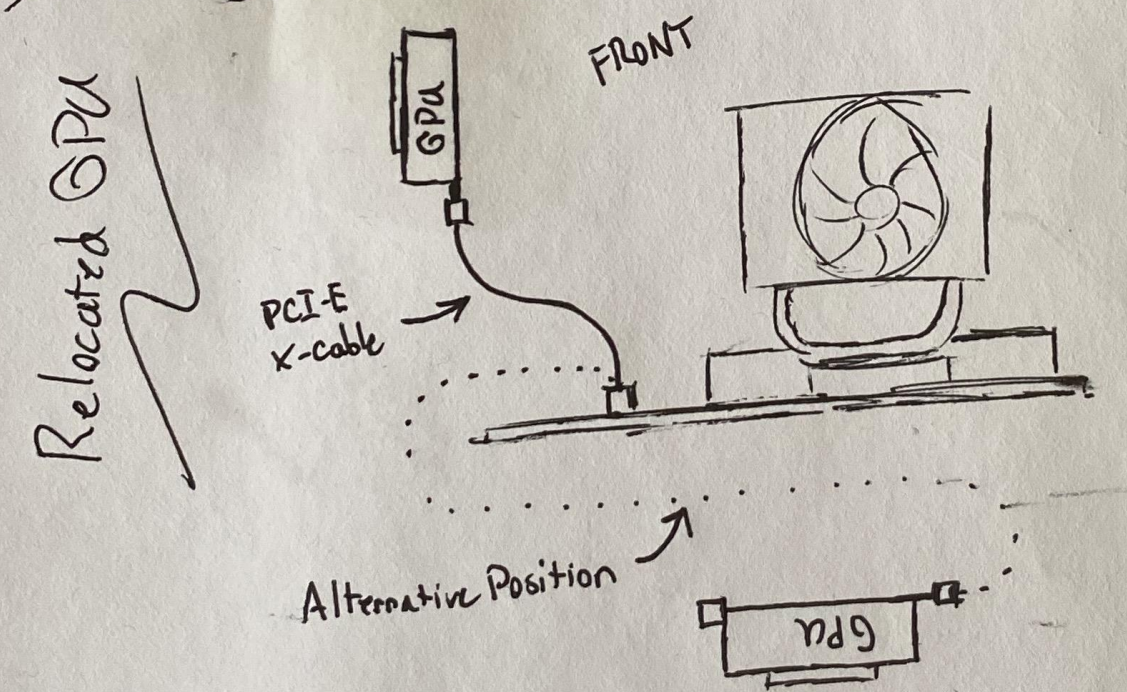
2-24-20
JK

Layout Concepts



Traditional

- GPU next to CPU
- 1/2 GPU exhaust hits MOBO



Relocated GPU

- GPU intake + exhaust unlimited
- Limited only by cable length
- Possible back-side mounting position

CONCEPT
DESIGN
MAKE



Workstation Components

CPU – Intel Core i9-9900K

GPU – Gigabyte RTX 2080 Super

Motherboard – Gigabyte Z390

Memory – Corsair LPX 64 GB

Storage – Samsung 970 Pro 1TB

Power Supply – Corsair SF750

CPU Cooler – Noctua NH-U12A

Case Fans – Noctua NF-A12x25



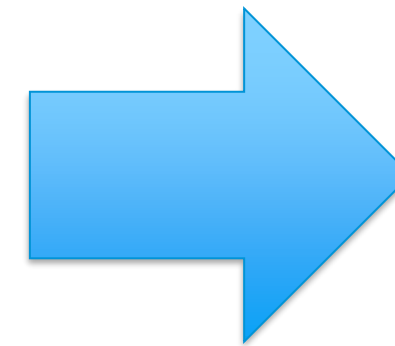
Component Digitization Methods

- 1. Designed from scratch**
- 2. Based on open-source assets**
- 3. Photogrammetry**

Power Supply (PSU) - Scratch



MFG Image

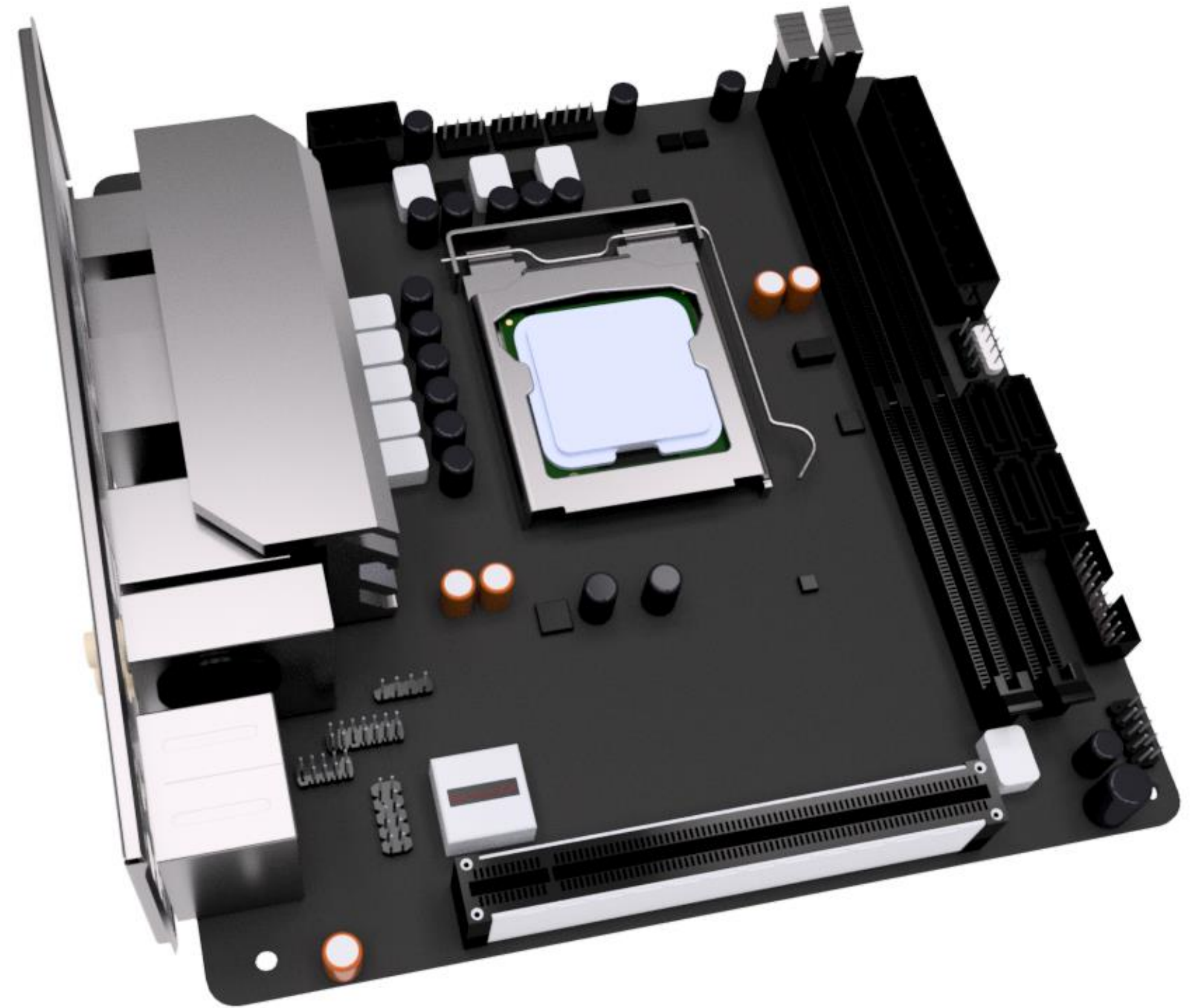
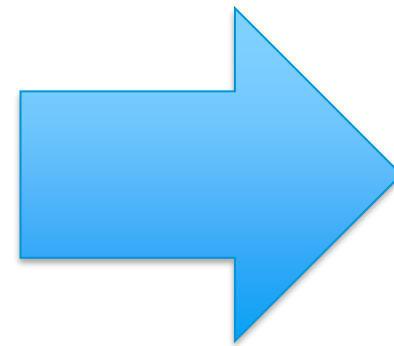


Model Render

Motherboard – Open-Source Assets



MFG Image



Model Render

GPU - Photogrammetry

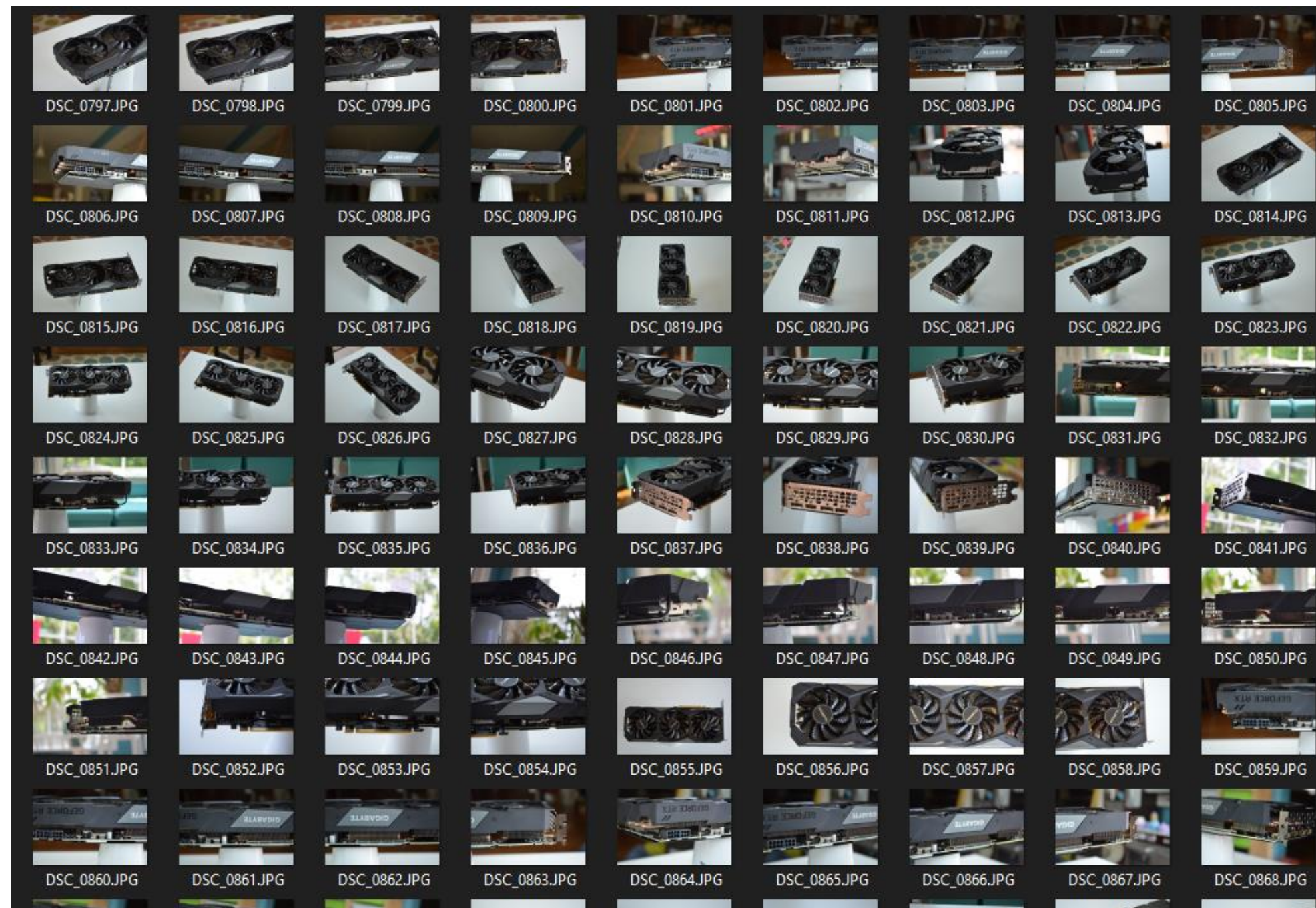
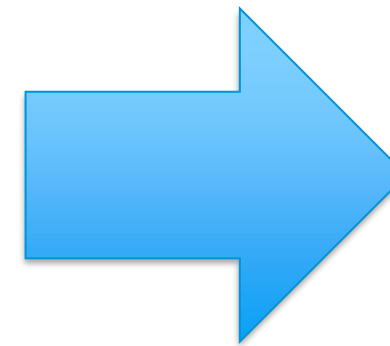
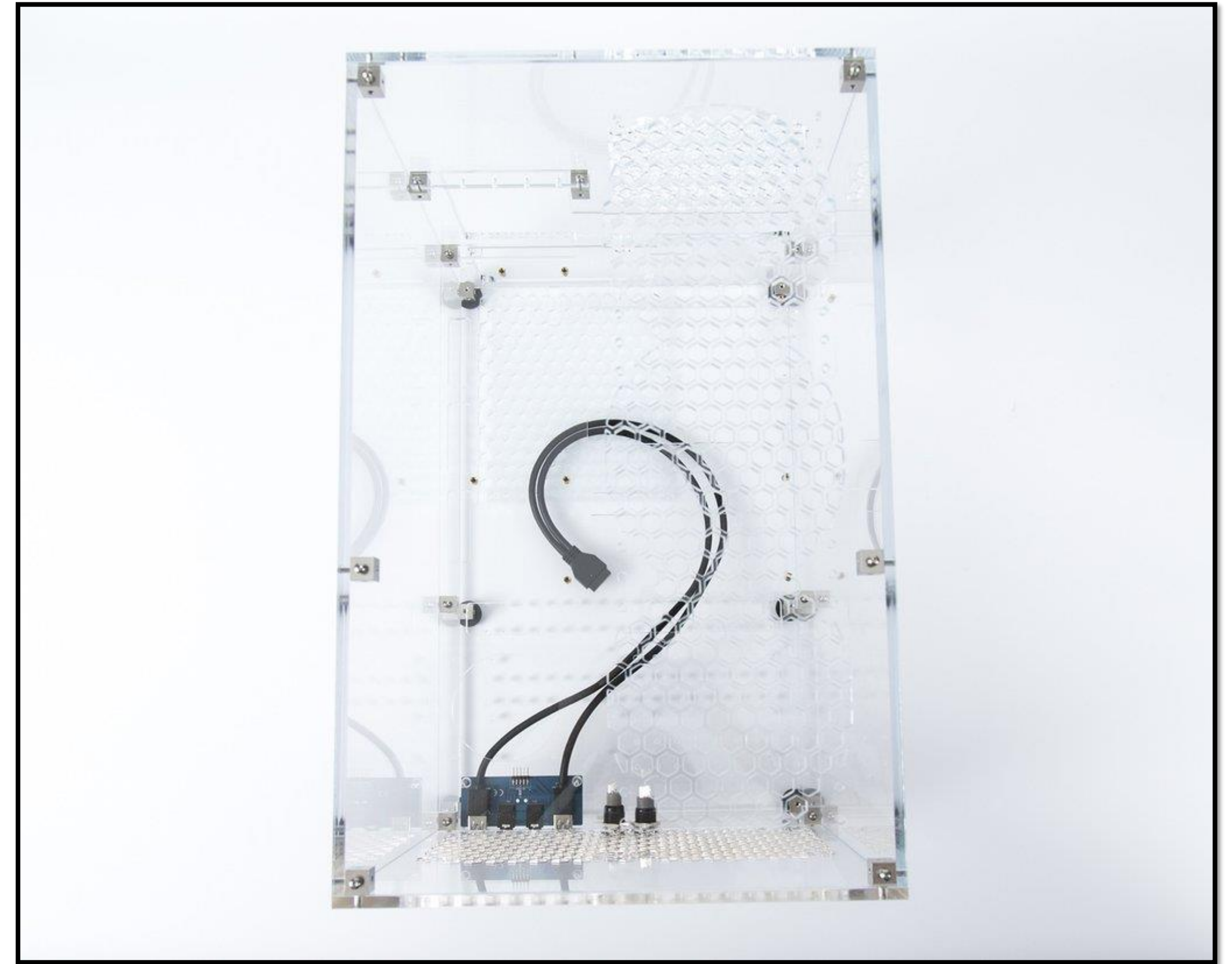


Photo Library

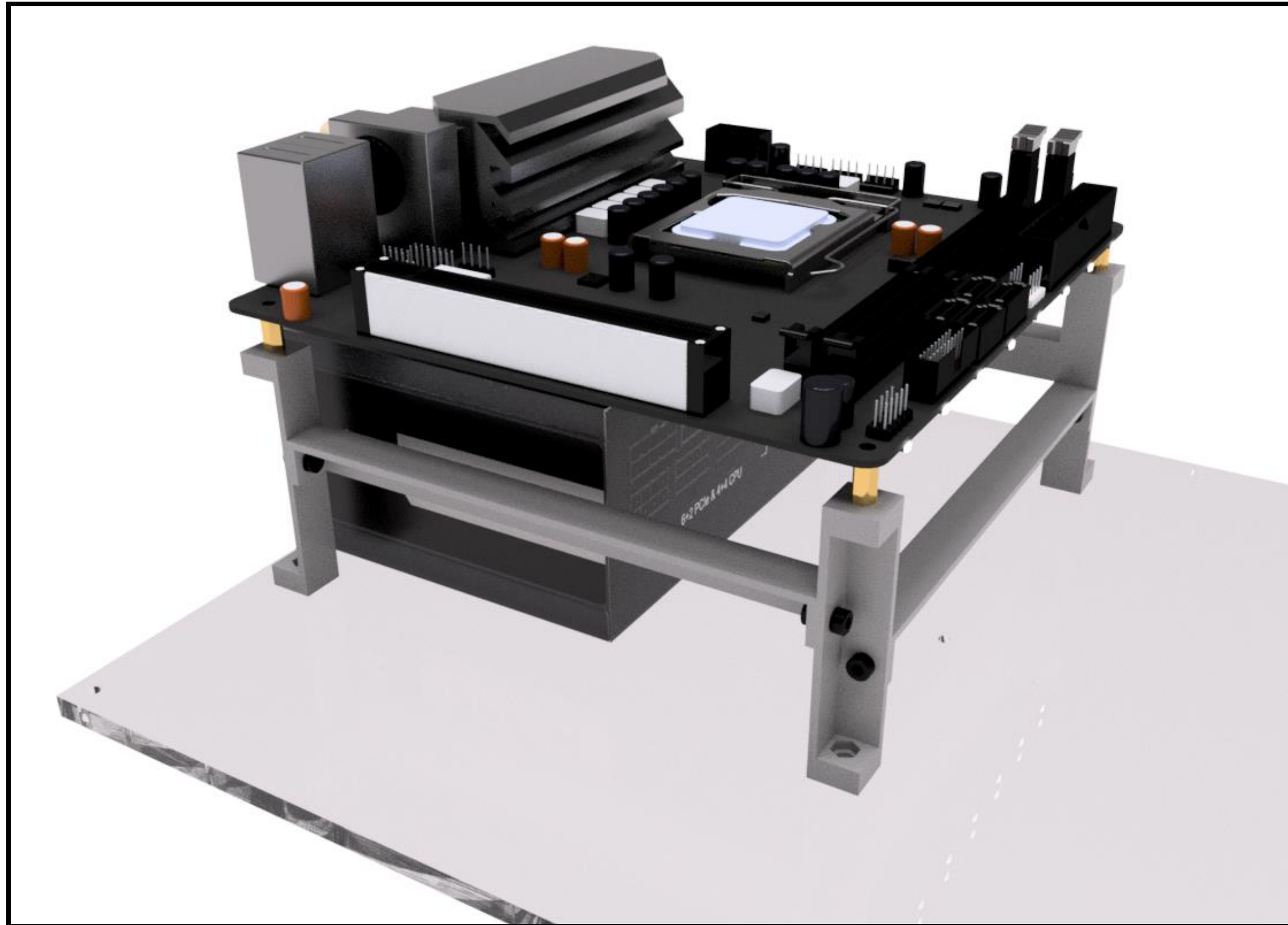


Digital Model

The Case



Motherboard Stand



Geometric Design

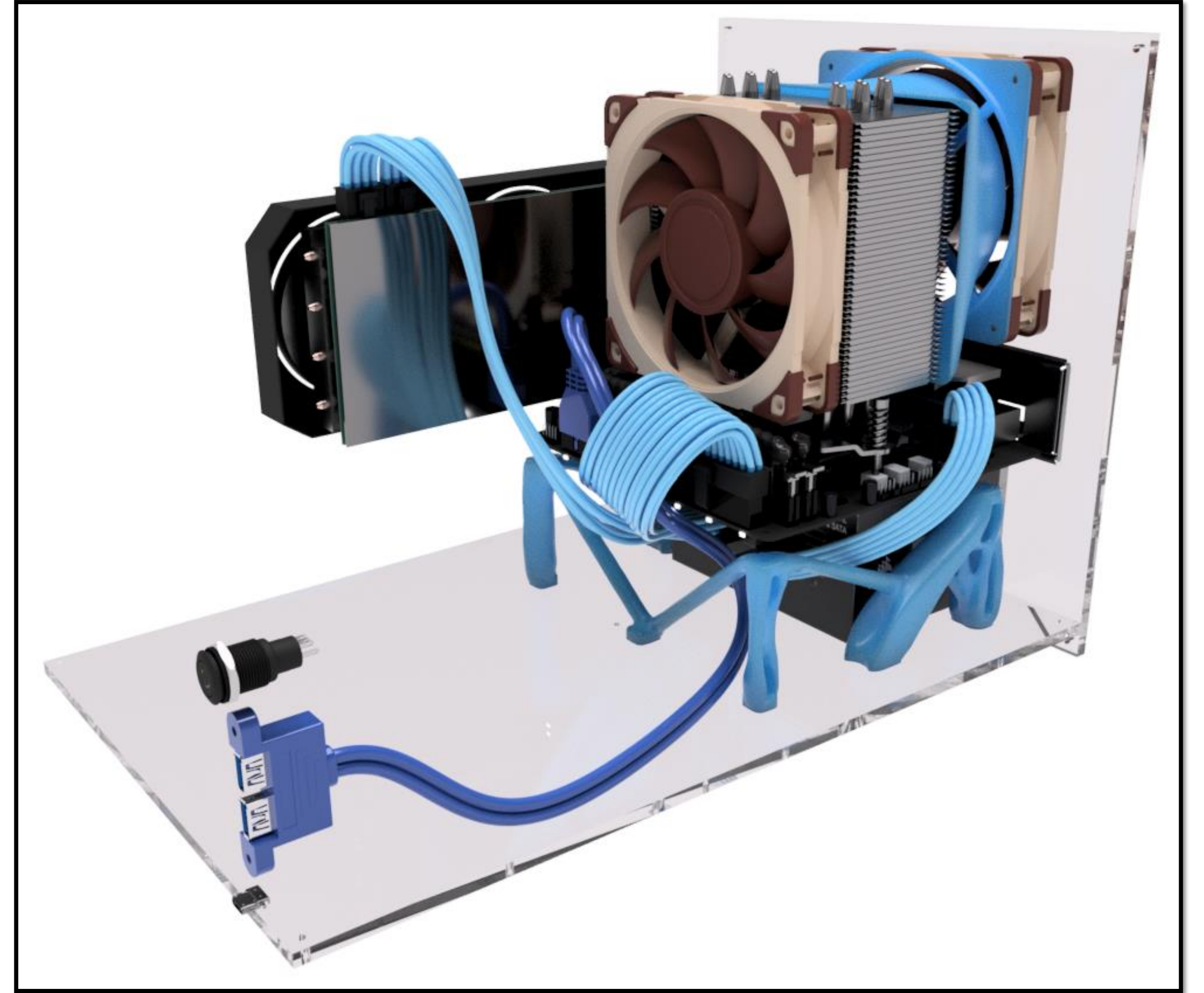
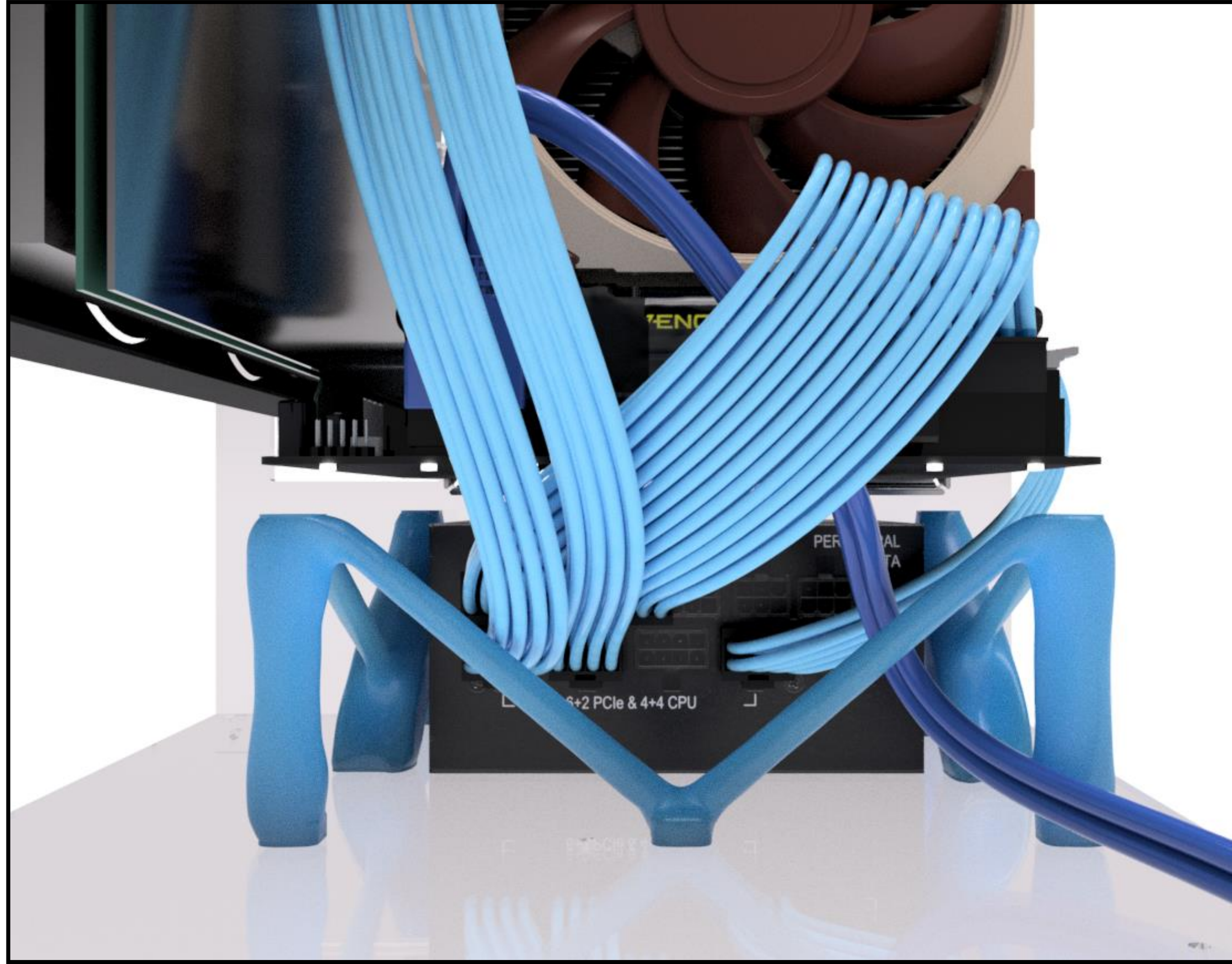


Generative Design

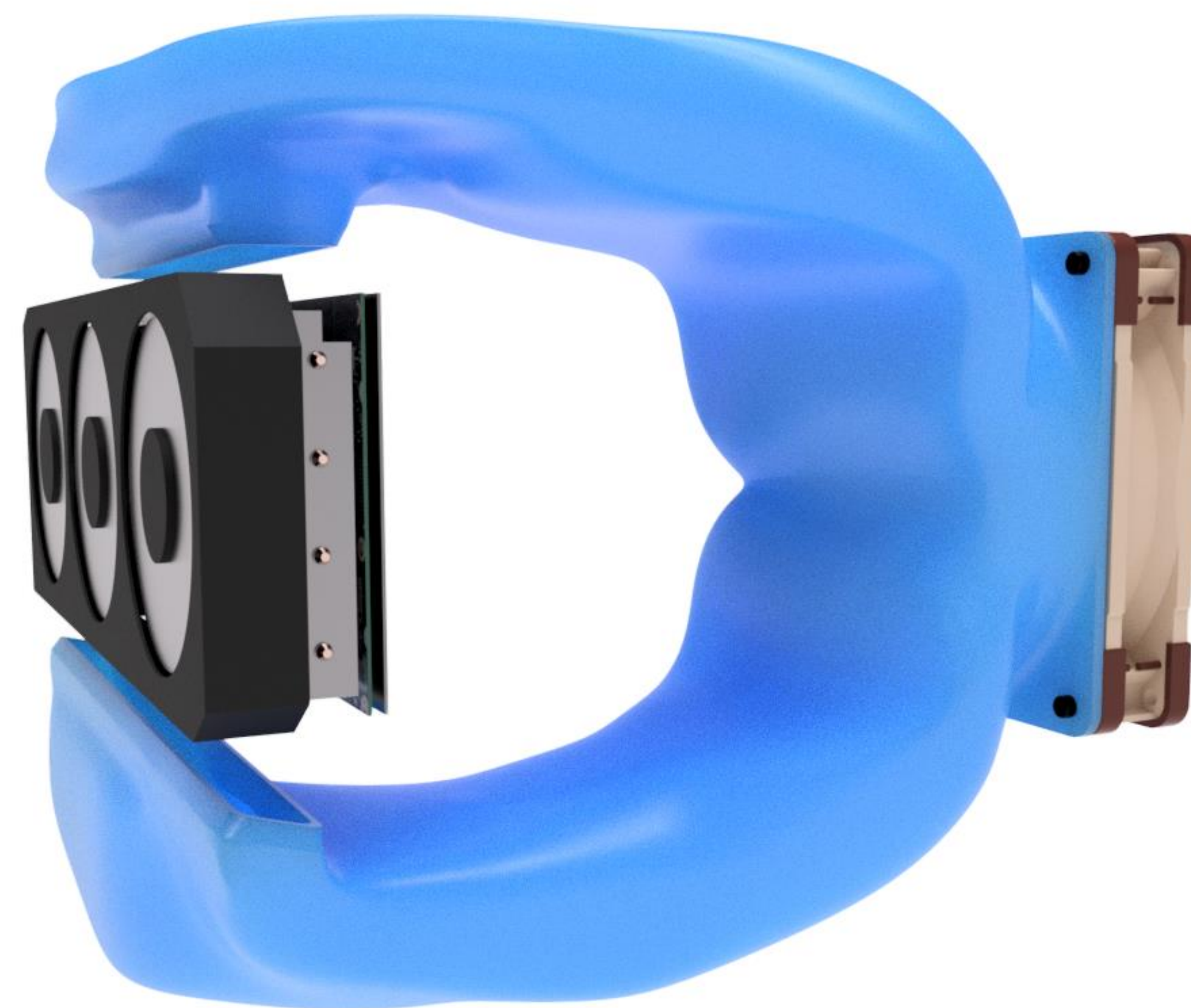
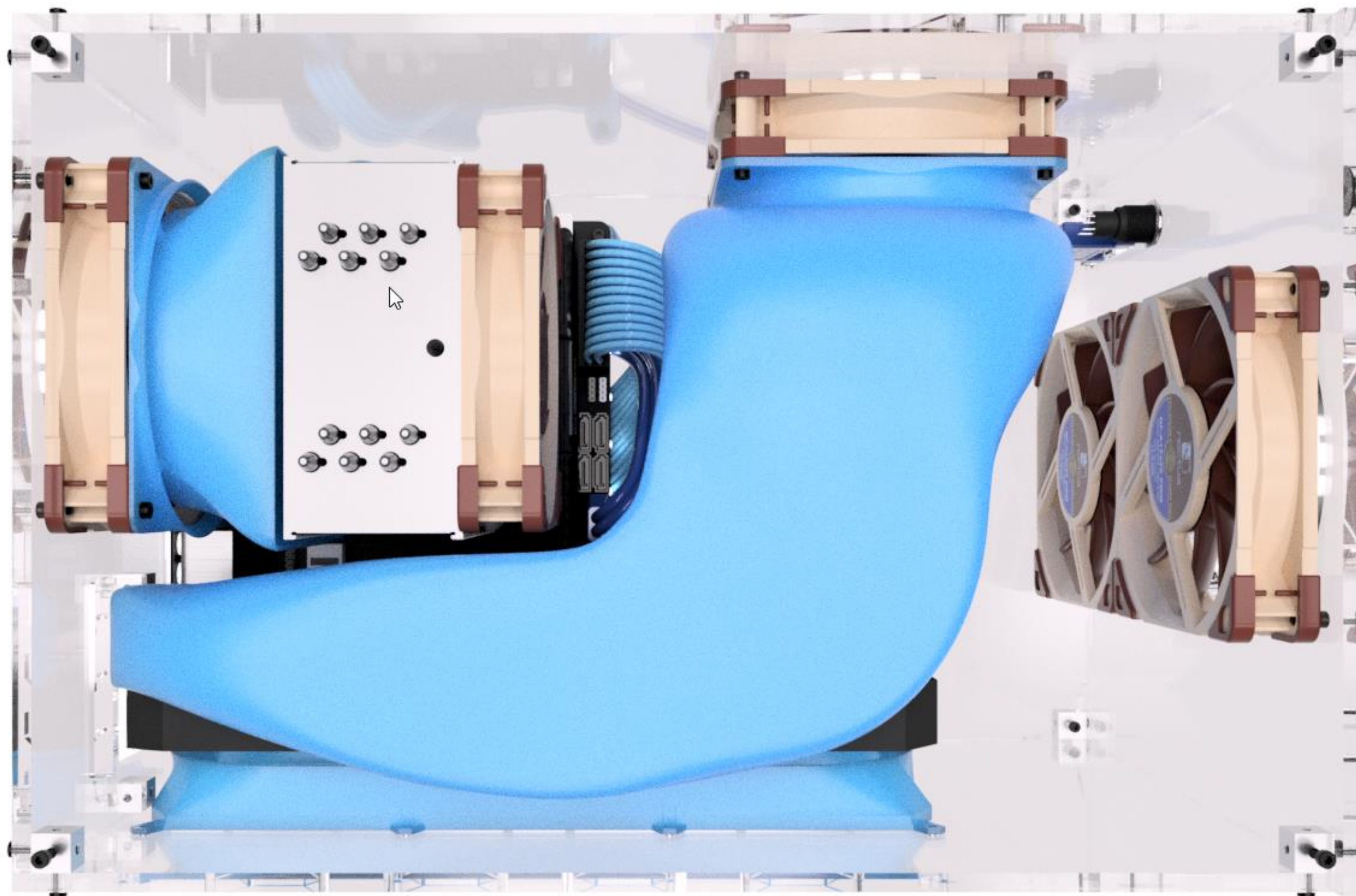
CPU Cooler Assembly



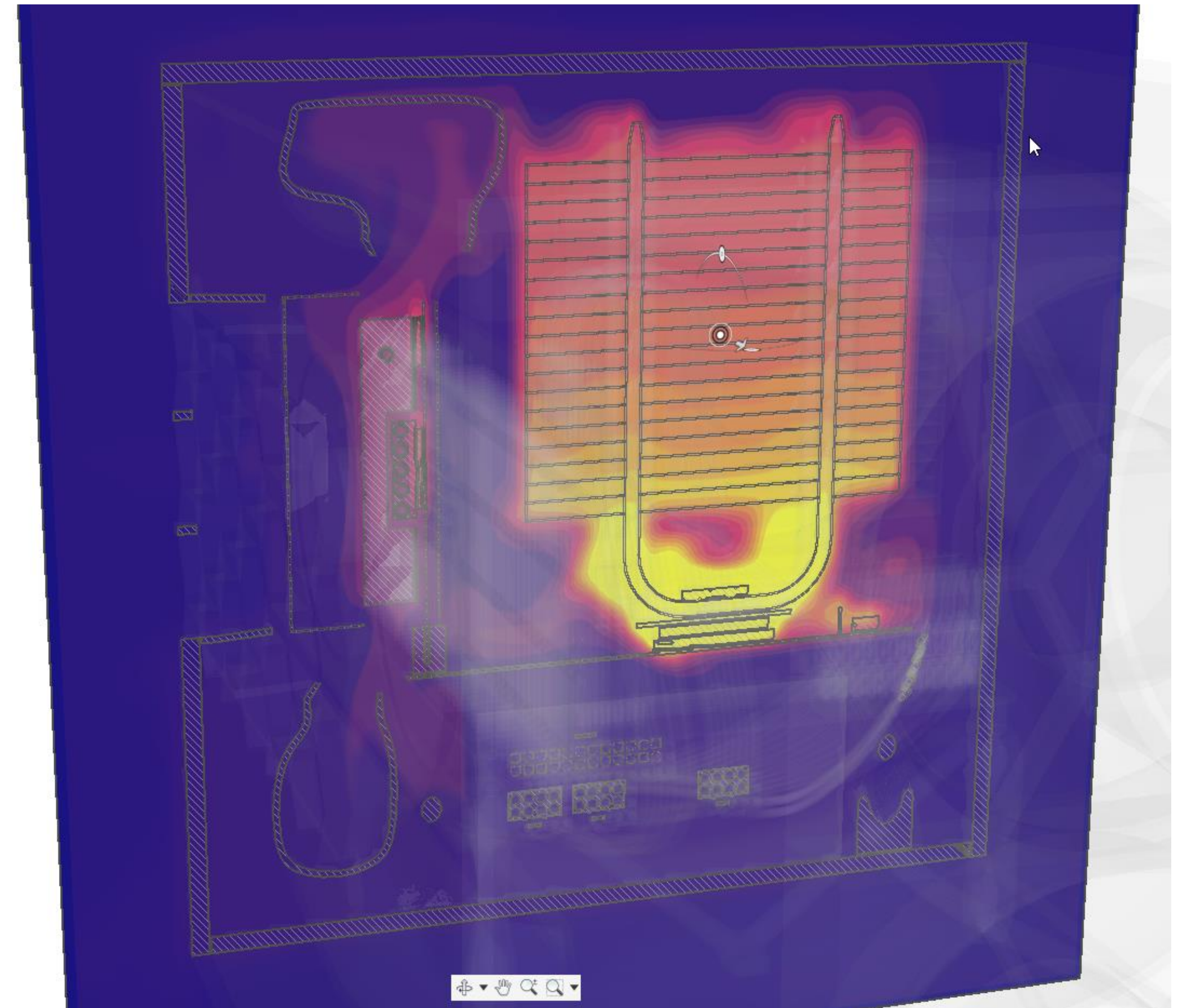
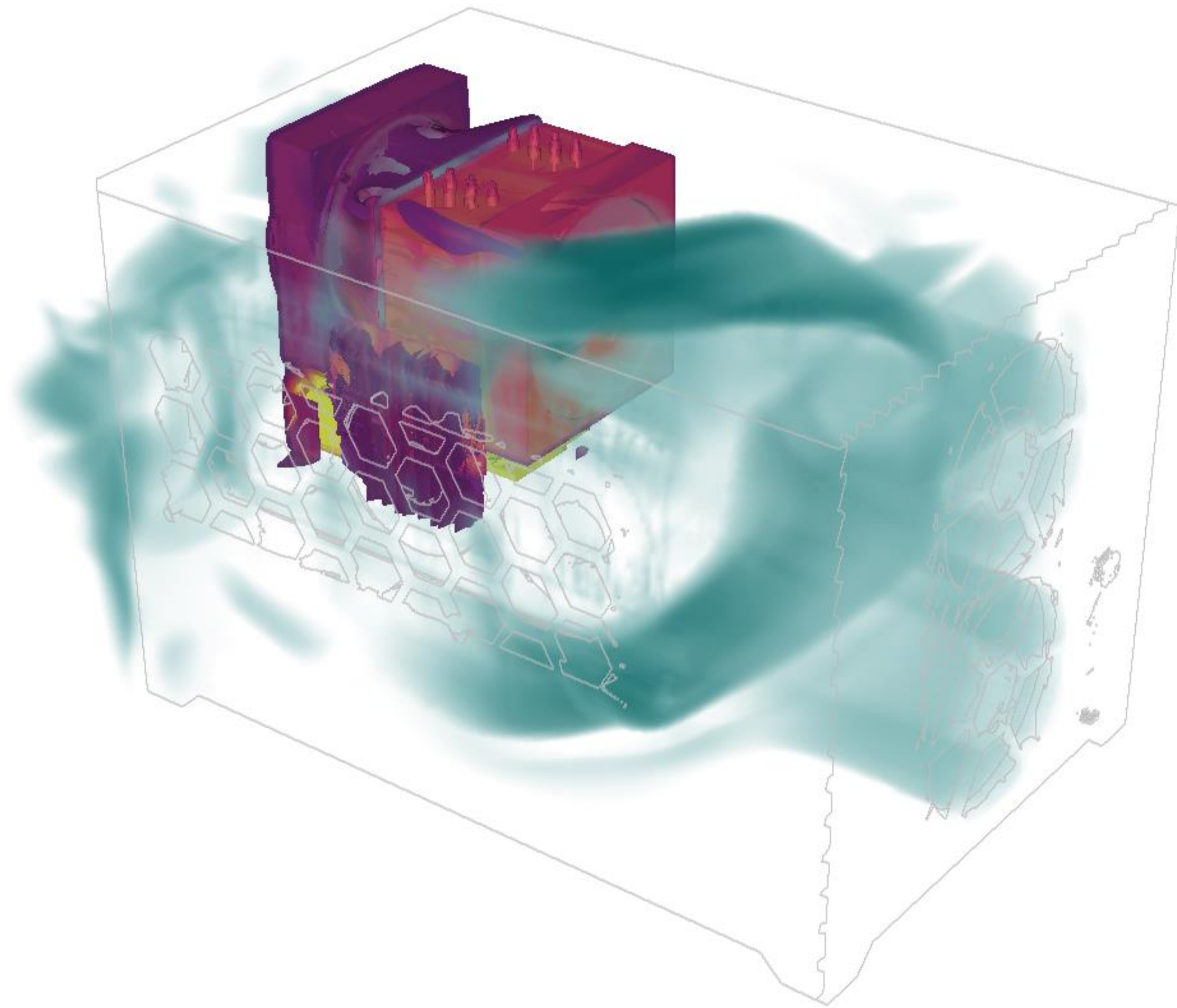
Wiring



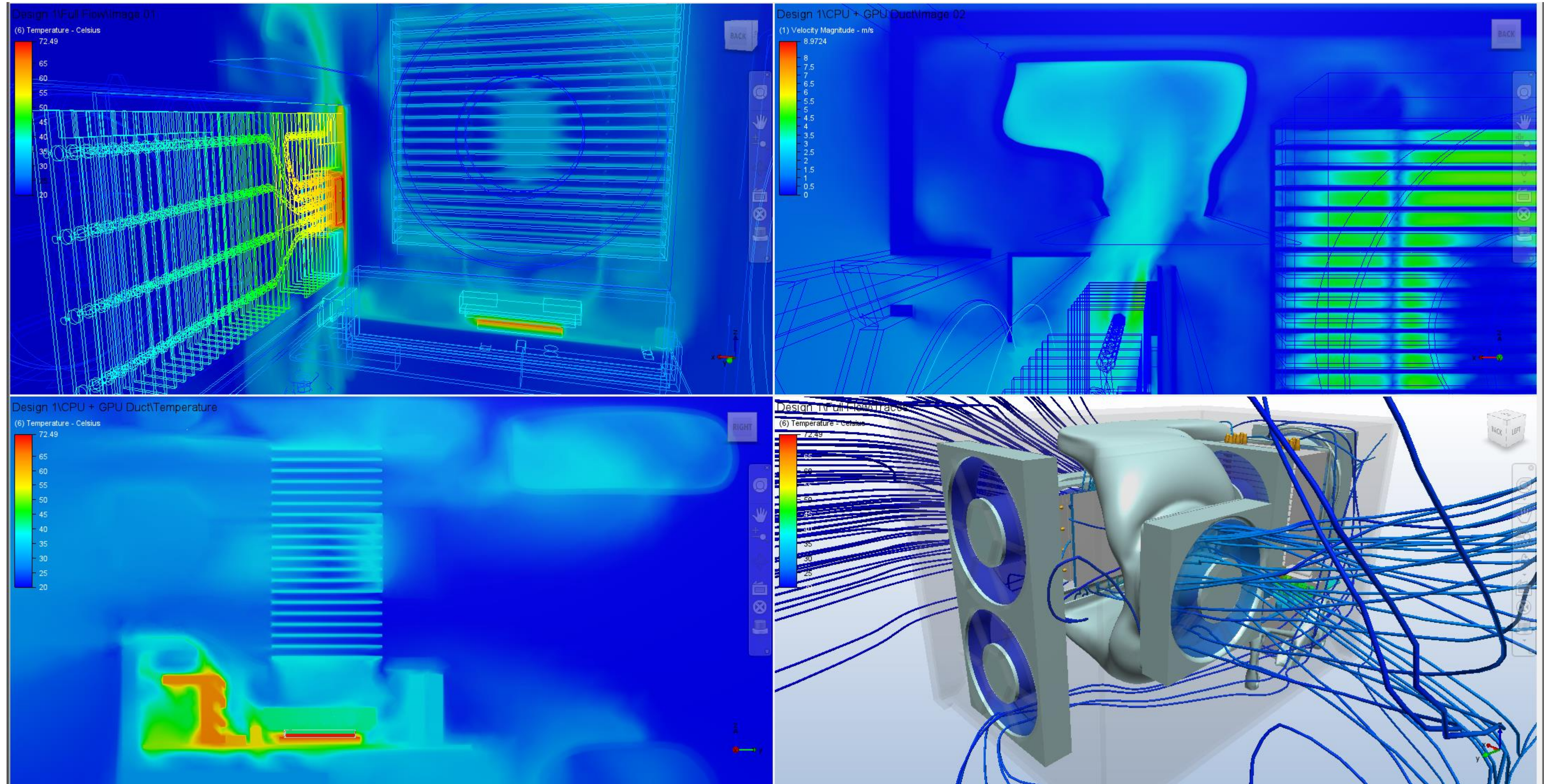
GPU Duct – Generative Design



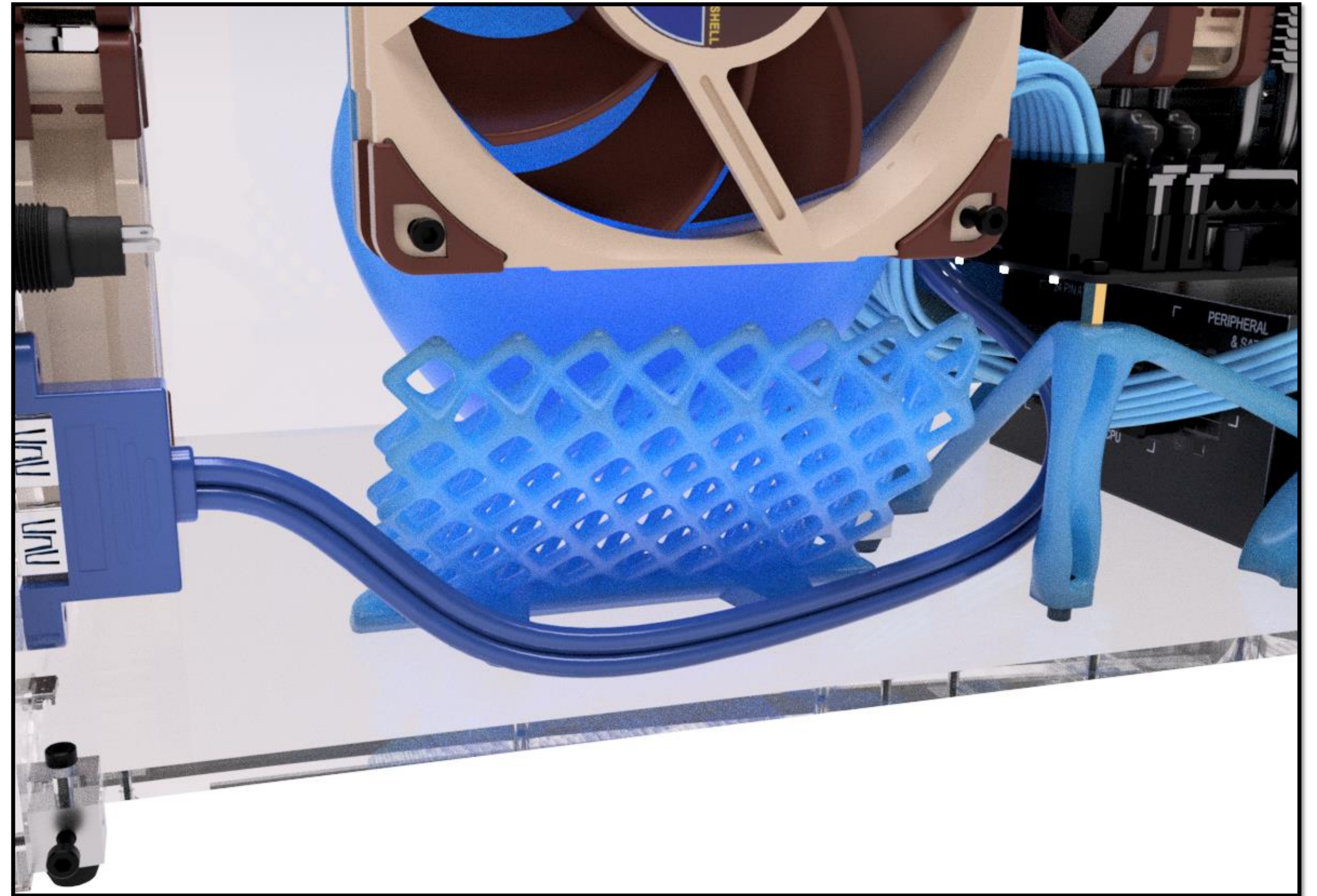
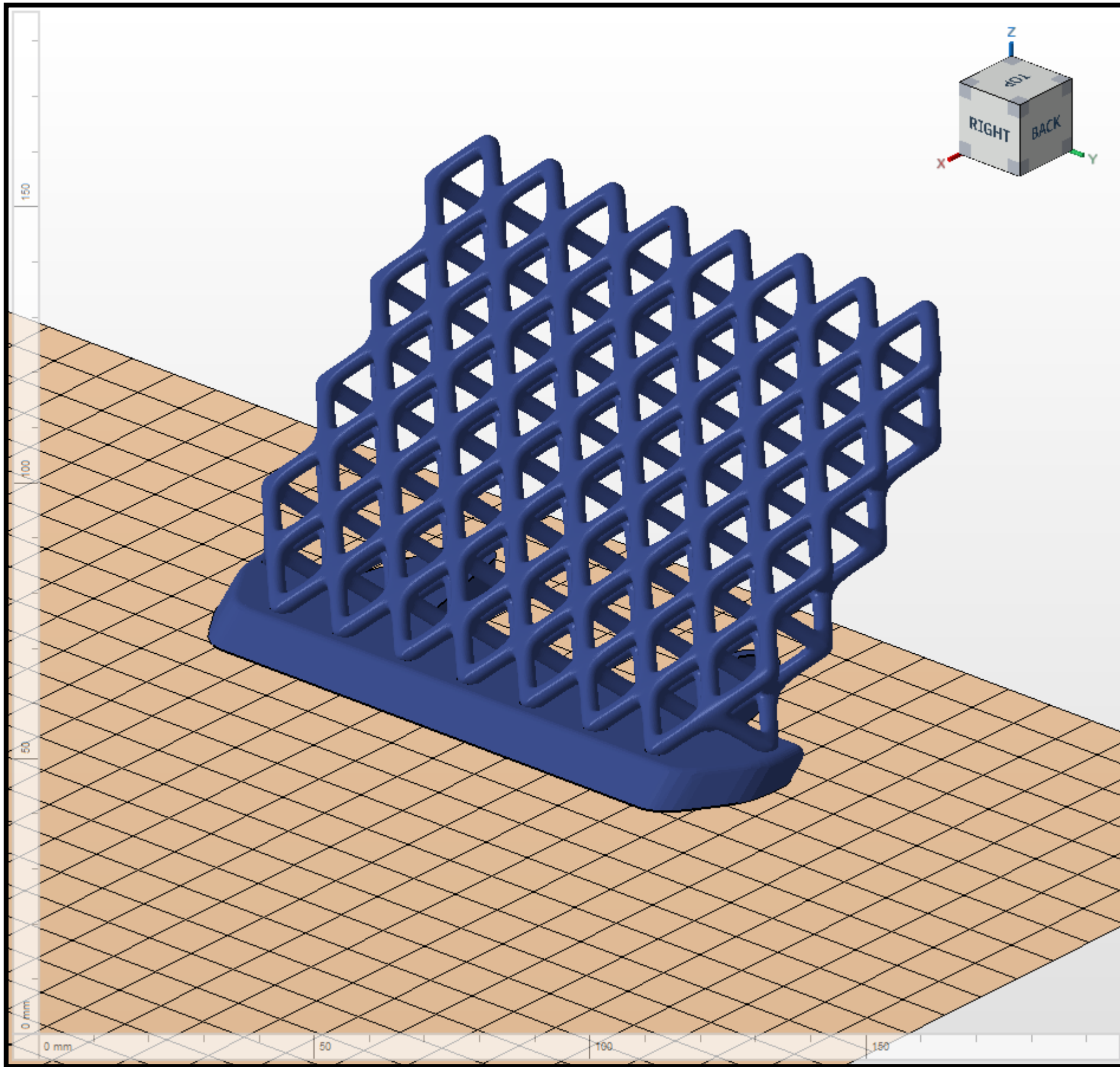
Validation – Fusion Electronics Cooling Simulation



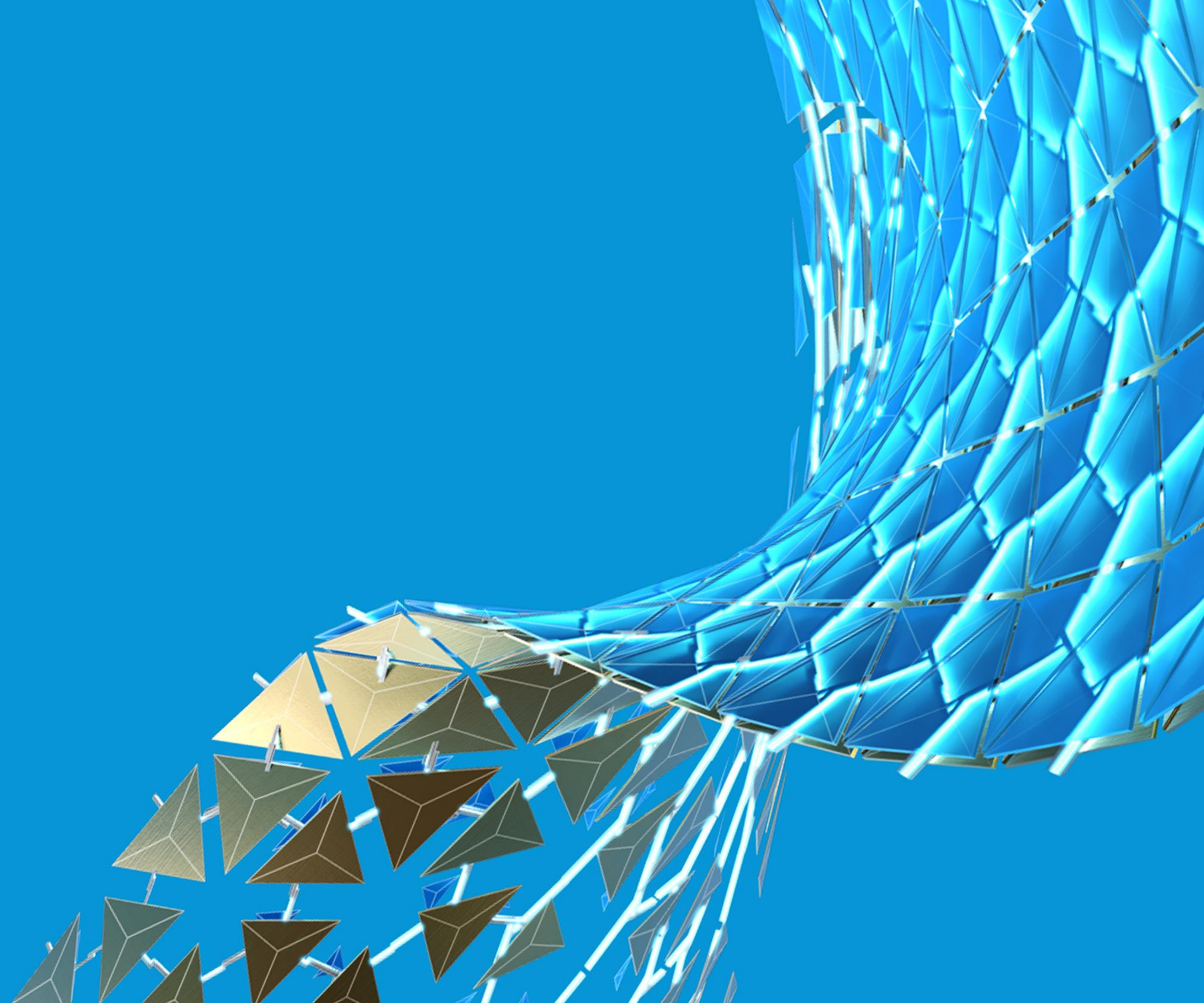
Advanced Validation – Autodesk CFD



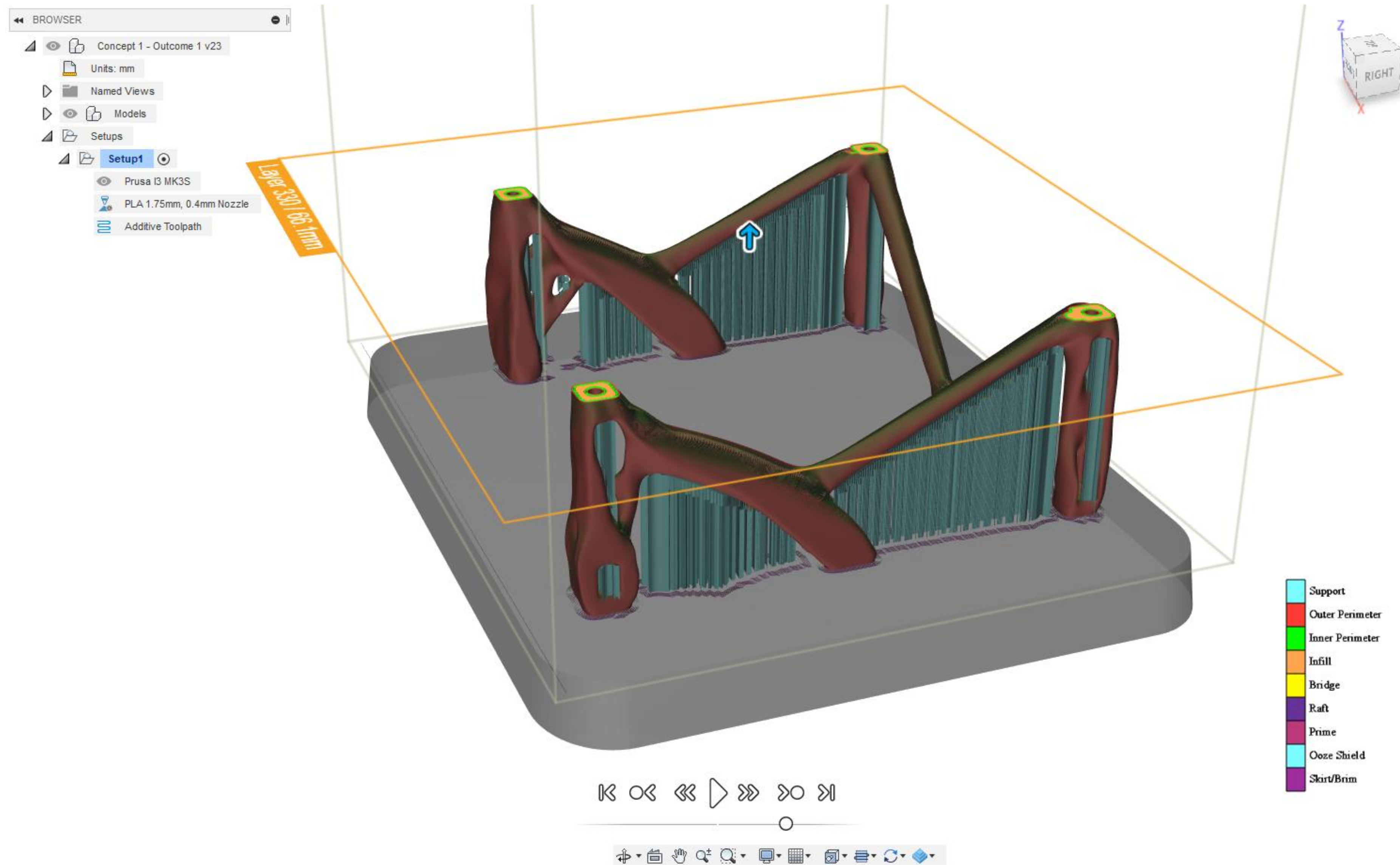
Wire Cage – Netfabb Lattice Generation



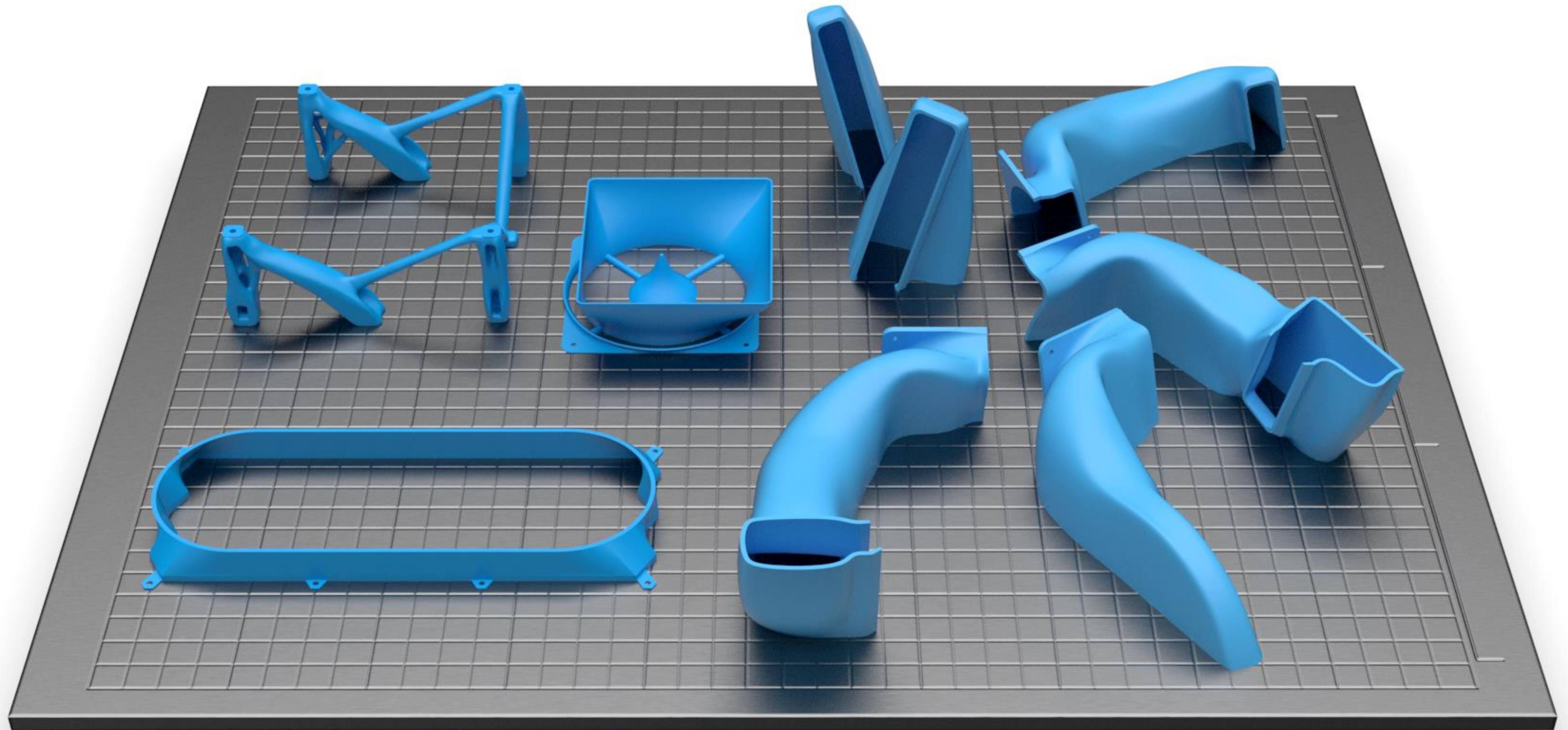
CONCEPT
DESIGN
MAKE



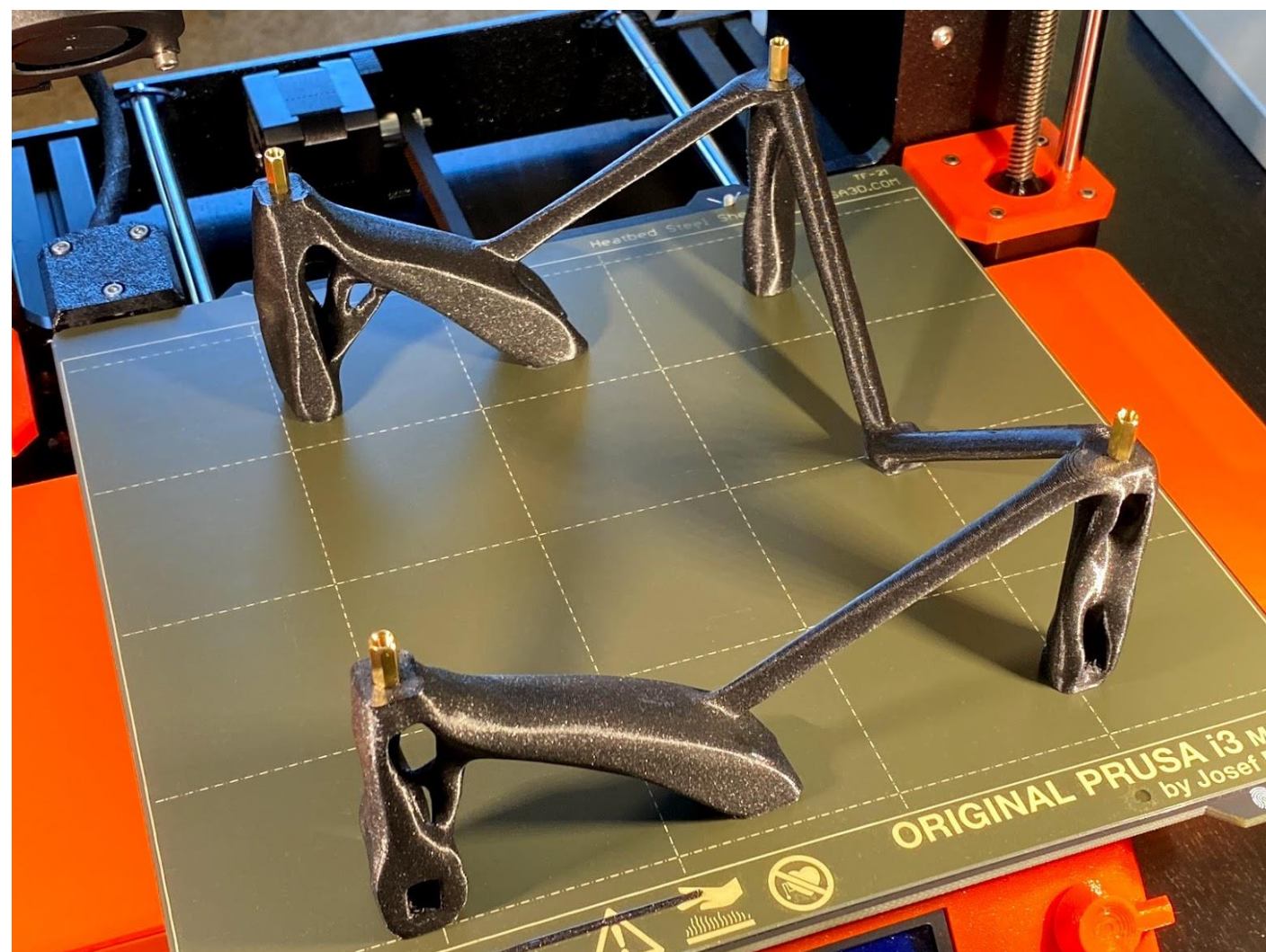
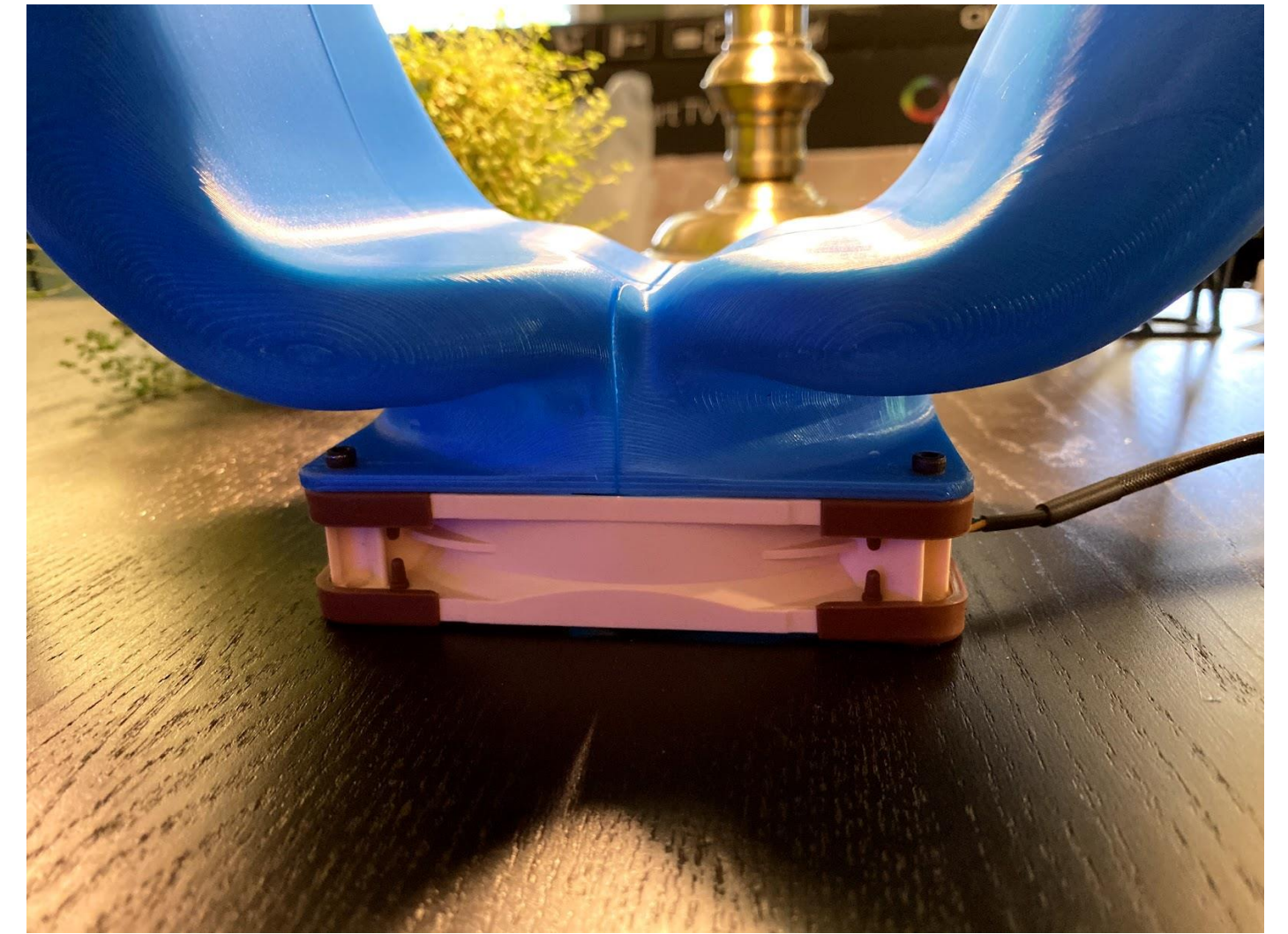
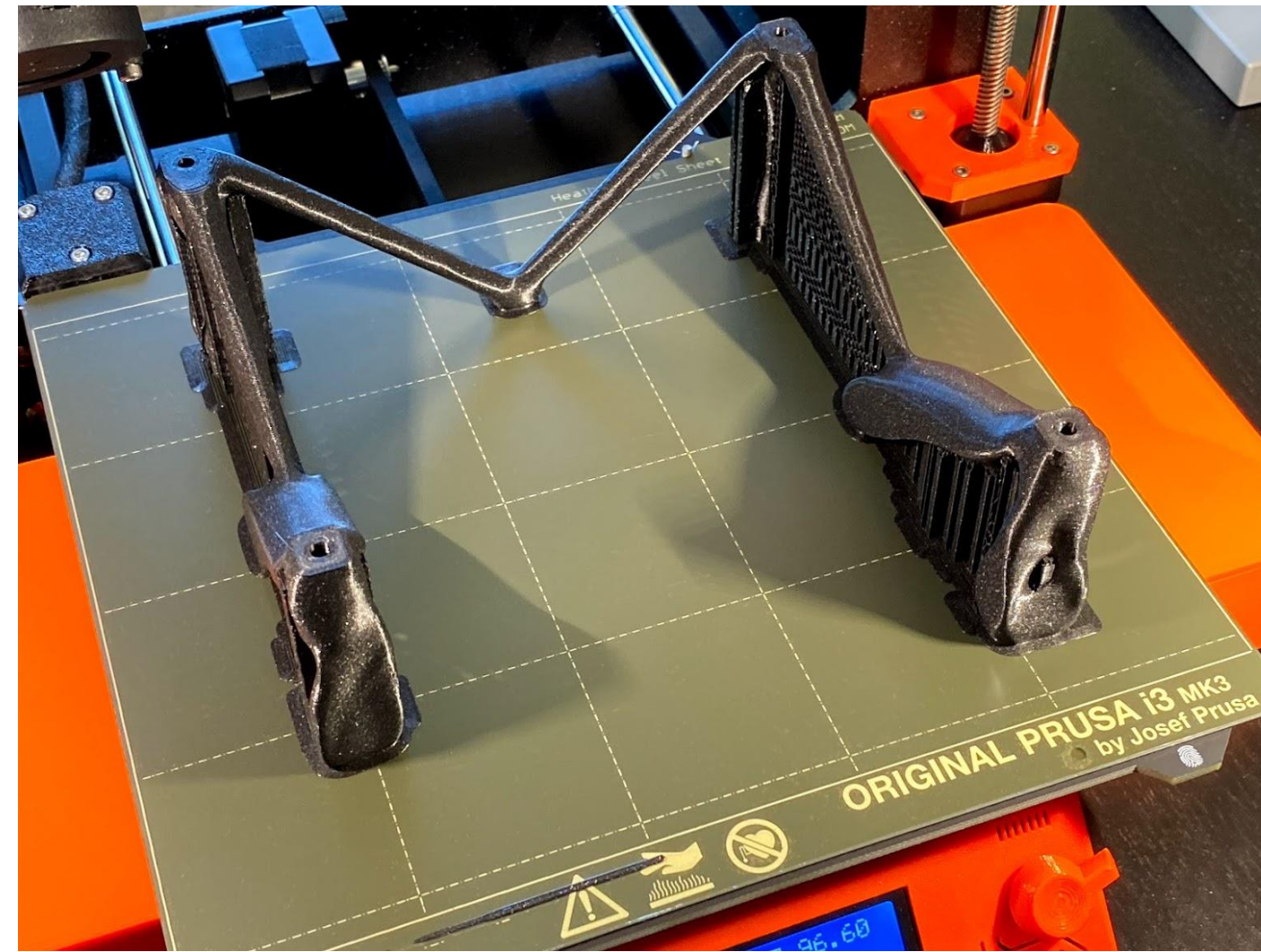
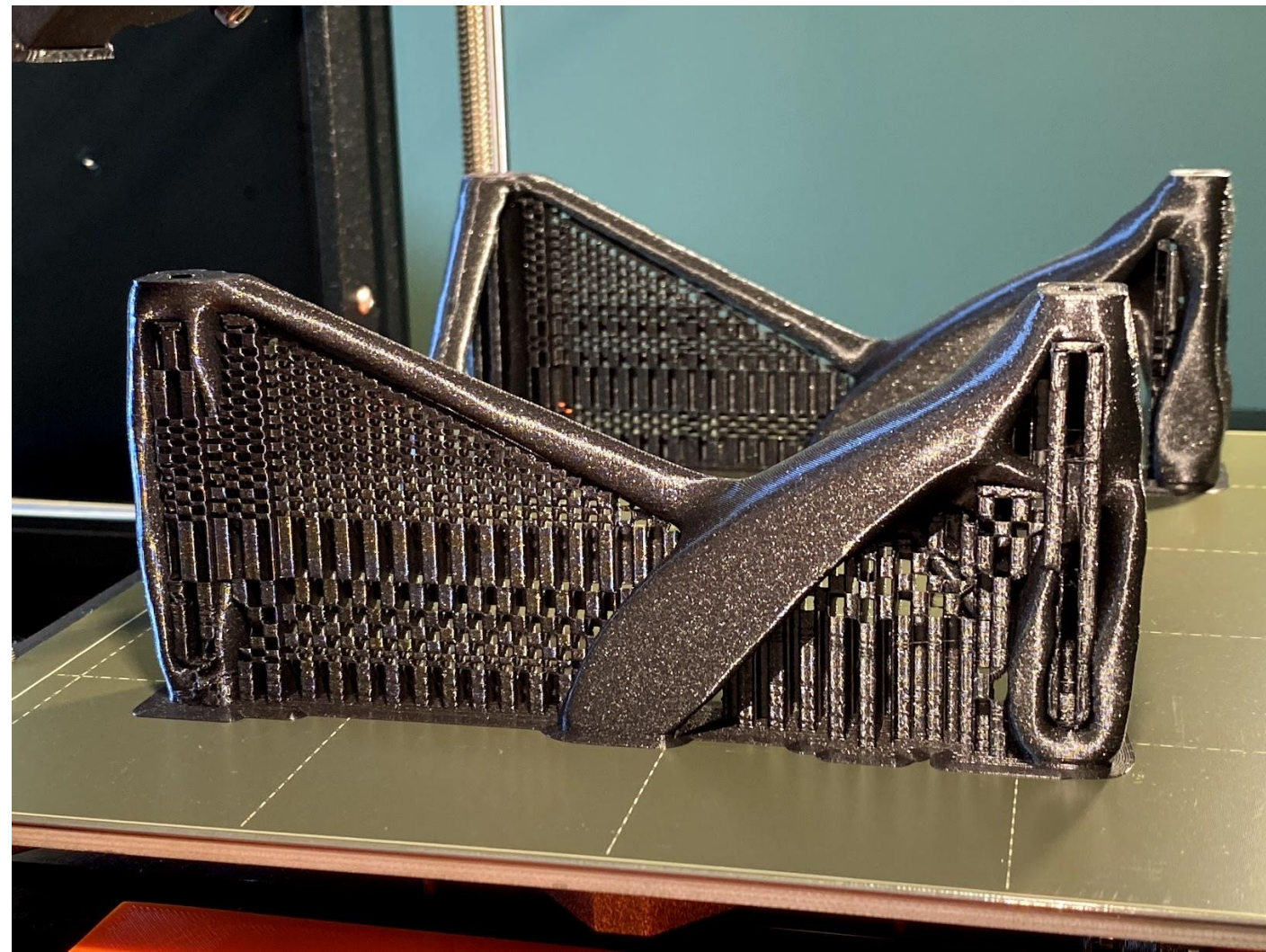
Fusion Manufacturing – FFF Slicing



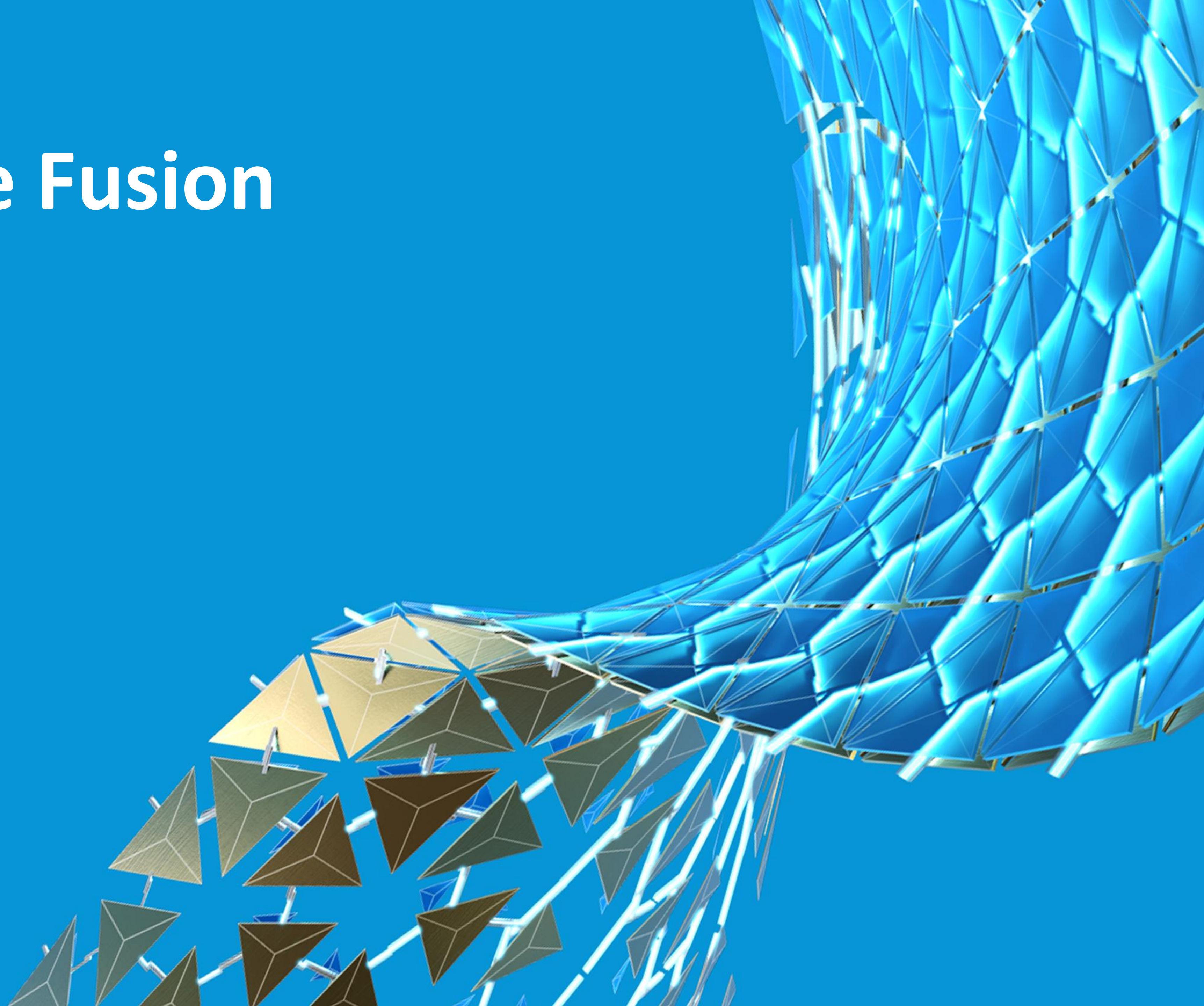
Fusion Manufacturing – All Printed Components

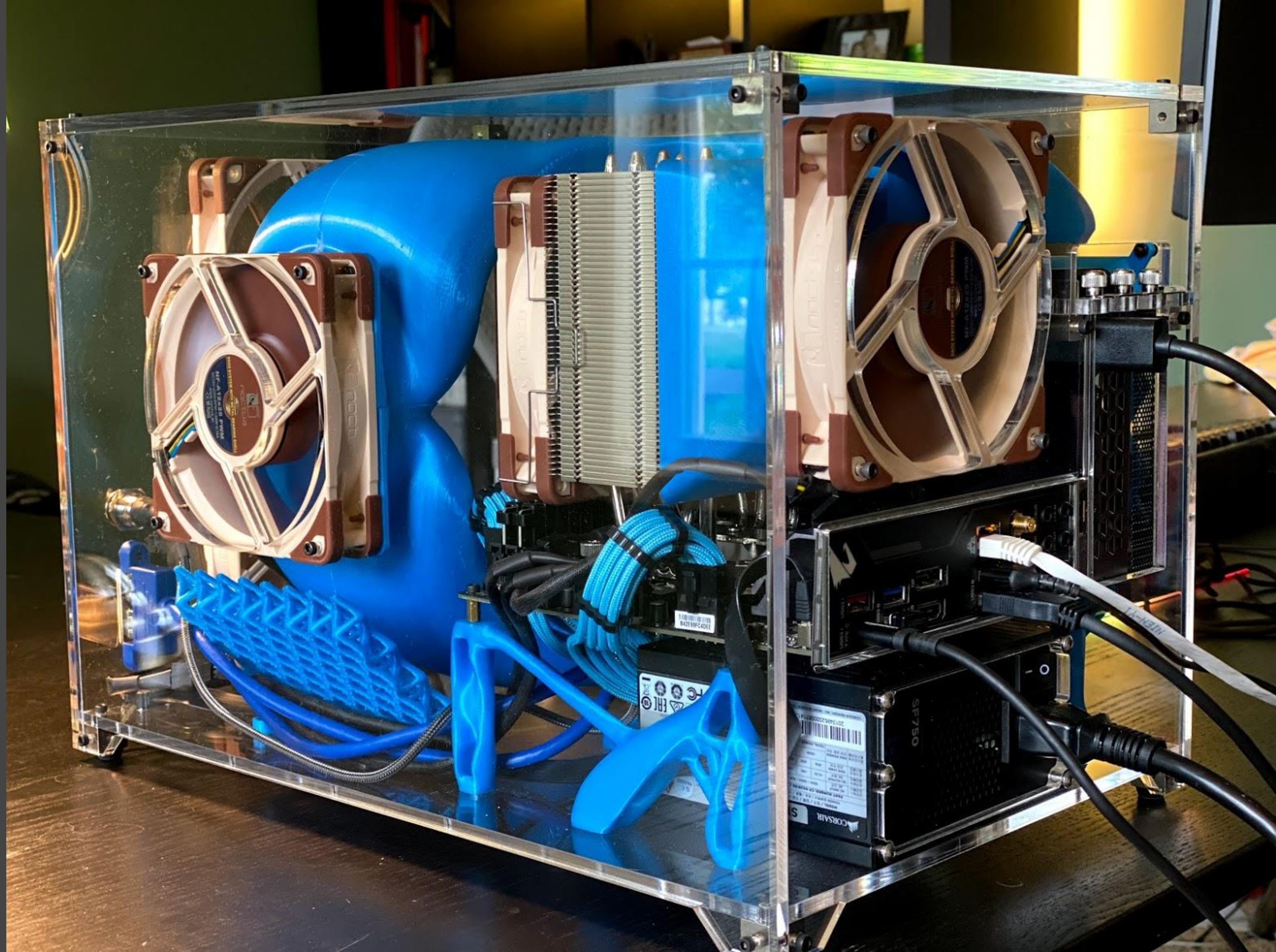


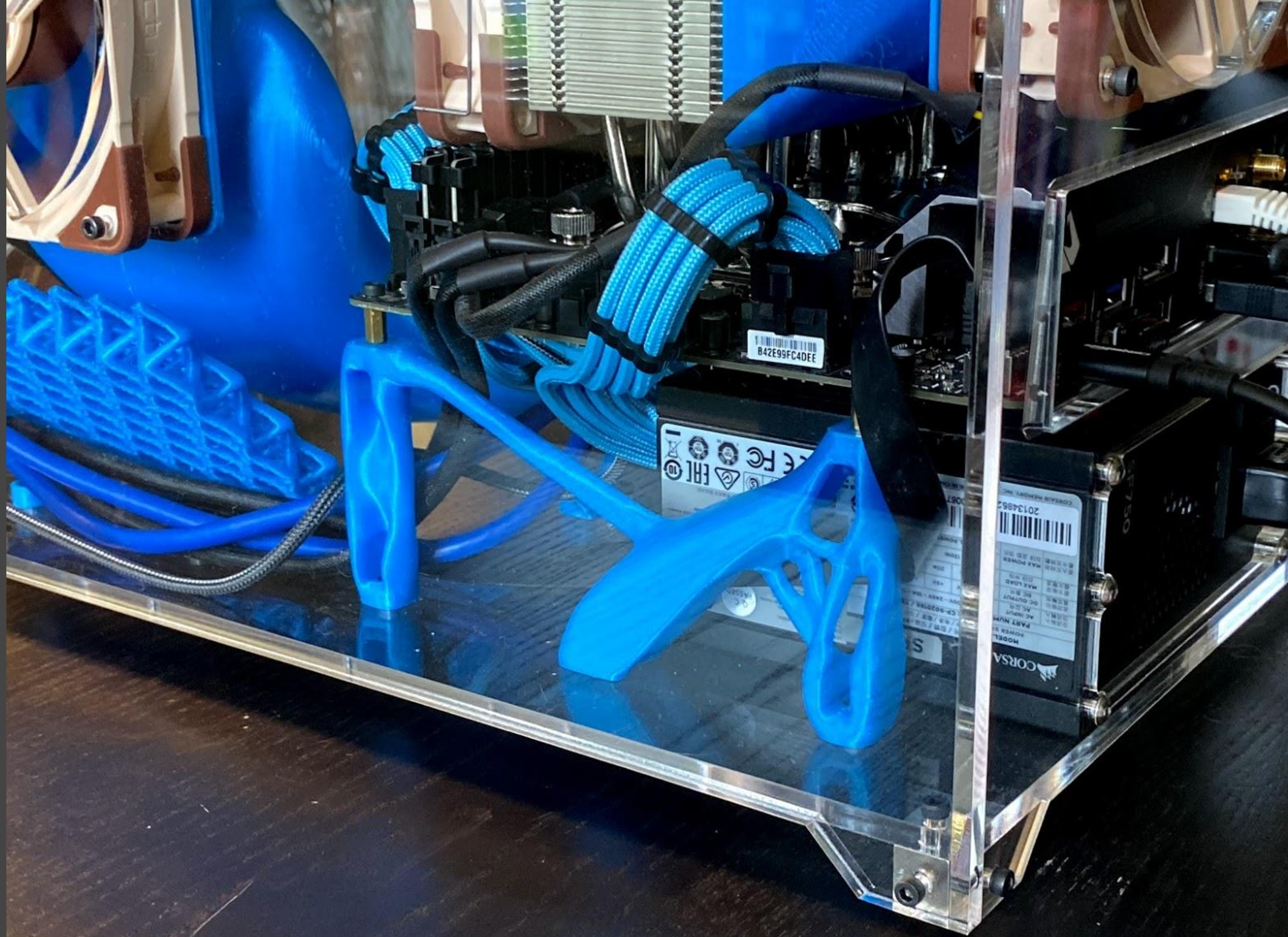
Fusion Manufacturing – FFF Printing



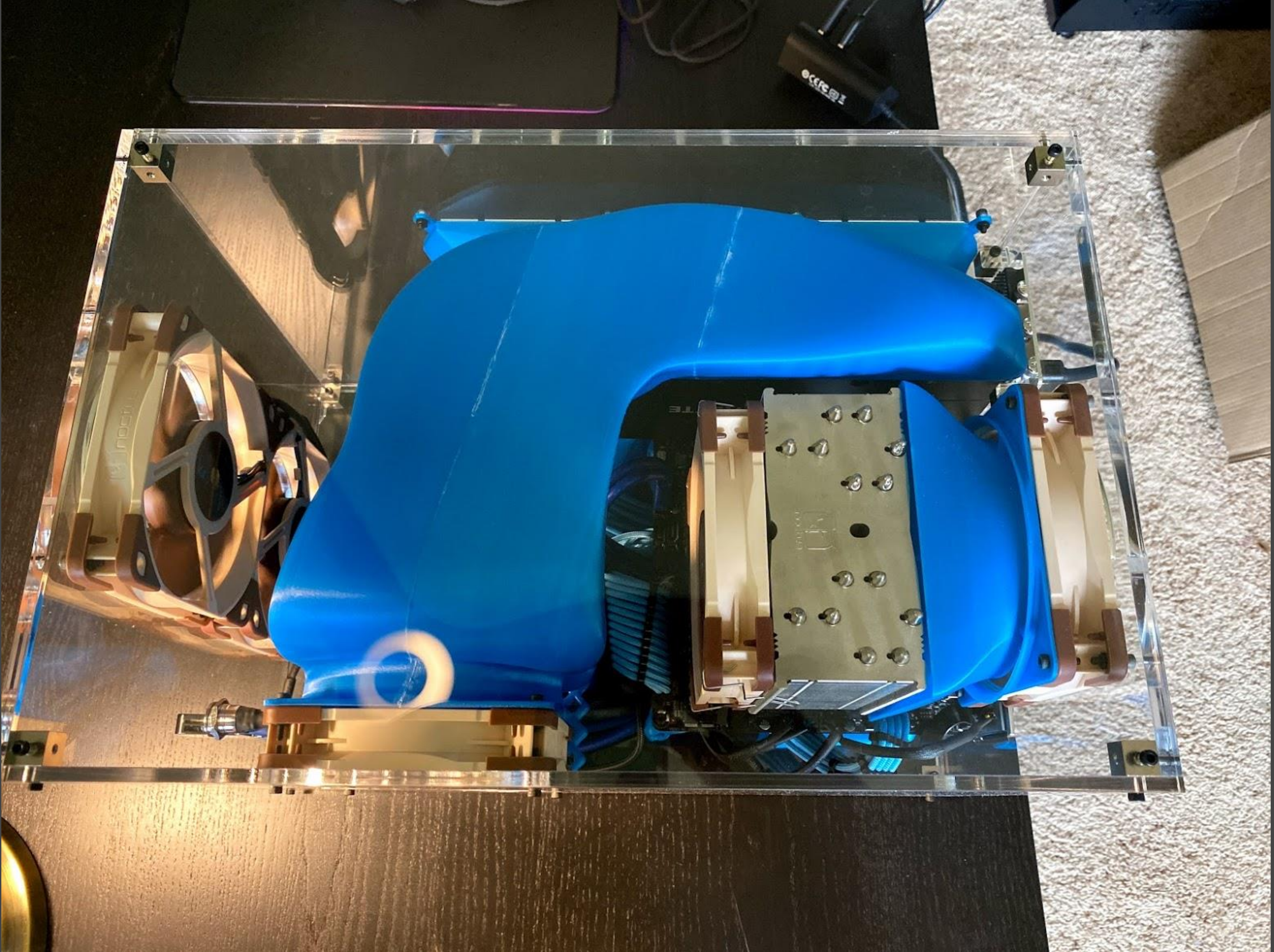
The Ultimate Fusion Workstation

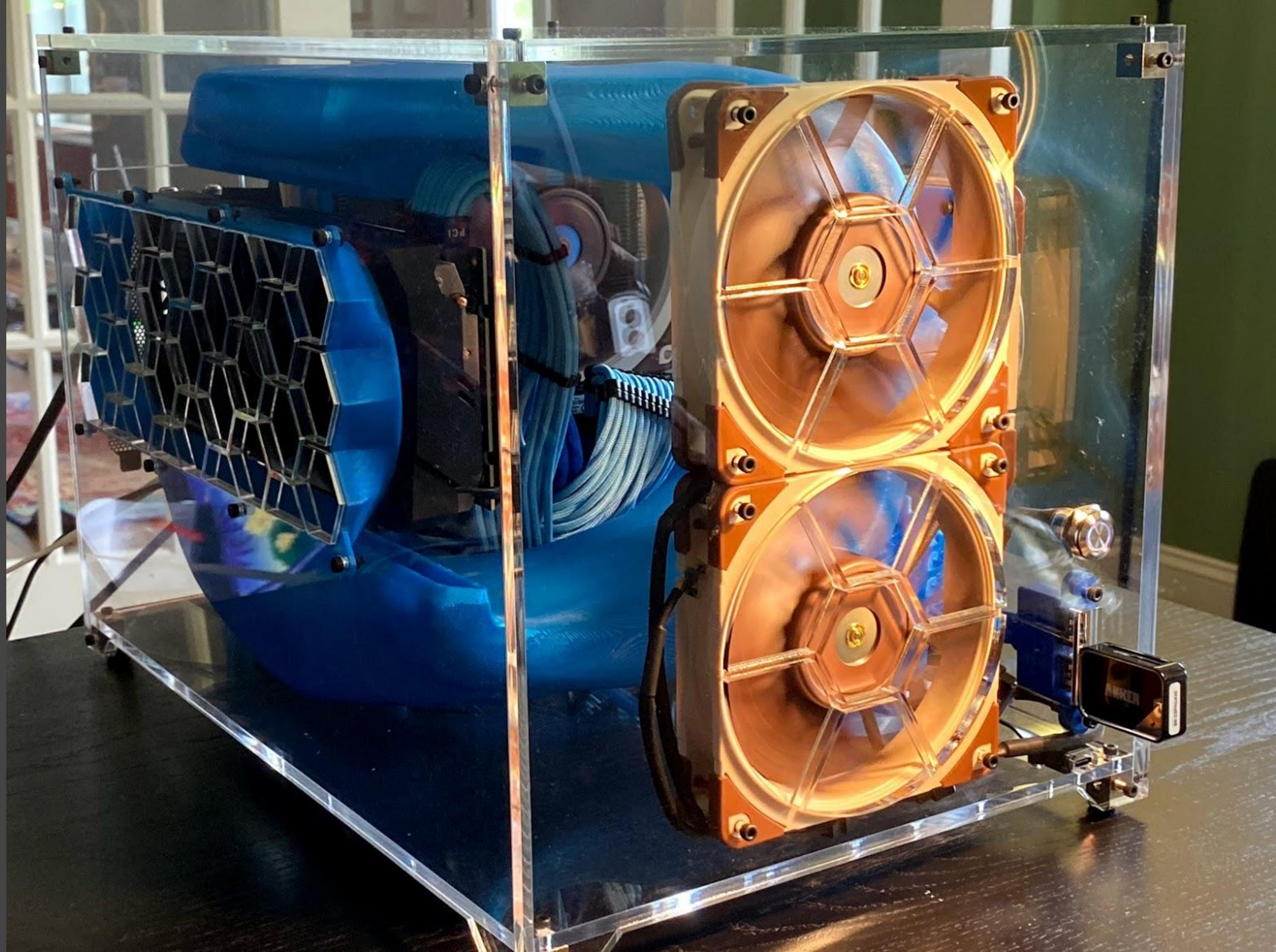


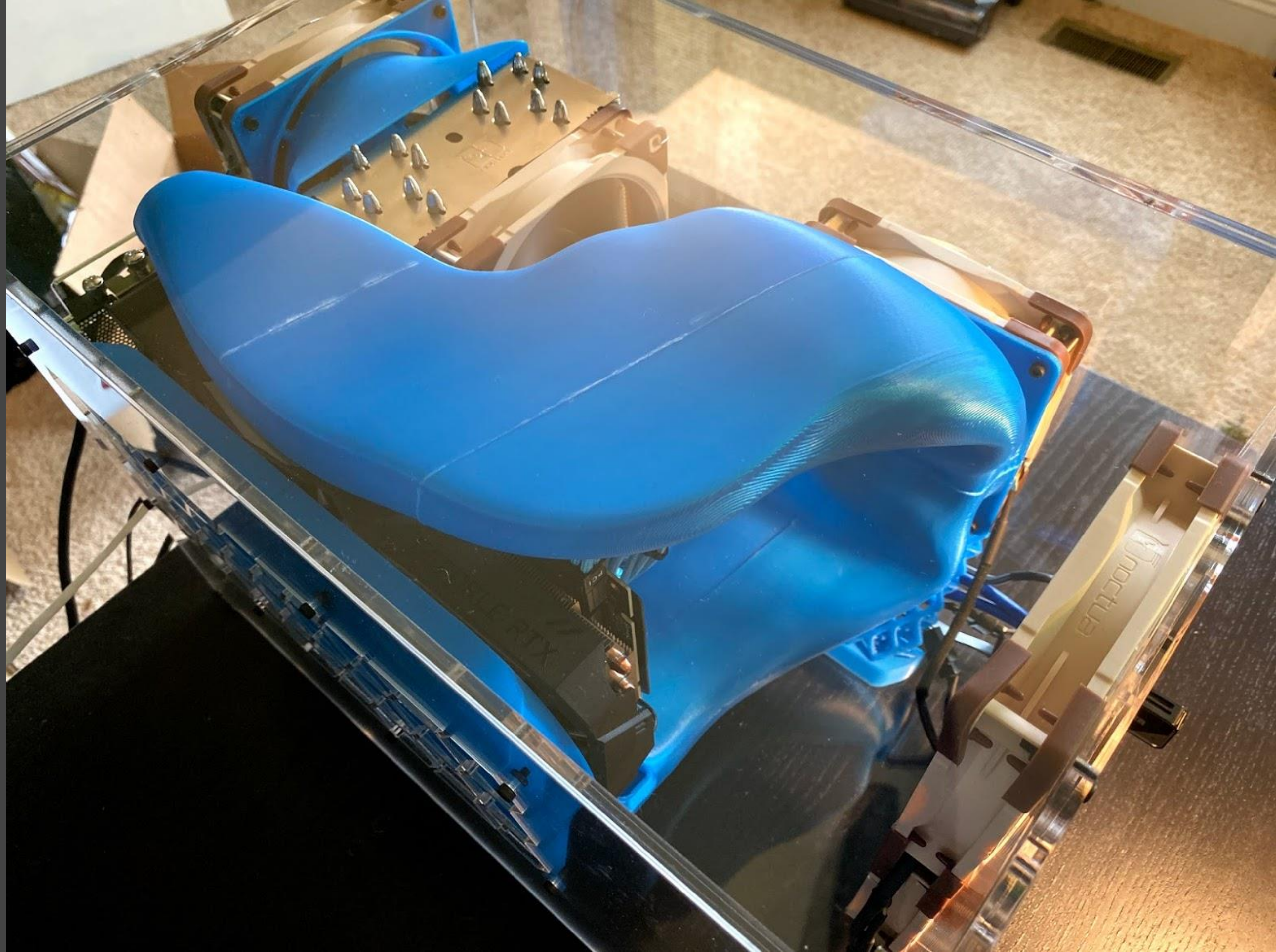


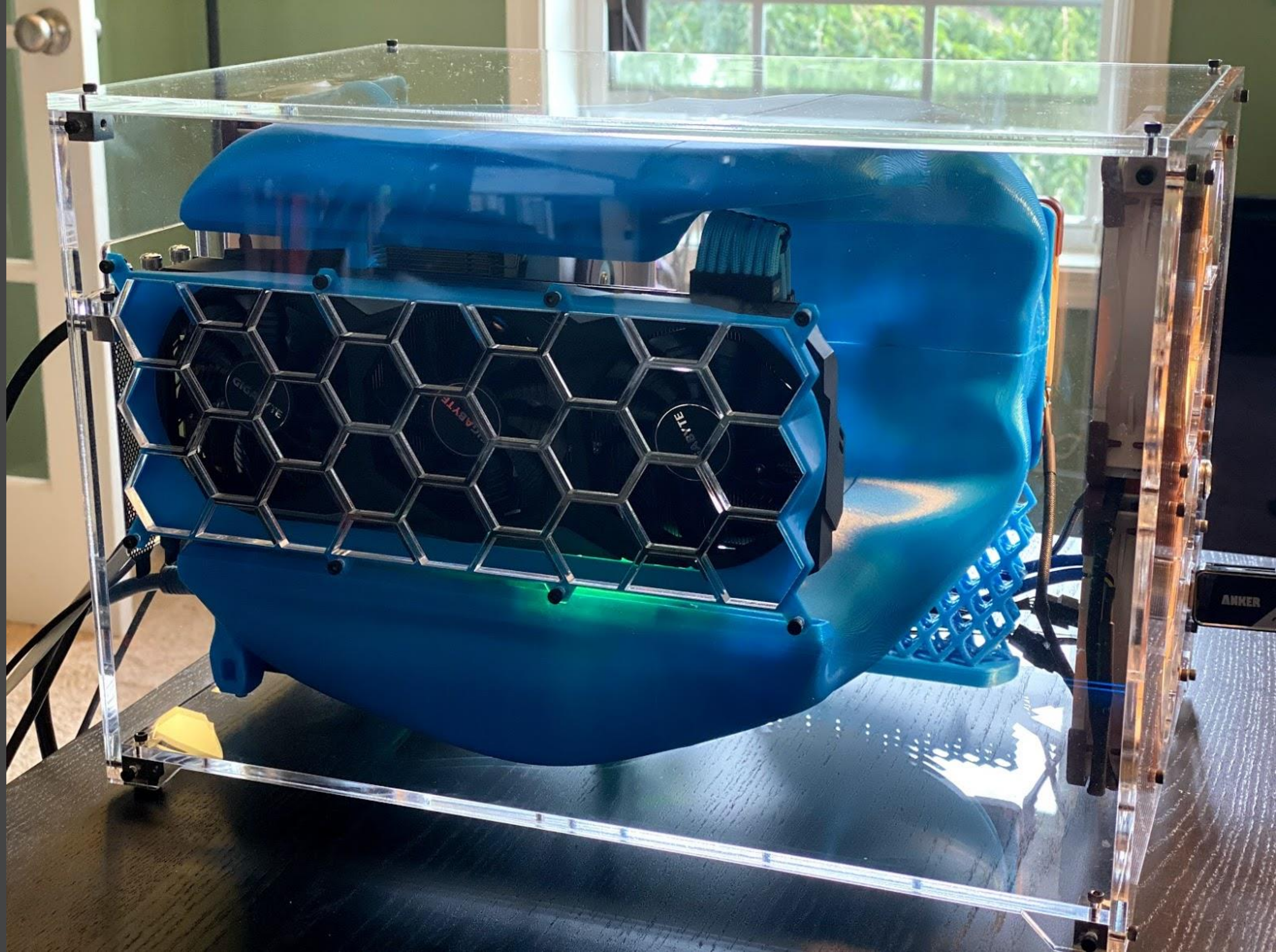


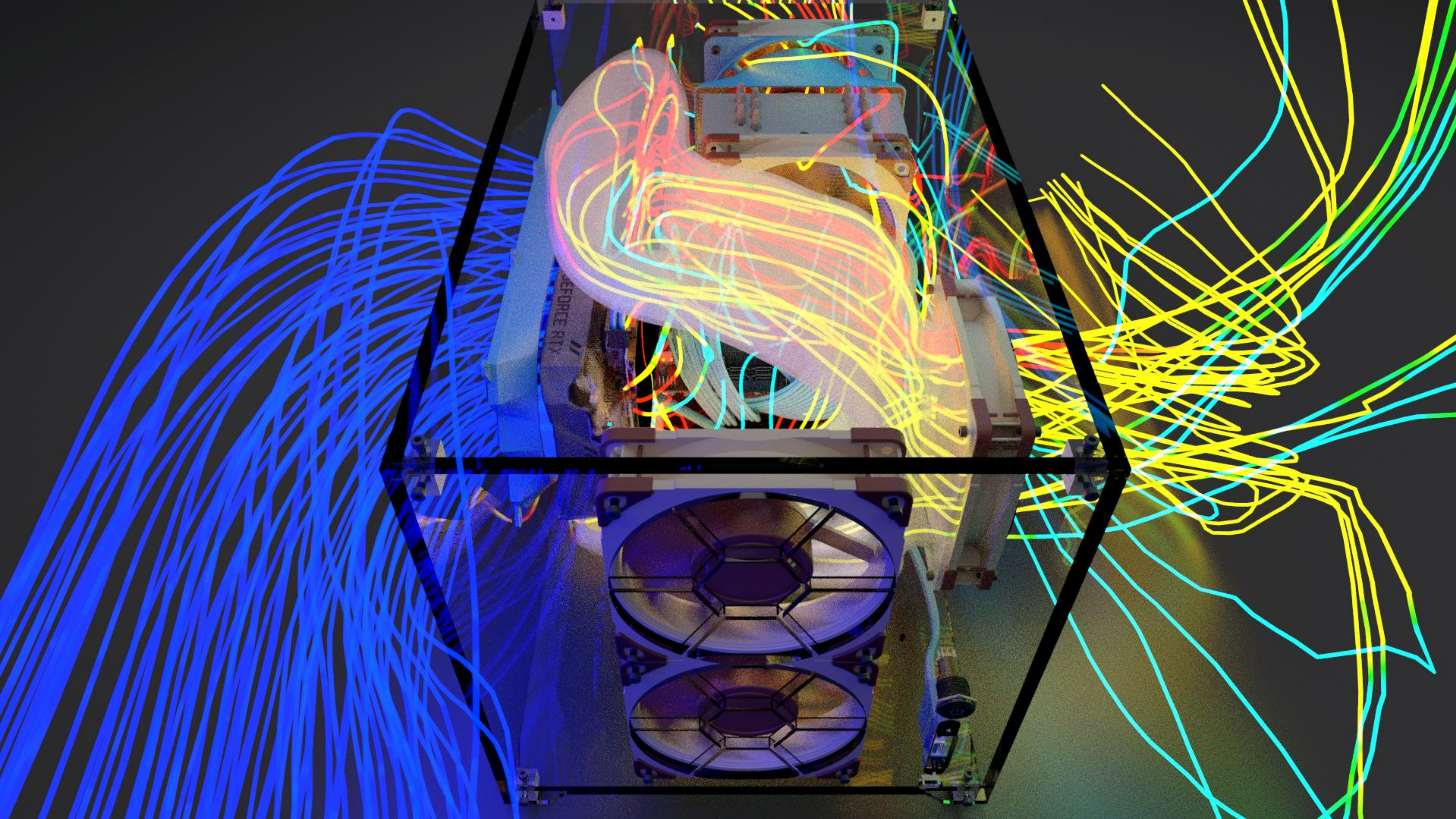














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