ROHITH SUBRAMANIAN · PORTFOLIO 2026

Mechanical Product Design

Electromechanical systems, reverse engineering, CAD, simulation, prototyping, DFM/DFA, and manufacturing execution.

PROFILE

Engineering from need to evidence.

Mechanical engineer with 6+ years of experience across electromechanical product development, manufacturing engineering, precision tooling, additive manufacturing, failure analysis, supplier coordination, and prototype build-test-iterate cycles.

6+

YEARS ENGINEERING EXPERIENCE

EXPERIENCE

Professional engineering experience

Manufacturing Engineer — ANI Pharmaceuticals · Mechanical Engineer Intern — Poolular · Design Engineer — Vijay Tool Room · Additive Manufacturing Design Engineer — iNSTA3D Technologies.

100+

PRODUCTION ORDERS DELIVERED

CASE STUDY 01 · PROFESSIONAL PROTOTYPE

Poolular Controller

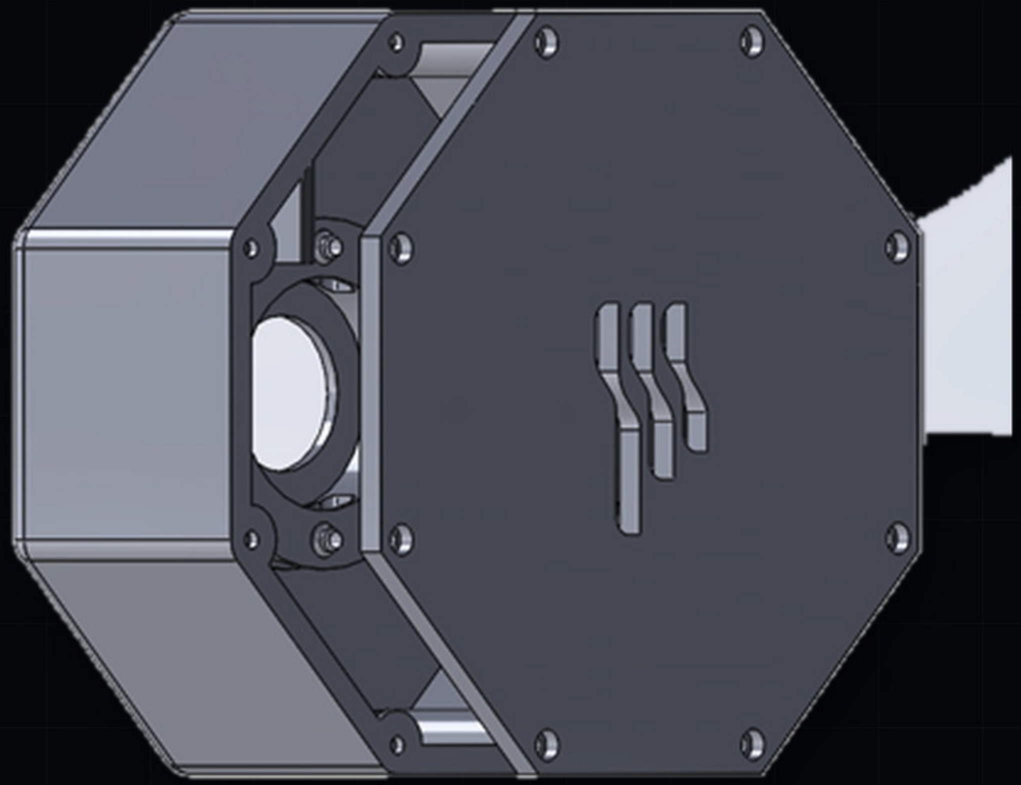
Electromechanical prototype development integrating mechanical housings, electronics, sensors, routing, assembly, and functional testing.

~45%

REPORTED SYSTEM PERFORMANCE IMPROVEMENT

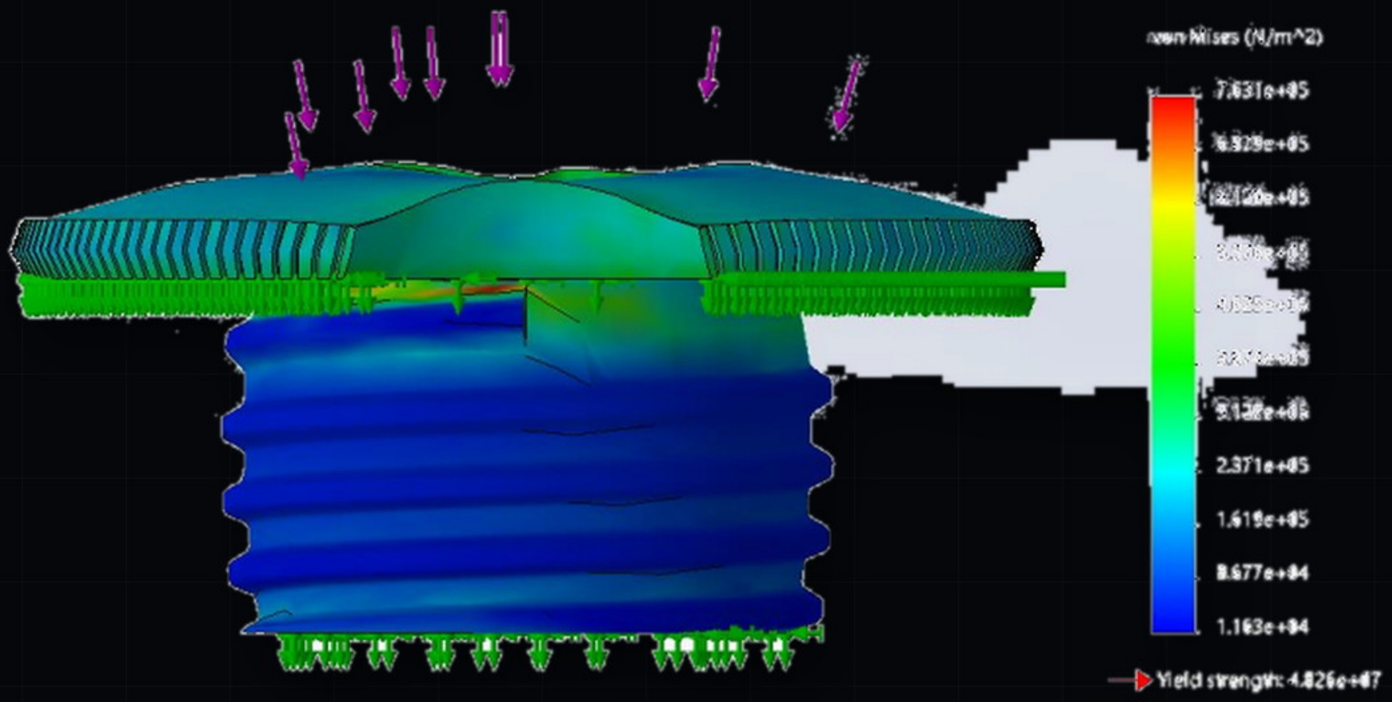
Enclosure CAD

The enclosure geometry establishes packaging, interfaces, access, and assembly features required by the complete electromechanical system.



Static analysis

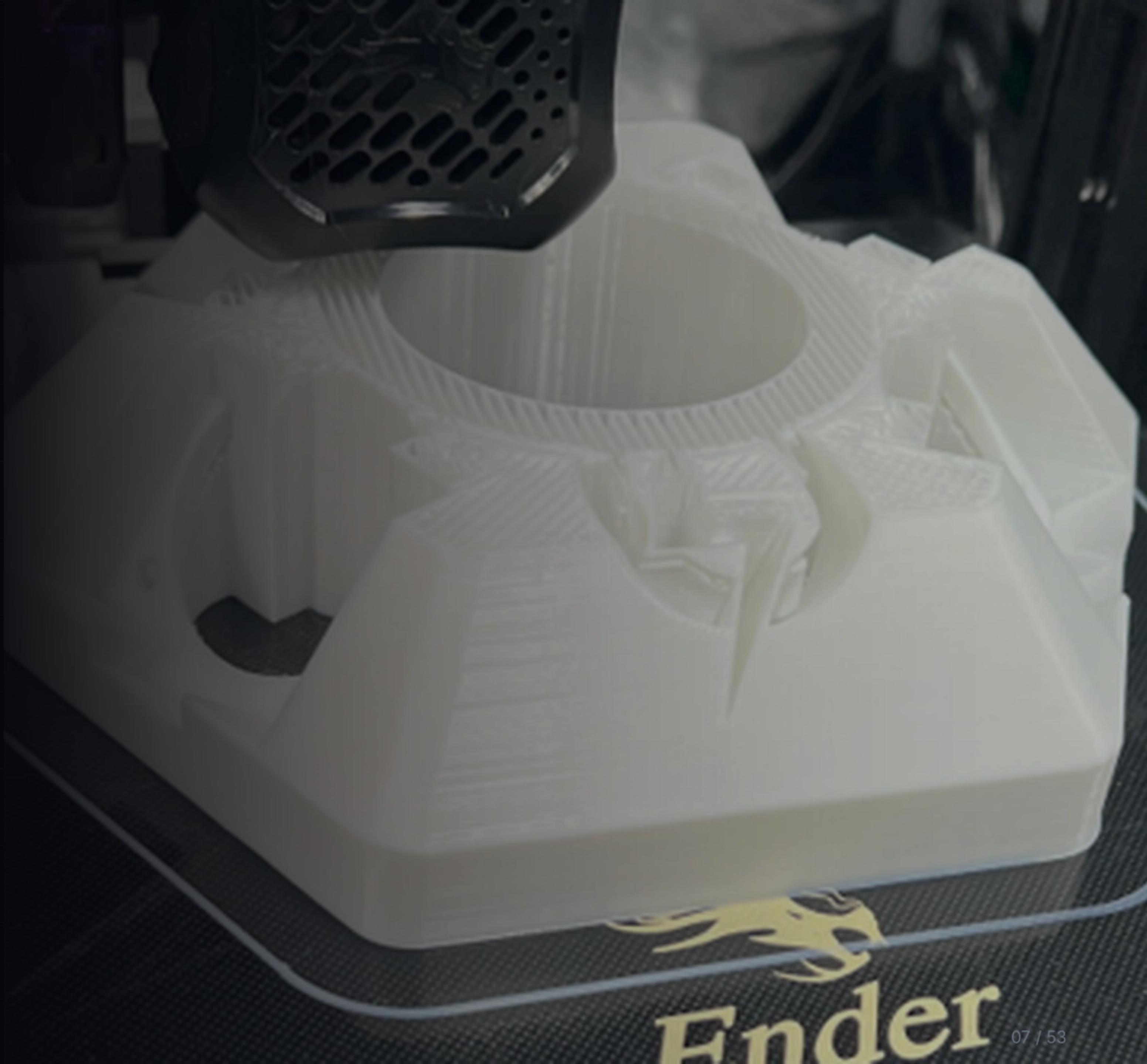
A source-supported static simulation result was used to examine the mechanical response of the designed component.



POOLULAR · PROTOTYPE

FDM prototype

Printed hardware made it possible to evaluate fit, routing, access, and assembly before further integration.



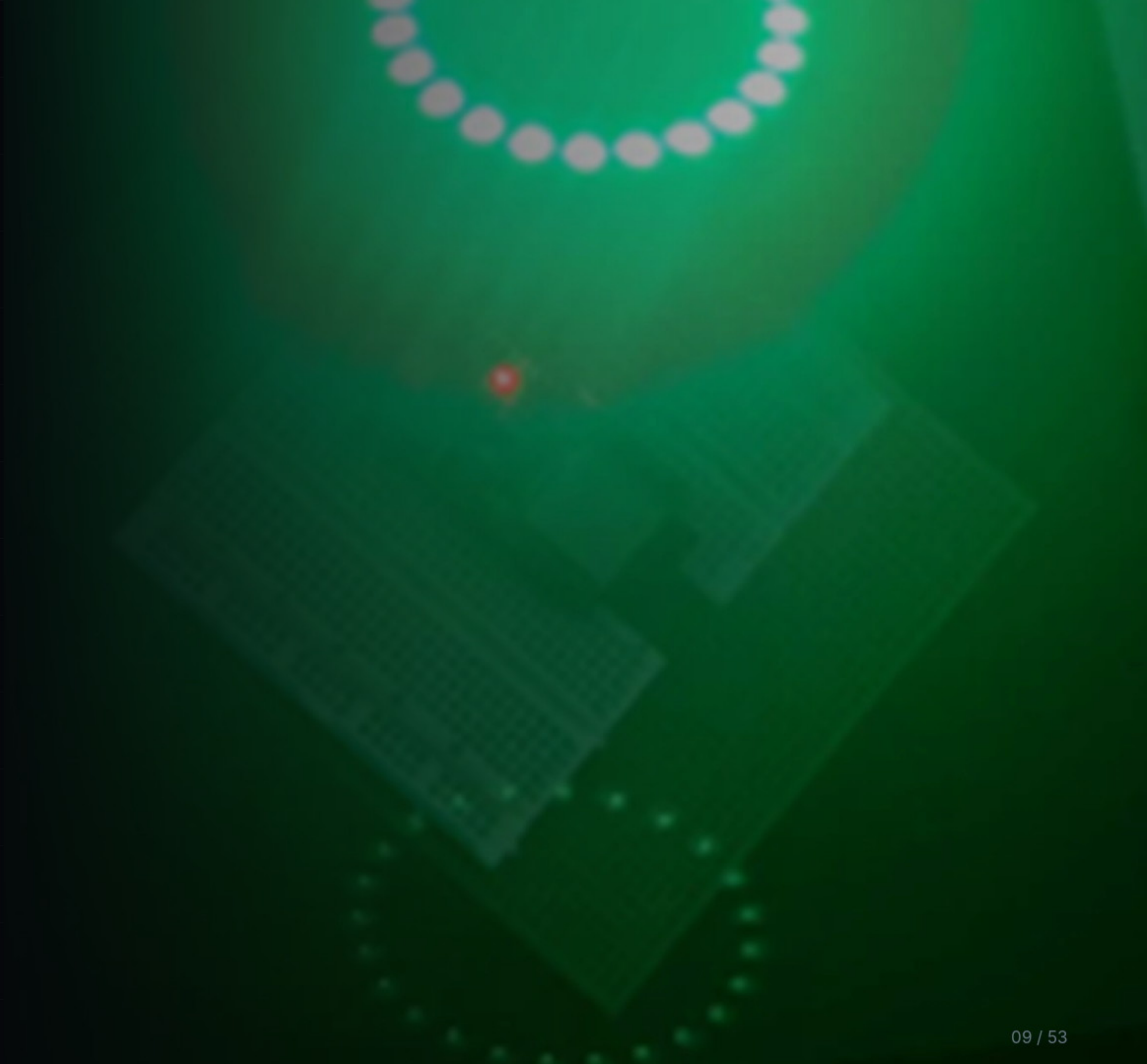
POOLULAR · INTEGRATE

System integration

Mechanical hardware, wiring, and control electronics were brought together during the prototype build.

Functional test

The assembled controller progressed through functional testing and design-iteration cycles with cross-functional partners.



CASE STUDY 02 · SCAN-TO-CAD + FEA

Lightweight Bicycle Fender

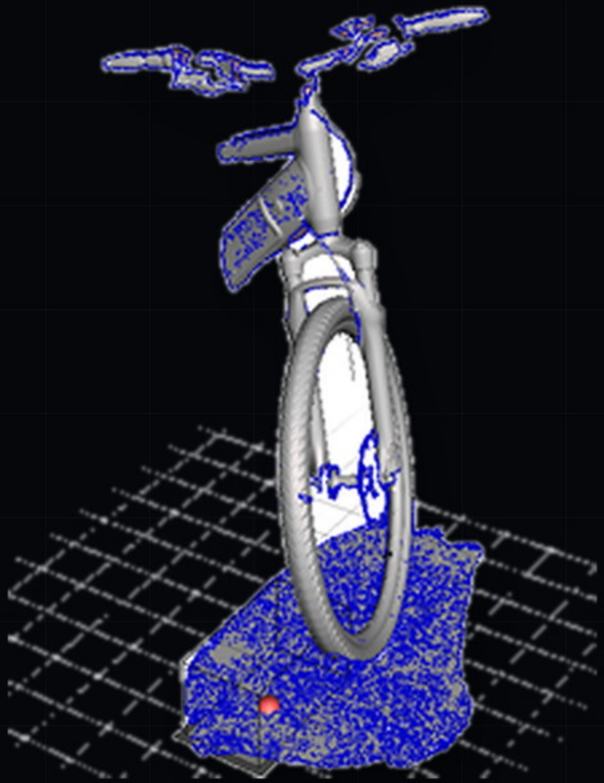
Reverse engineering, static analysis, topology optimization, manufacturable CAD rebuild, mounting detail, and additive-manufacturing preparation.

63%

MODELED WEIGHT REDUCTION

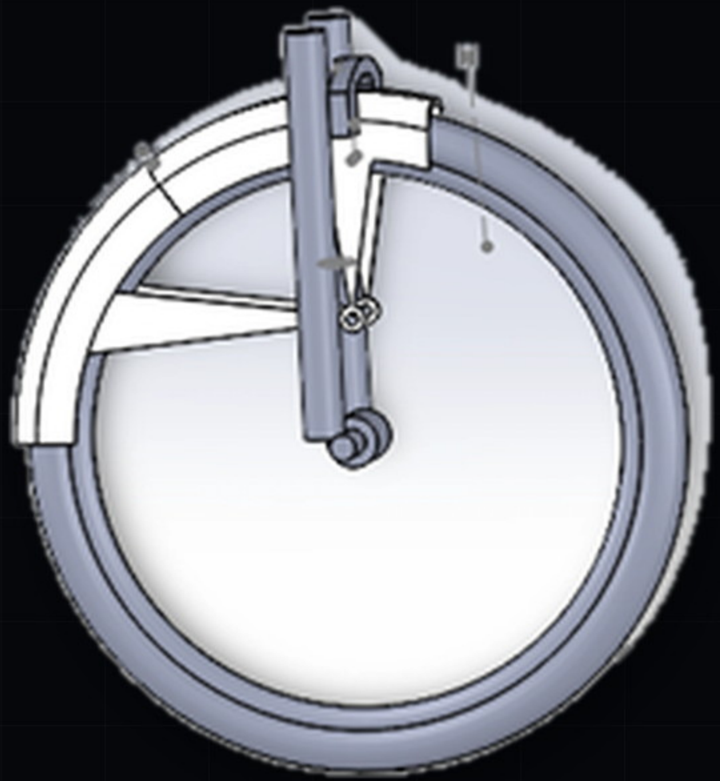
Capture the bicycle

3D scan data established the real bicycle and wheel geometry that would drive the design.



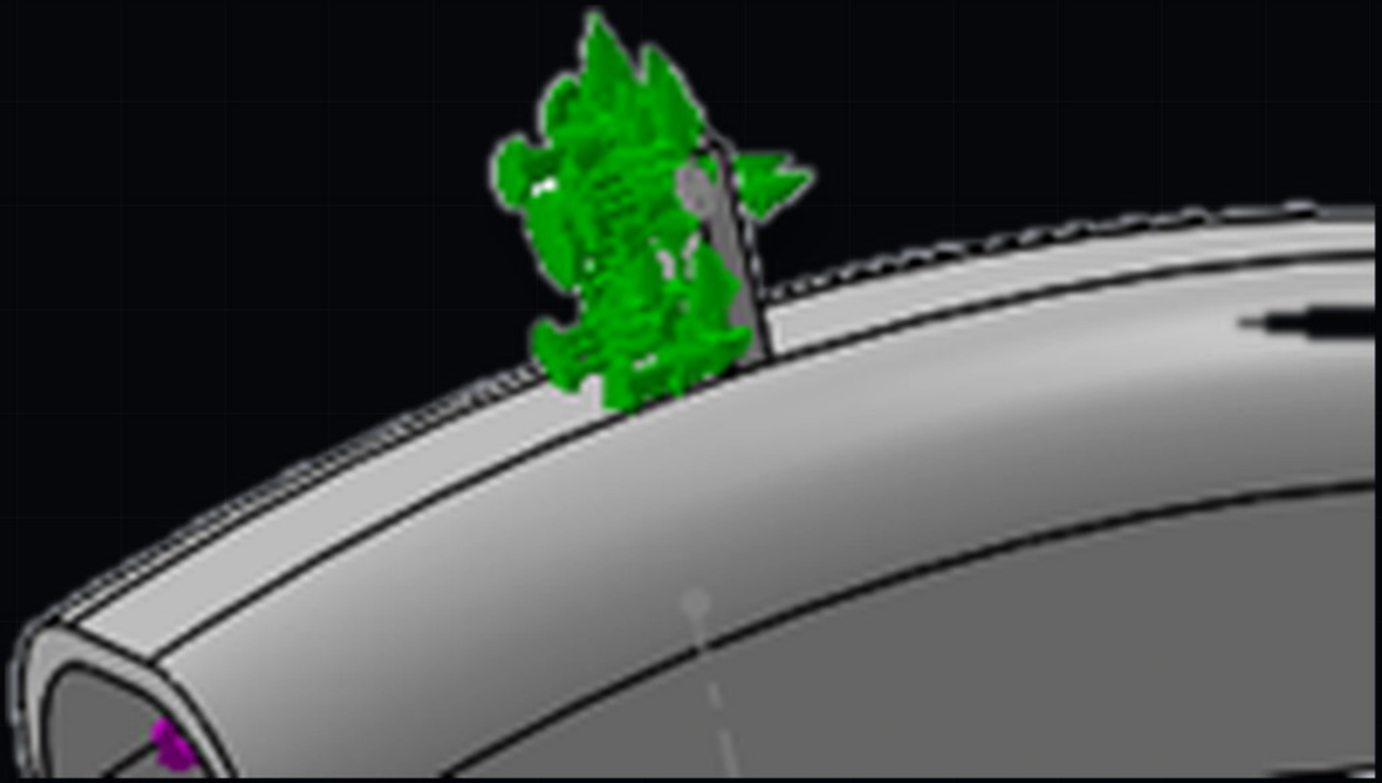
Rebuild reference geometry

The scan was cleaned and simplified, then reconstructed into usable reference geometry for the wheel, fork, and mounting region.



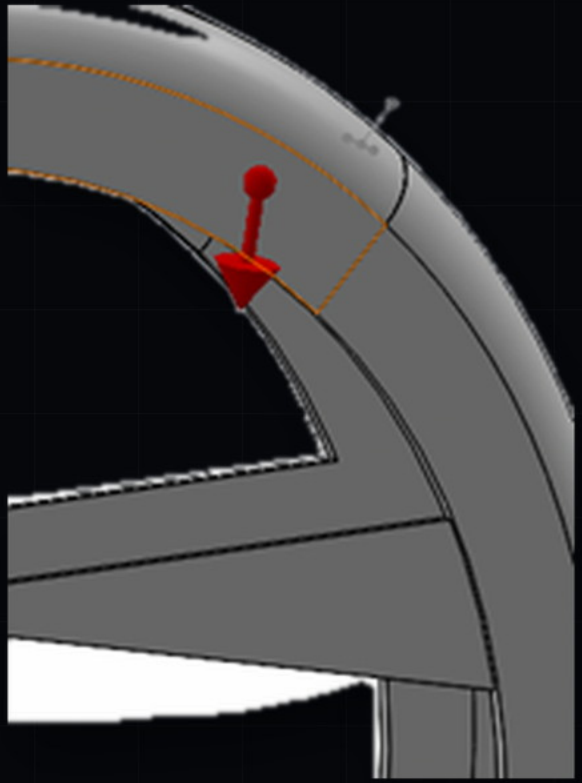
Define restraints

The static study begins with the intended restraint condition at the support location.



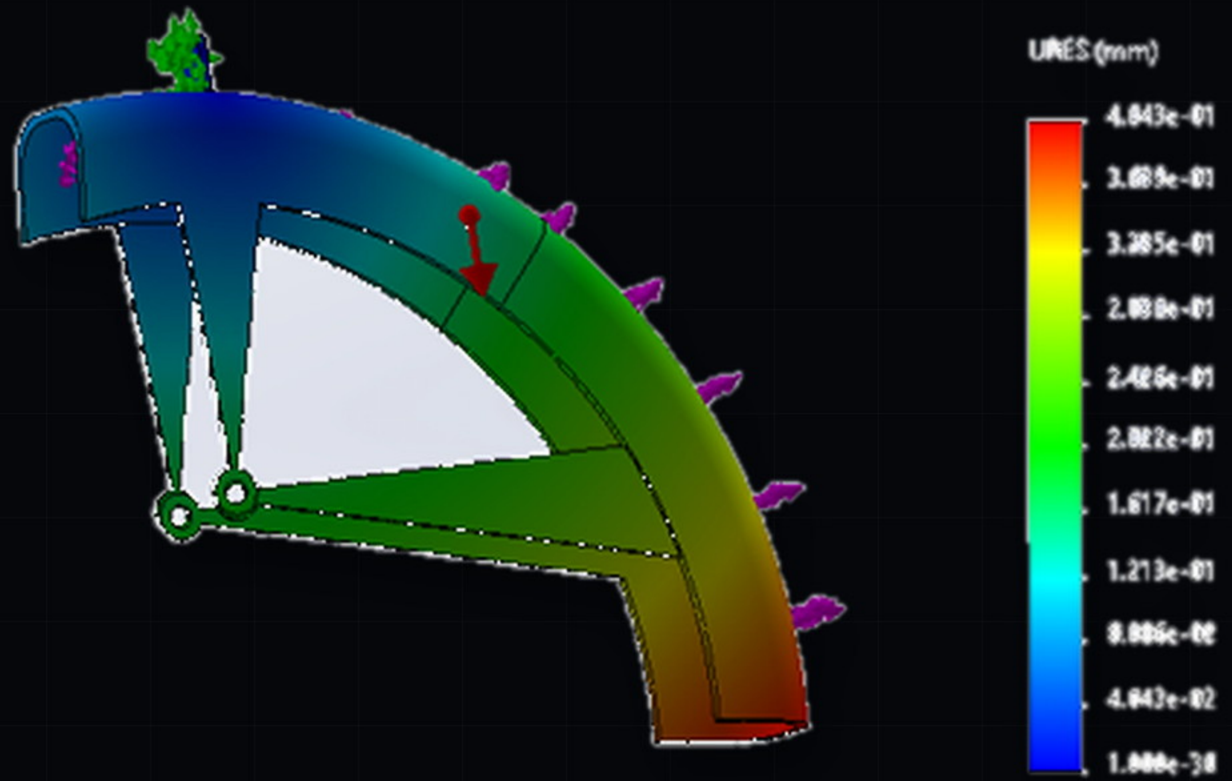
Apply the design load

The loading condition was applied before solving for structural response.



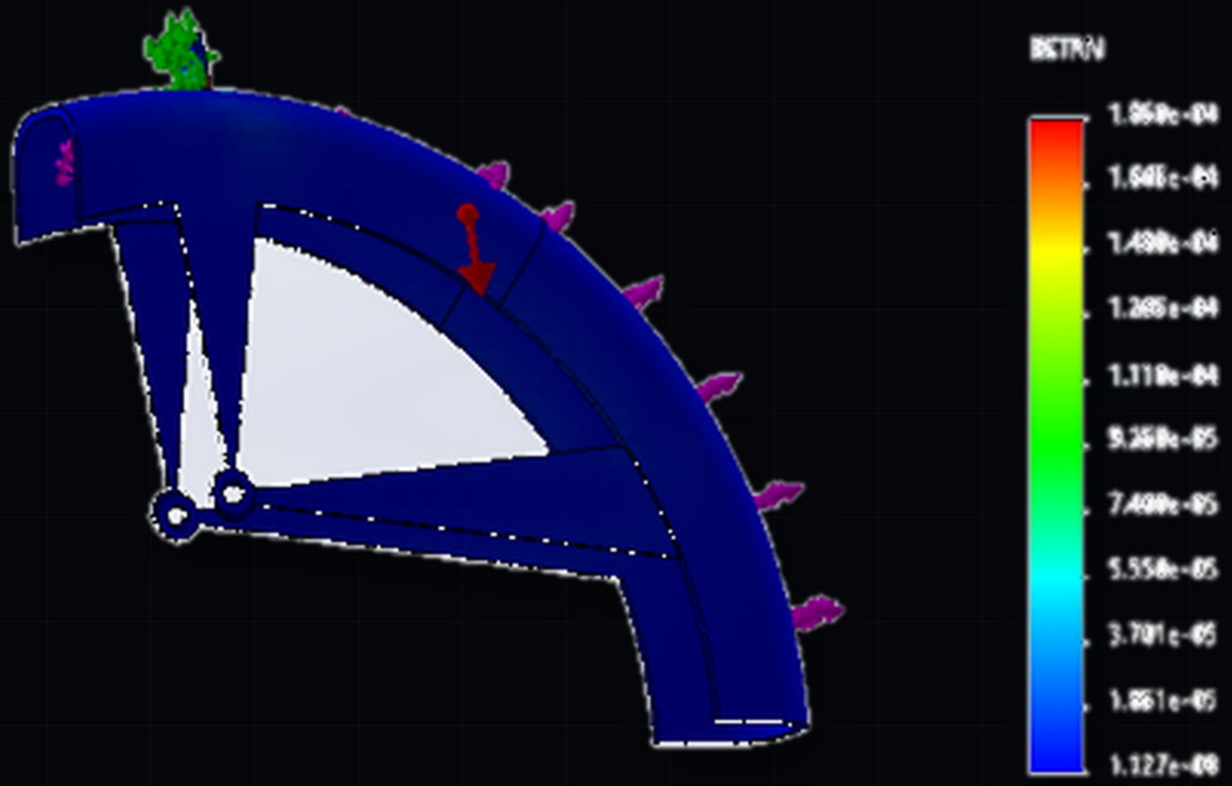
Displacement

Standalone displacement result with the original simulation scale retained.



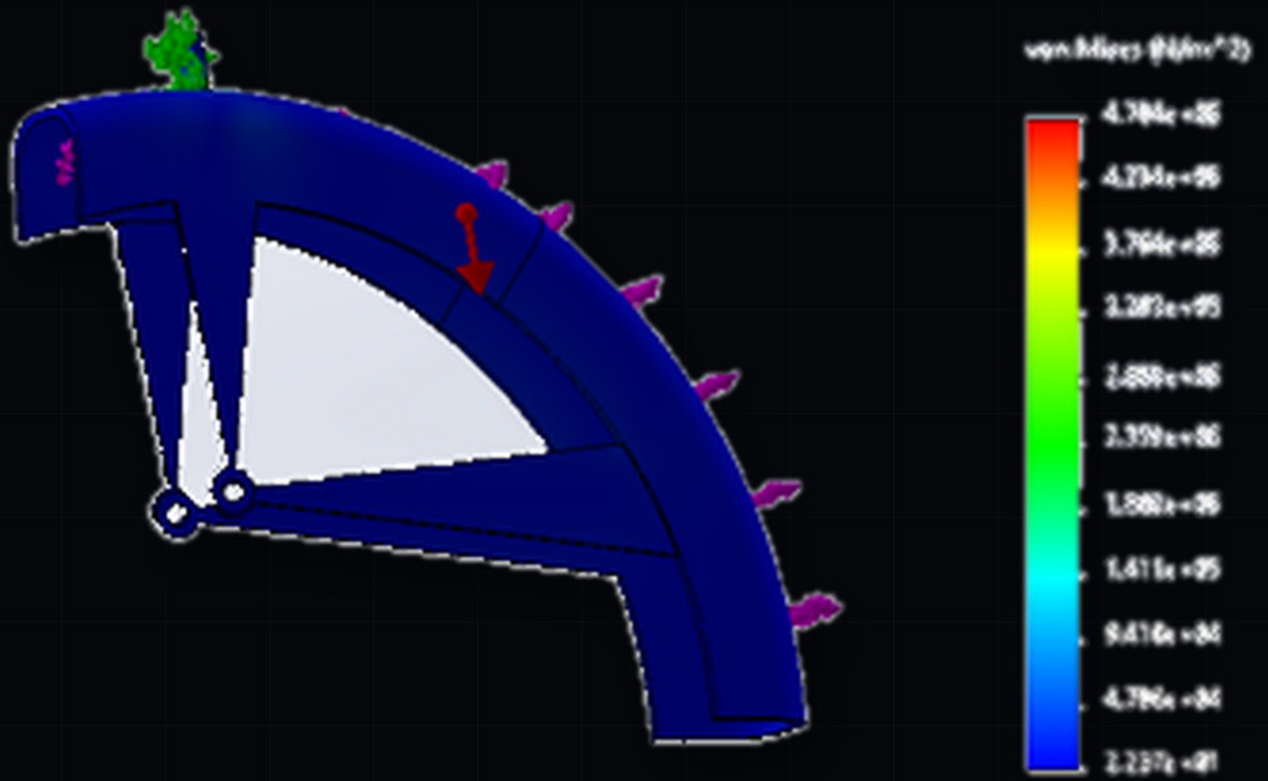
Strain

Static-study strain output shown independently at full scale rather than compressed into a collage.



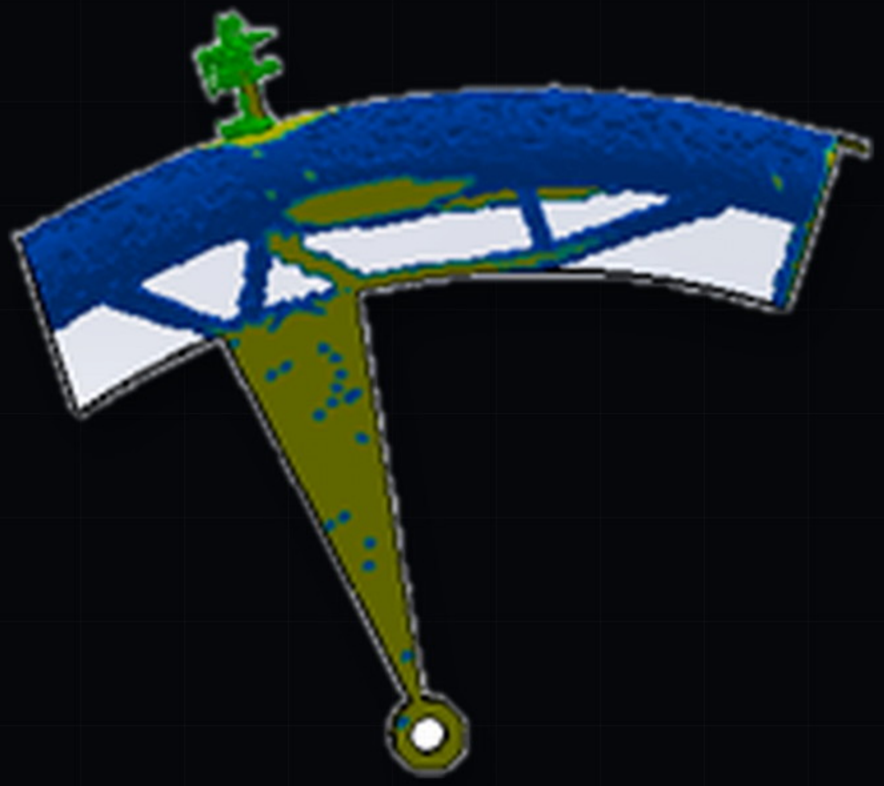
von Mises stress

Standalone stress output makes the stress distribution and load path easier to inspect.



Topology optimization

The topology study identified where material contributed to the load path and where mass could potentially be removed.

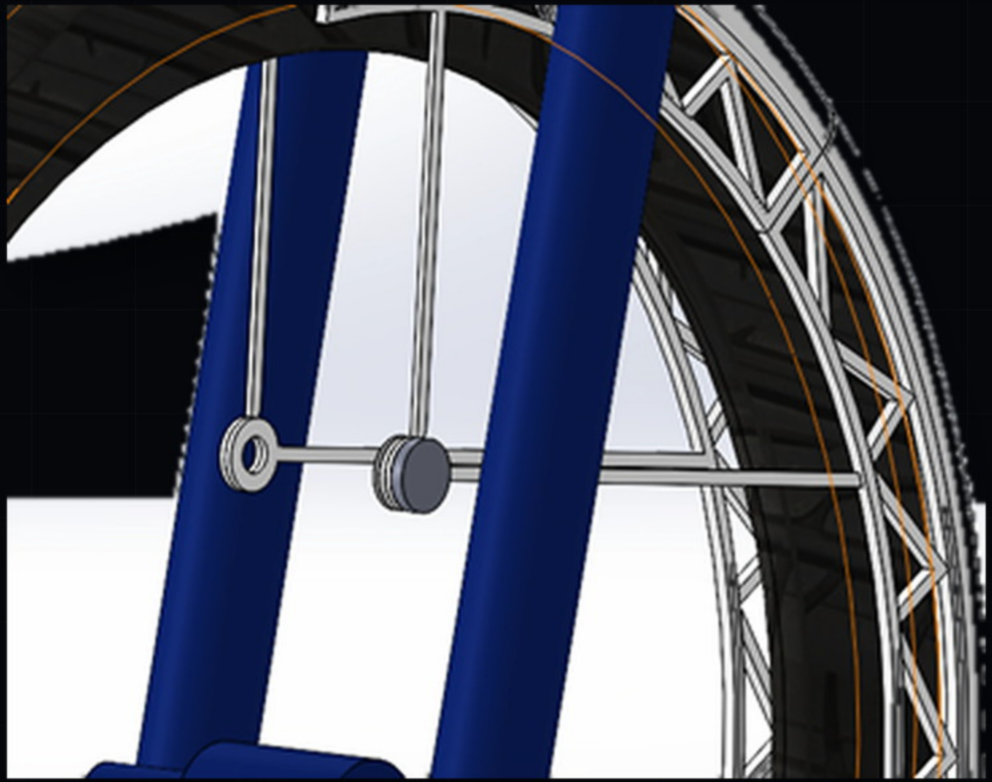


Rebuild manufacturable CAD

Topology output was treated as engineering information, then translated into printable geometry with the required interfaces preserved.

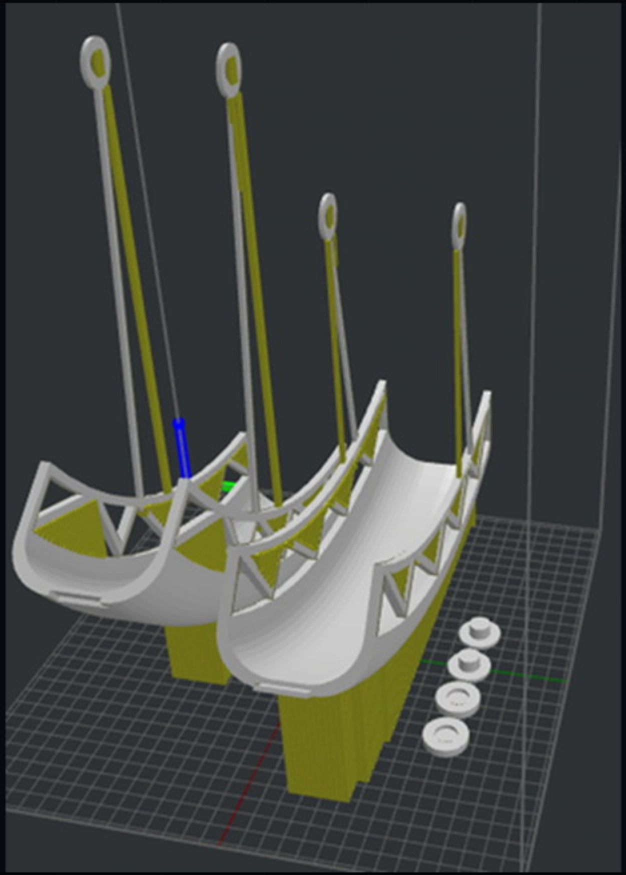
Resolve the mounting system

The fork attachment and support geometry were developed as a separate mechanical interface problem.



Prepare to print

The final design was oriented for additive manufacturing while balancing structural direction, support material, and manufacturability.



1.40 → 0.52 lb

MODELED WEIGHT

CASE STUDY 03 · DFAM + DFA

Modular Phone Case

A three-part architecture combining phone fit, modular protection, grip, and a camera privacy feature without conventional fasteners.

3

TOTAL PARTS

Outer shell

The perforated outer shell provides the modular protective layer and side-grip concept.

Inner case

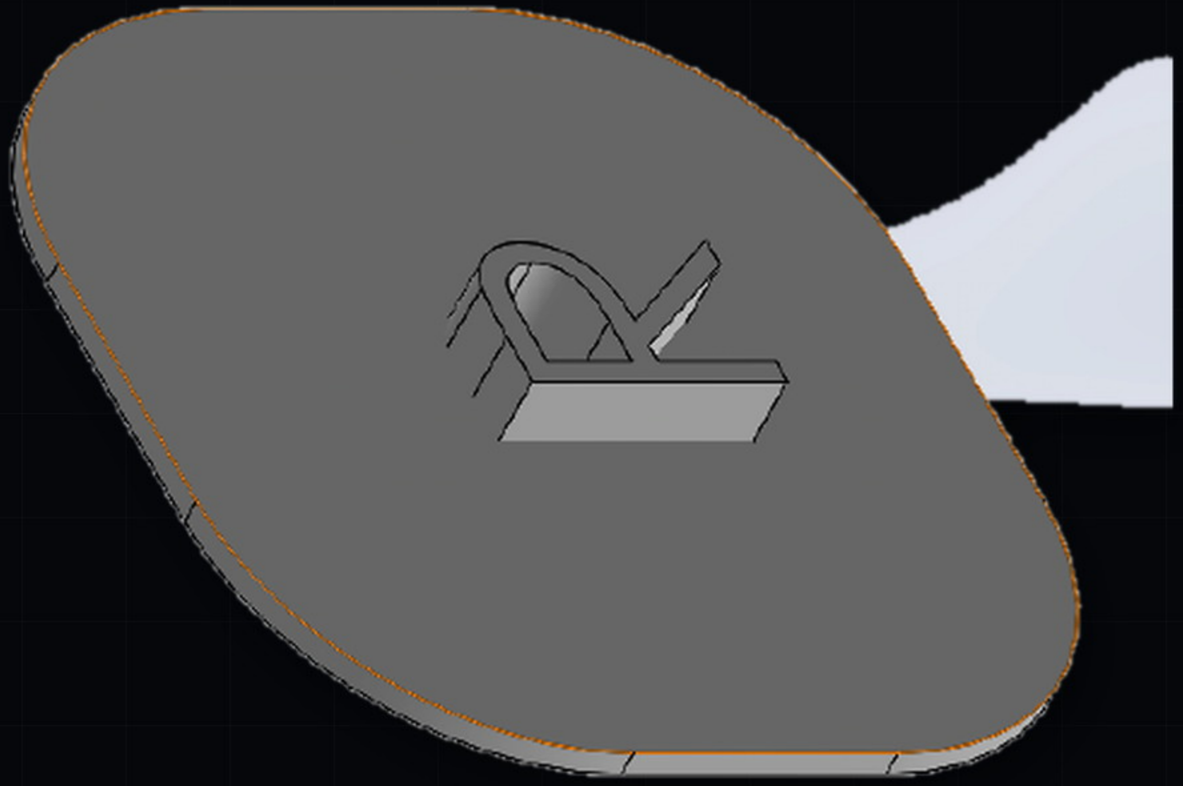
The inner case provides the primary phone fit and carries the interface used by the camera slider.

Snap-fit assembly

The protective shell connects to the inner case without screws or loose fasteners.

Camera privacy slider

The separate slider press-fits into the inner-case slot and moves to cover the camera.



Integrated product architecture

Inner case + optional protective shell + camera slider. Future validation remains tolerance/fit, drop/impact testing, and production material/process selection.

Future validation is not presented as completed testing.

CASE STUDY 04 · REVERSE ENGINEERING + FEA

Optimized Prosthetic Socket

A scan-to-design engineering concept exploring digital mass customization, a 1000 N static study, topology-informed redesign, and additive-manufacturing preparation.

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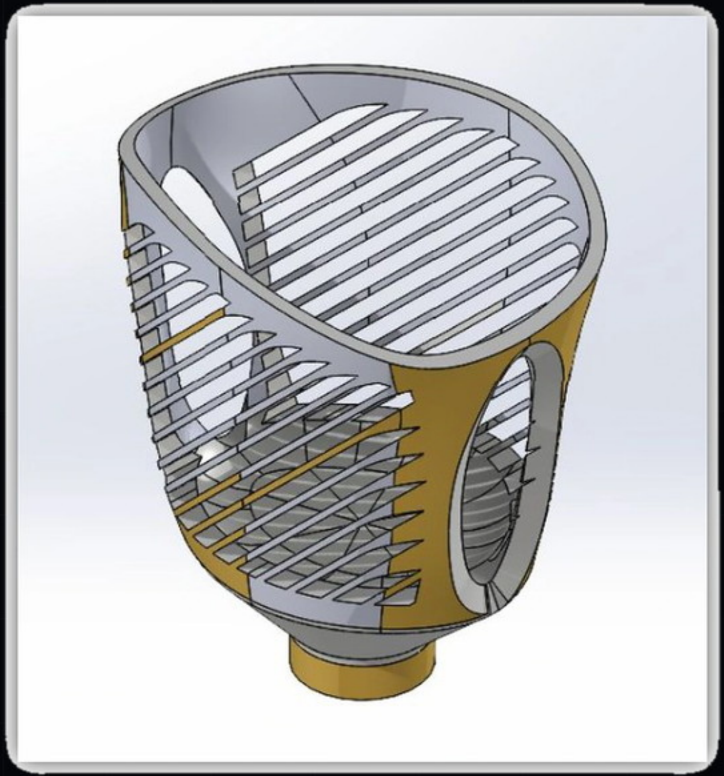


57%

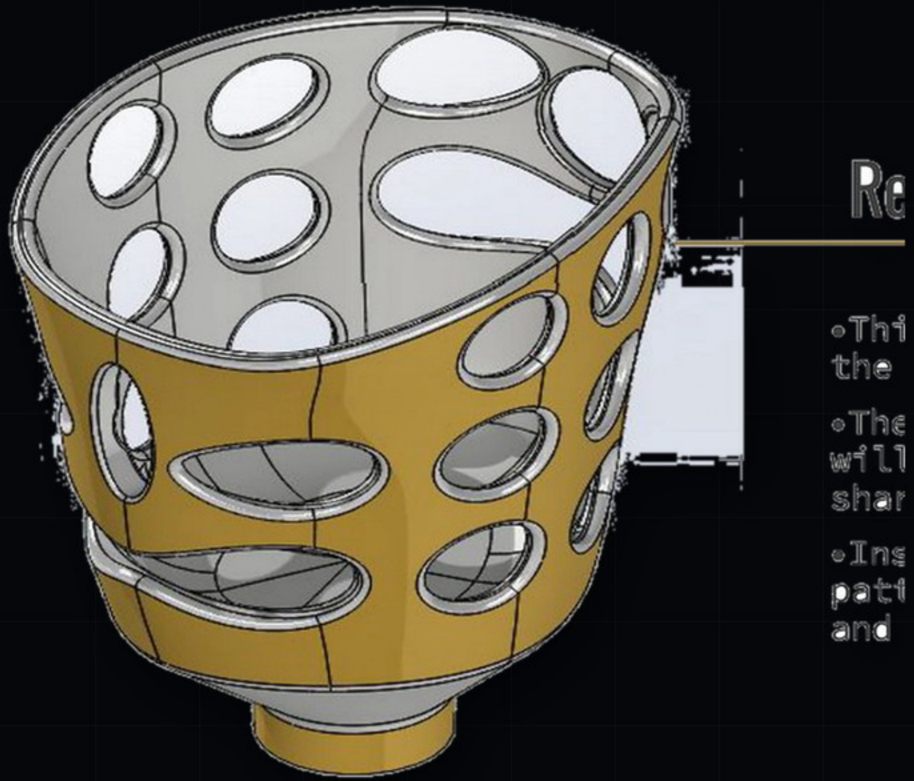
MODELED MASS REDUCTION

Concept only — engineering study, not a clinically validated medical device.

PROSTHETIC · 01 MODEL

Reference geometry

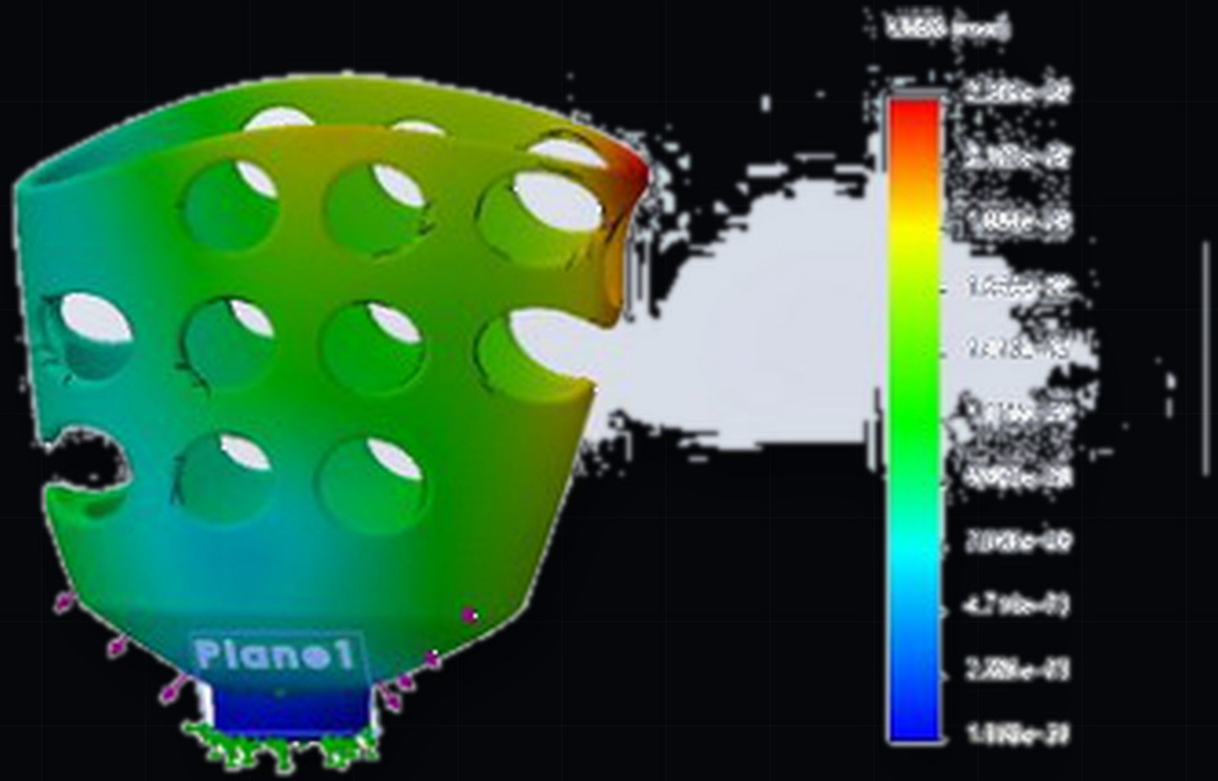
A reference limb model and reverse-engineered socket geometry formed the starting point for the engineering concept.



PROSTHETIC · 1000 N STATIC STUDY

Displacement

Standalone displacement output from the static study.



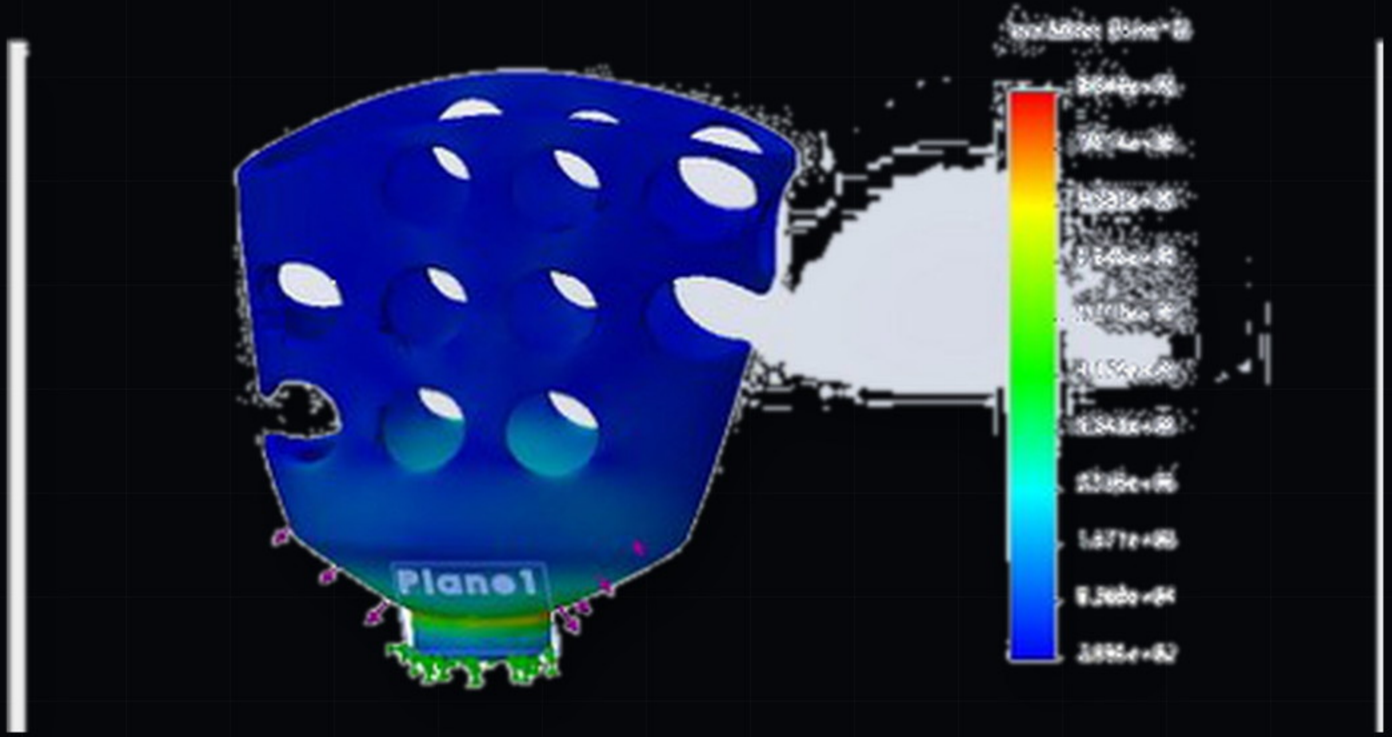
0.02 mm

MAXIMUM DISPLACEMENT REPORTED

PROSTHETIC · 1000 N STATIC STUDY

von Mises stress

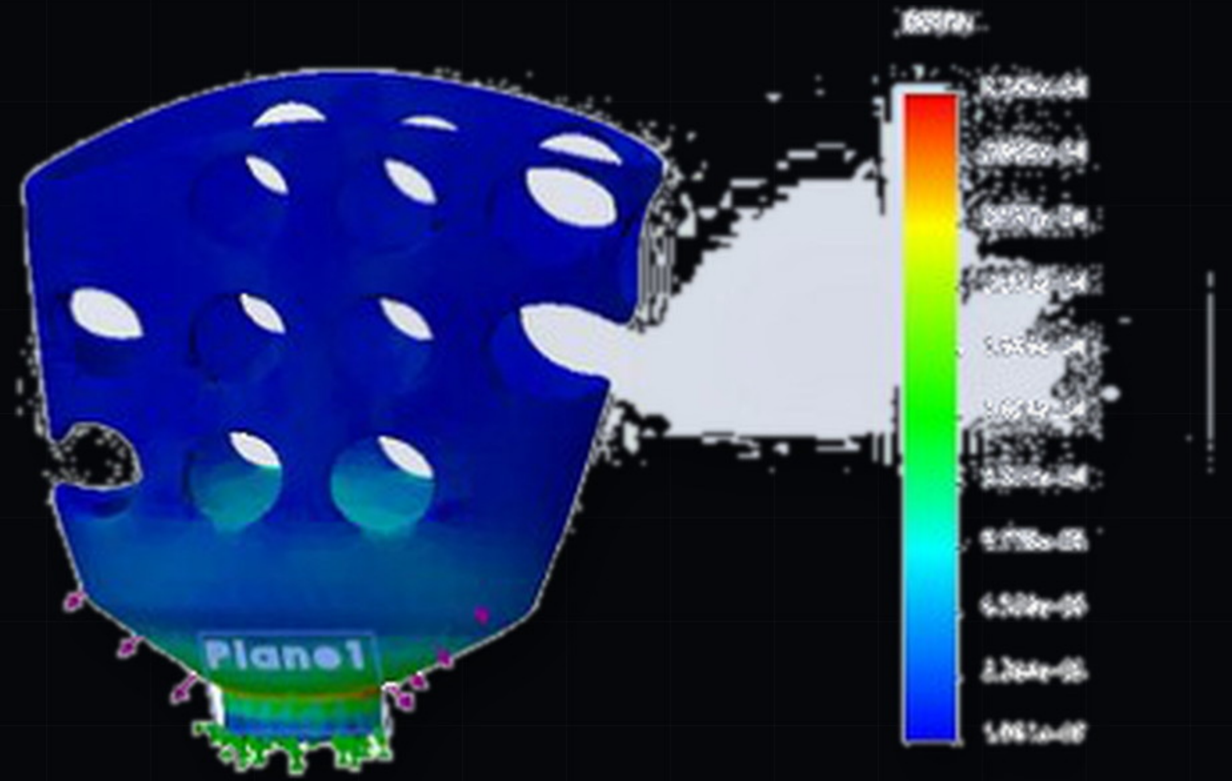
Stress output shown independently so the structural response can be evaluated without a multi-image collage.



PROSTHETIC · 1000 N STATIC STUDY

Strain

Standalone strain output from the source analysis.



PROSTHETIC · REDESIGN

Topology-informed redesign

The concept was converted into smoother geometry with filleted cutouts, ventilation, and reduced support demand.

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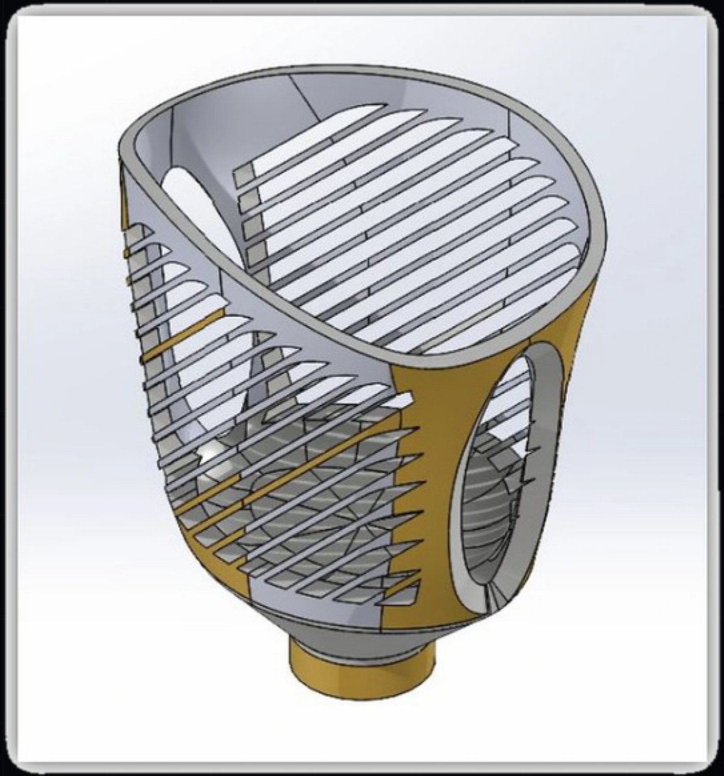
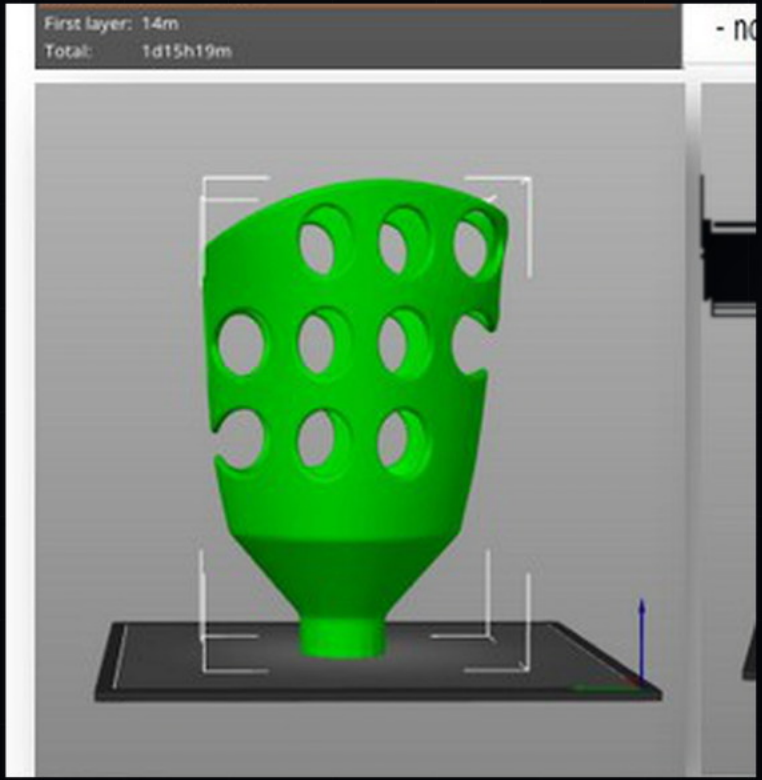


740 → 321 g

MODELED MASS

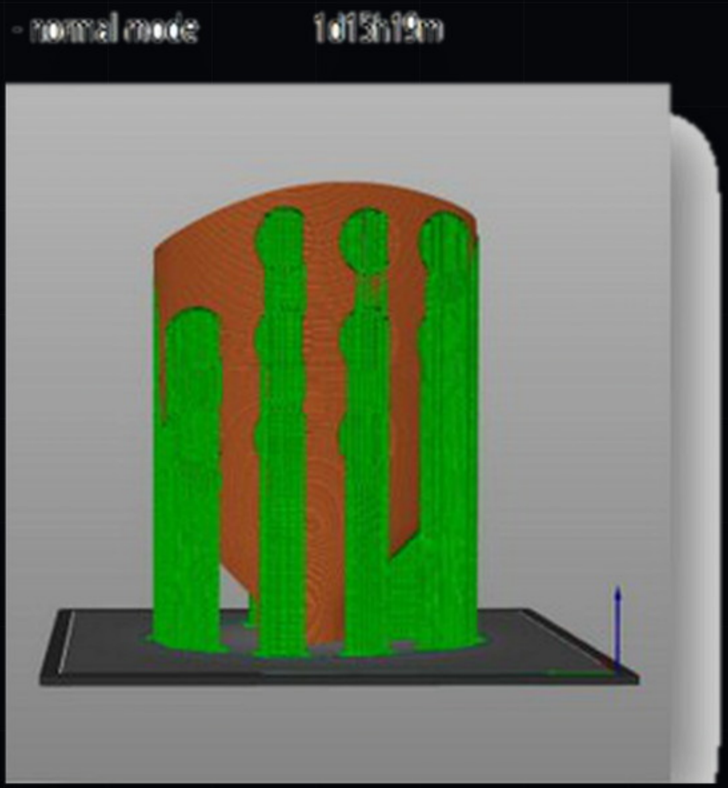
Build orientation A

A more self-supporting orientation was reviewed for additive-manufacturing implications.



Build orientation B

An alternate orientation makes the support requirement explicit and helps compare manufacturing tradeoffs.



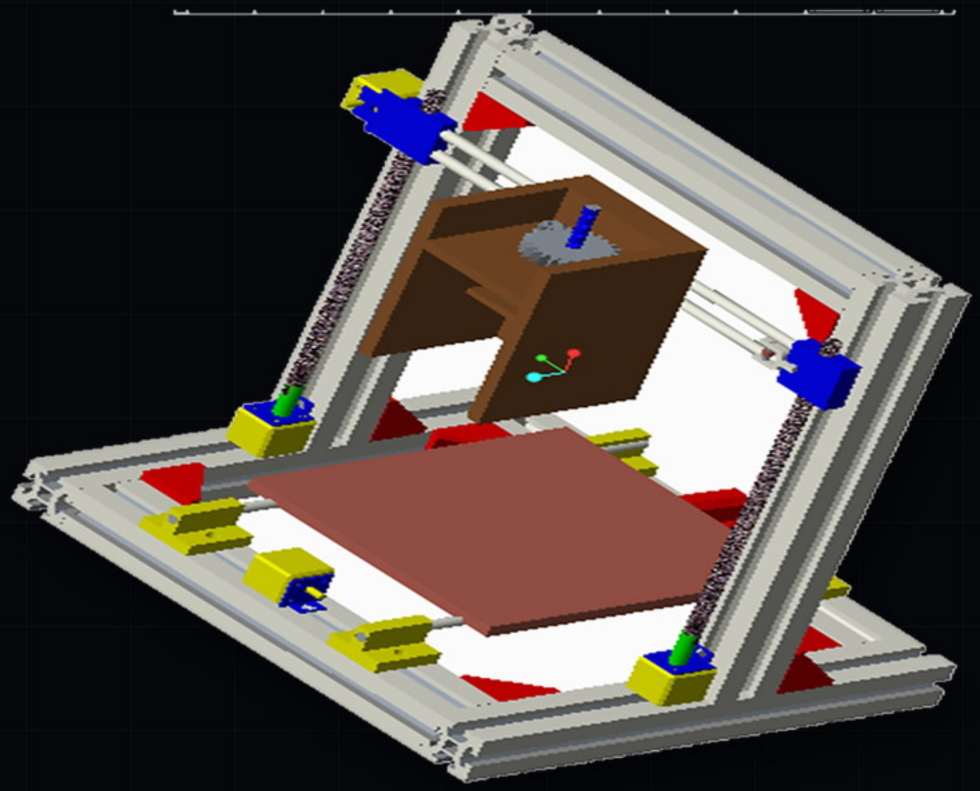
1d 15h 19m

PRINTING ESTIMATE SHOWN IN SOURCE

CASE STUDY 05 · SYSTEM ARCHITECTURE

Universal Paste Extruder

A low-cost 3D-printer concept combining an aluminum-extrusion frame, stepper-driven motion, and a paste-extrusion subsystem.

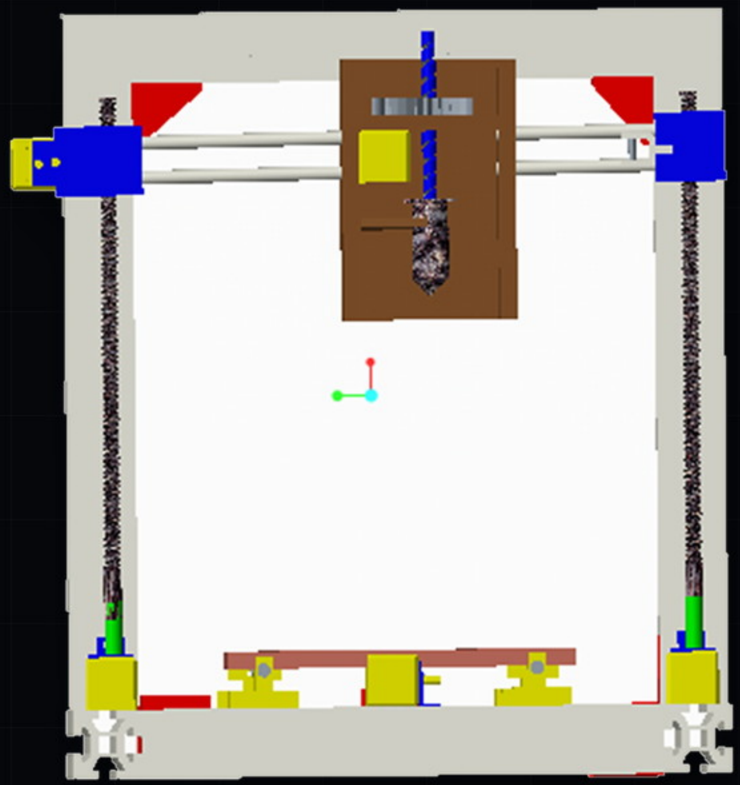


V1 → V2

FEED-SYSTEM ITERATION

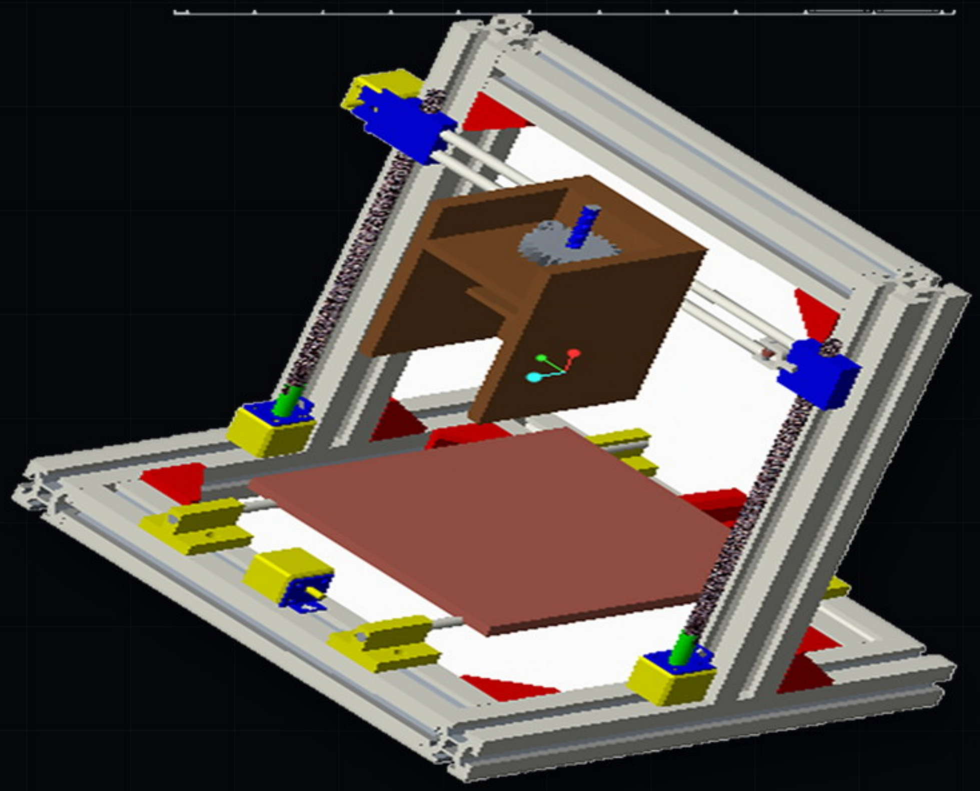
Front system layout

The front CAD view establishes the overall frame, motion system, table, and extrusion packaging.



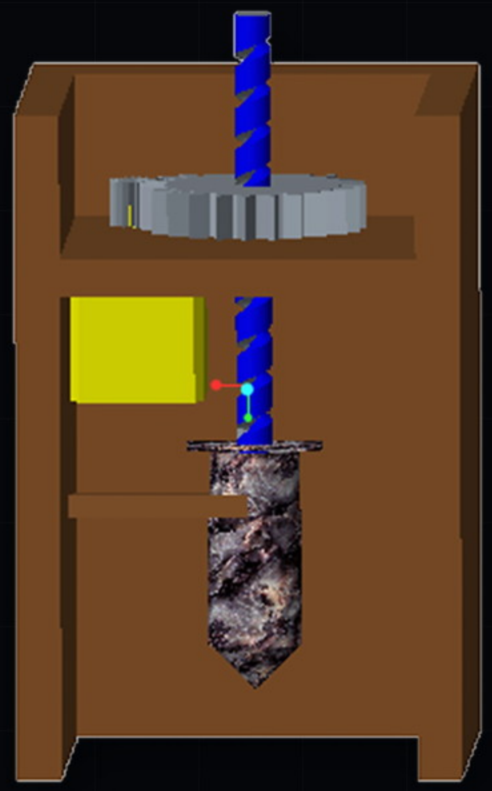
Isometric assembly

The isometric view shows how the structural frame, motion hardware, table, and extrusion concept fit together.



V1 cartridge extruder

The original cartridge-based feed required repeated pauses for refill or changeover.



Prototype feed hardware

Physical prototype hardware supported iteration of the material-delivery system.

V2 continuous feed concept

A larger table-top reservoir and peristaltic pump were introduced to create a more continuous material path.

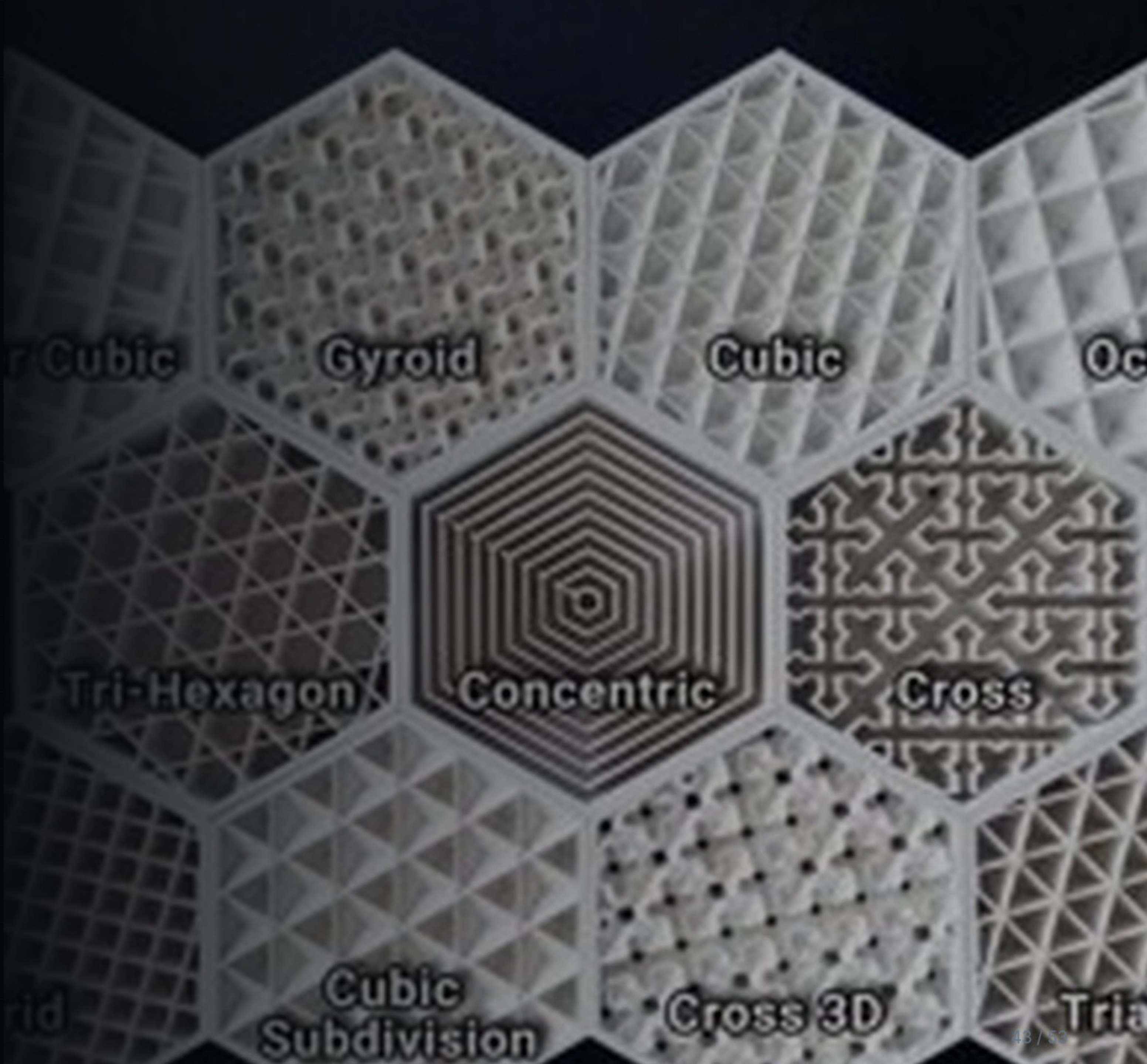
Nozzle / output interface

The downstream nozzle hardware completes the physical material-delivery path.

MATERIAL STUDY

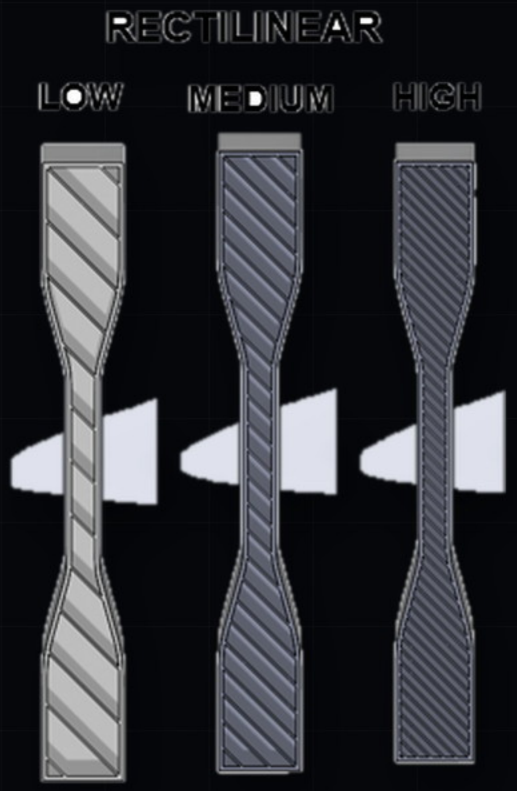
Infill Density & Pattern Study

Dogbone specimens across multiple patterns, densities, and materials followed by simulation and tensile-strength comparison.



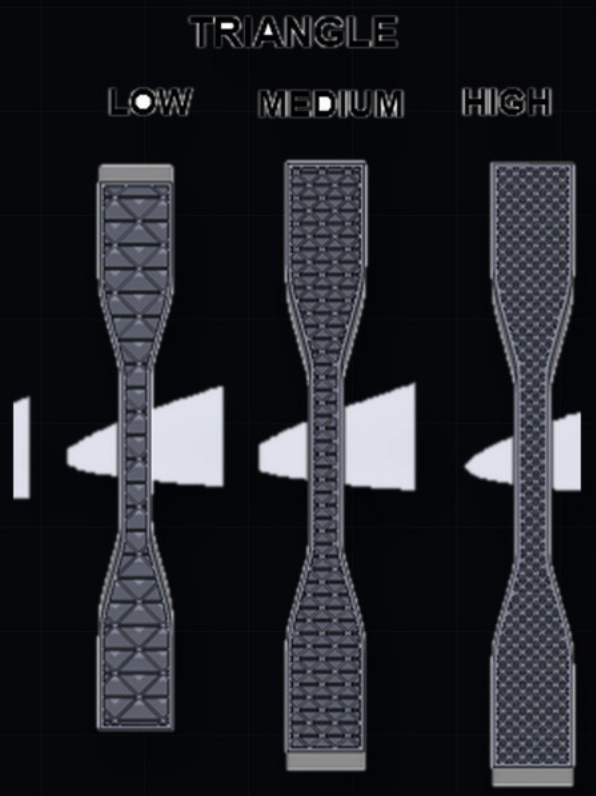
Rectilinear family

Low-, medium-, and high-density rectilinear specimen geometry.



Triangle family

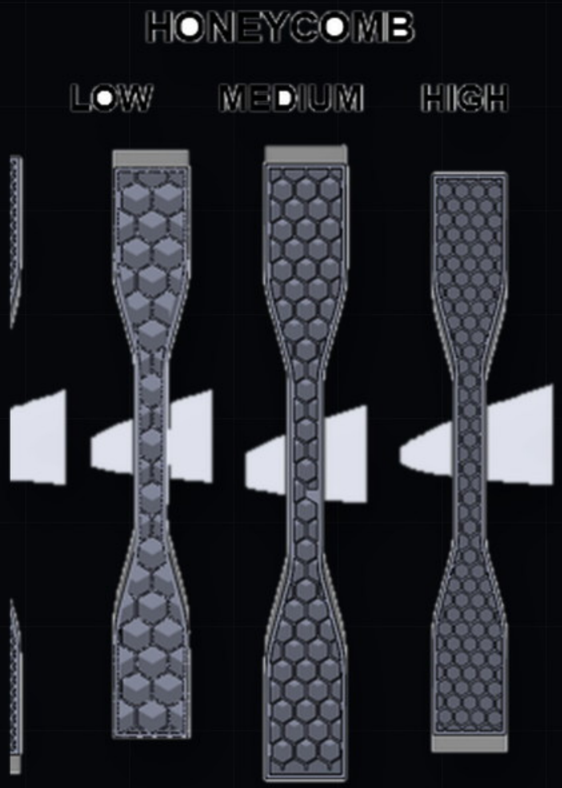
Low-, medium-, and high-density triangle specimen geometry.



MATERIAL STUDY · SPECIMEN ARCHITECTURE

Honeycomb family

Low-, medium-, and high-density honeycomb specimen geometry.



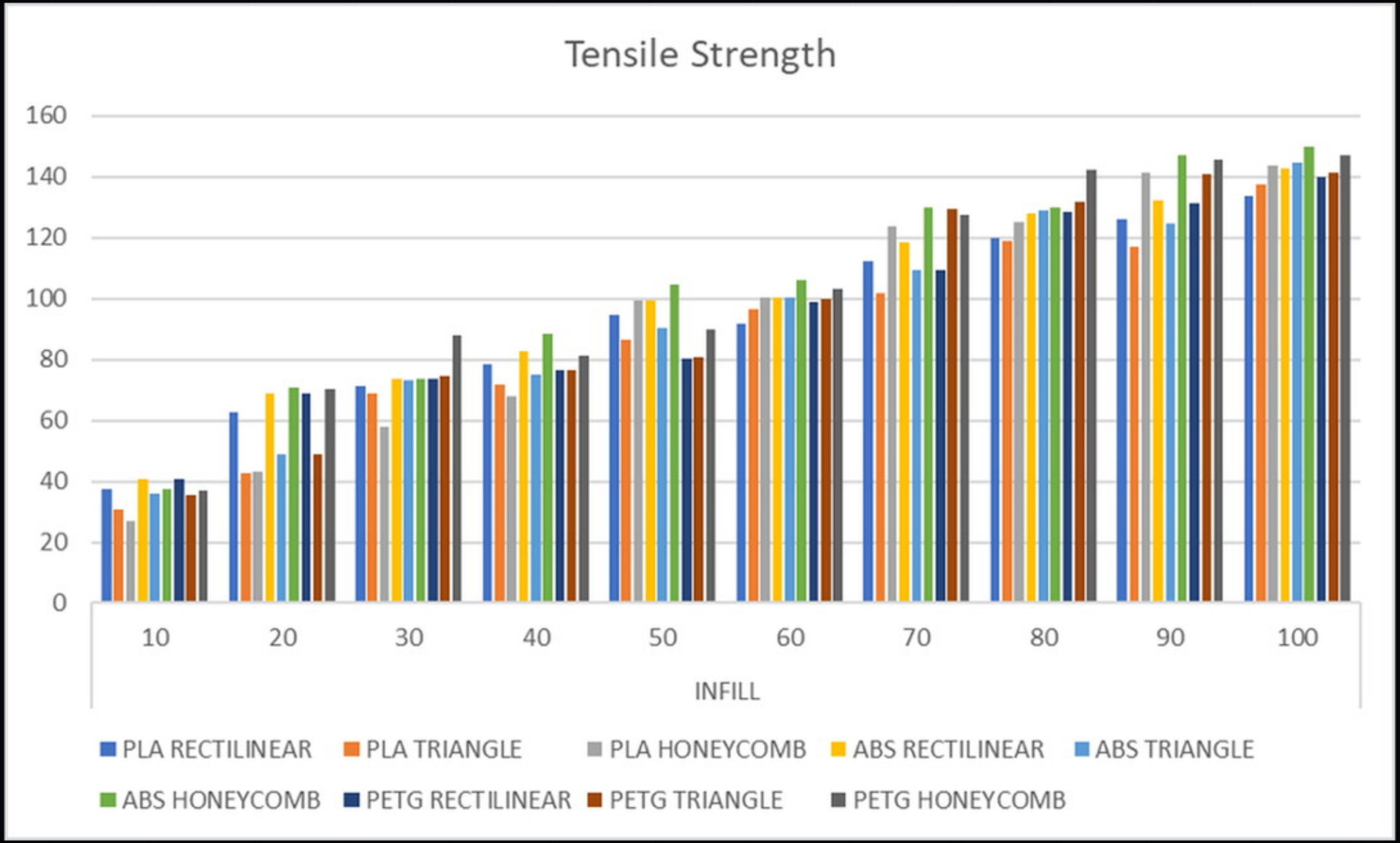
Simulation

A source-supported simulation result for the dogbone specimen.

MATERIAL STUDY · TEST + COMPARE

Tensile-strength comparison

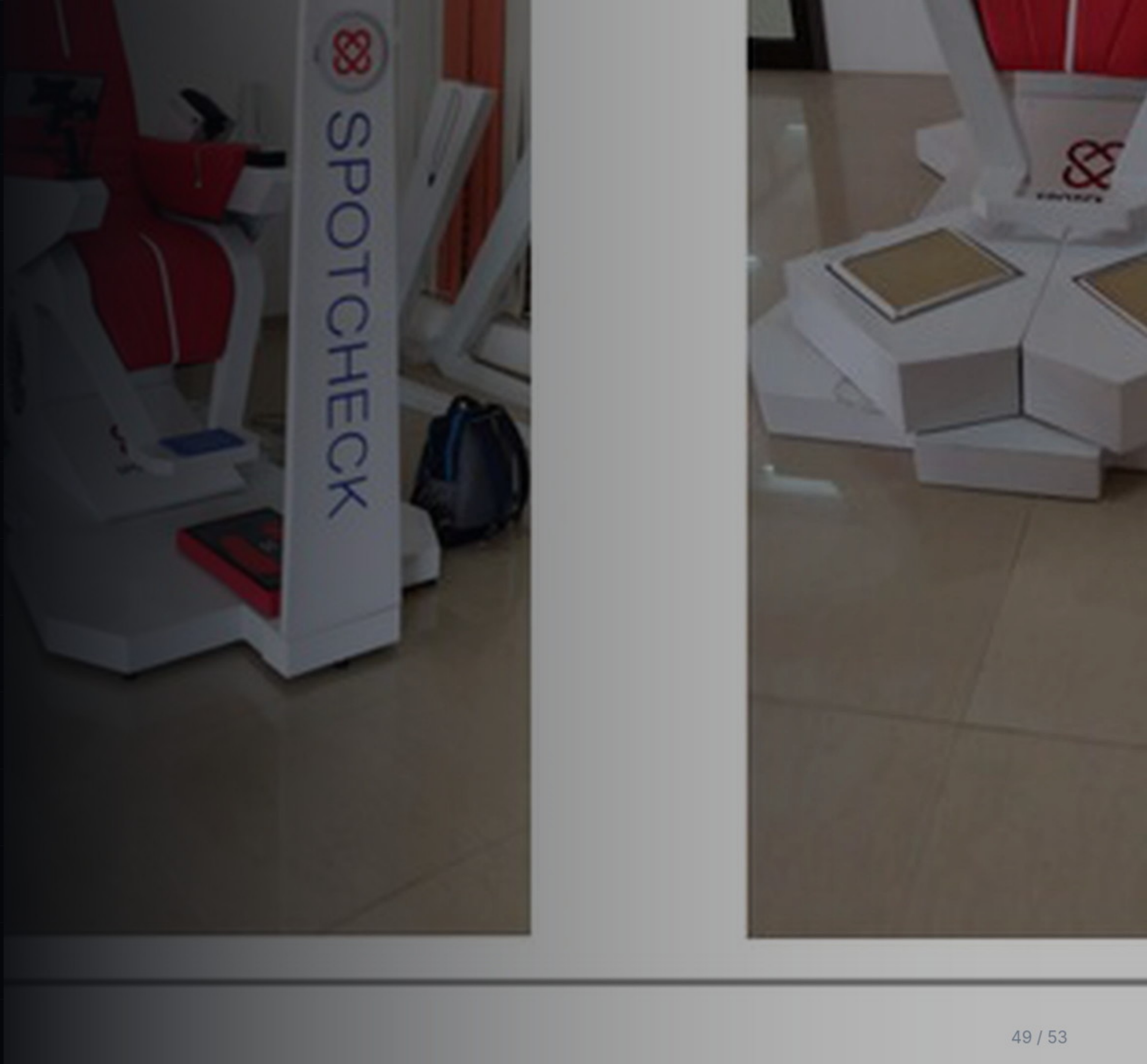
The source chart compares tensile strength across infill levels and material/pattern combinations.



SUPPORTING WORK · SHEET-METAL PRODUCT DEVELOPMENT

Health Kiosk

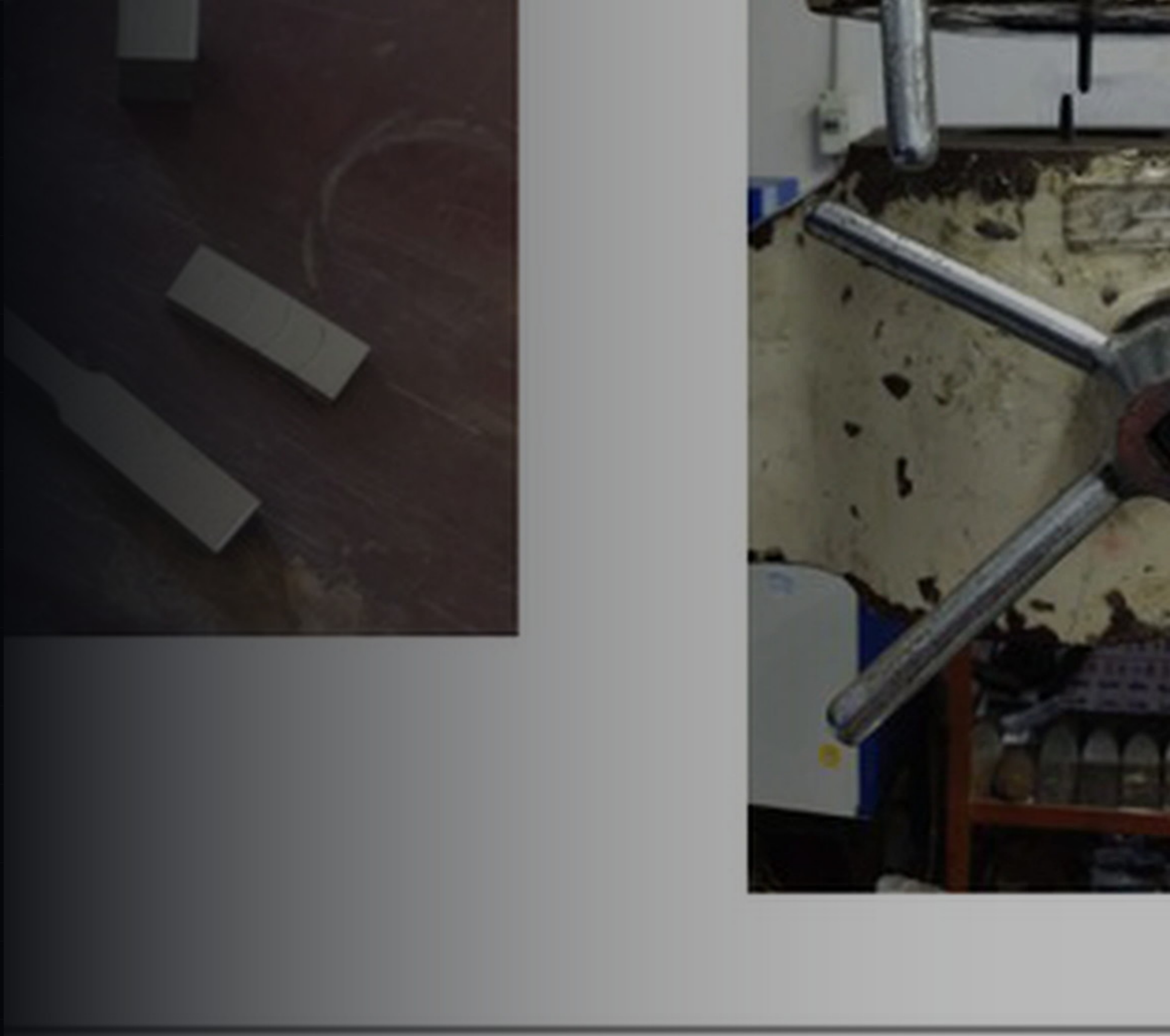
Product-development work spanning enclosure and sheet-metal manufacturing exposure.



SUPPORTING WORK · DMLS

Metal Additive Manufacturing

Metal additive-manufacturing exposure including dogbone specimens and tensile-testing work.



SUPPORTING WORK · SLA

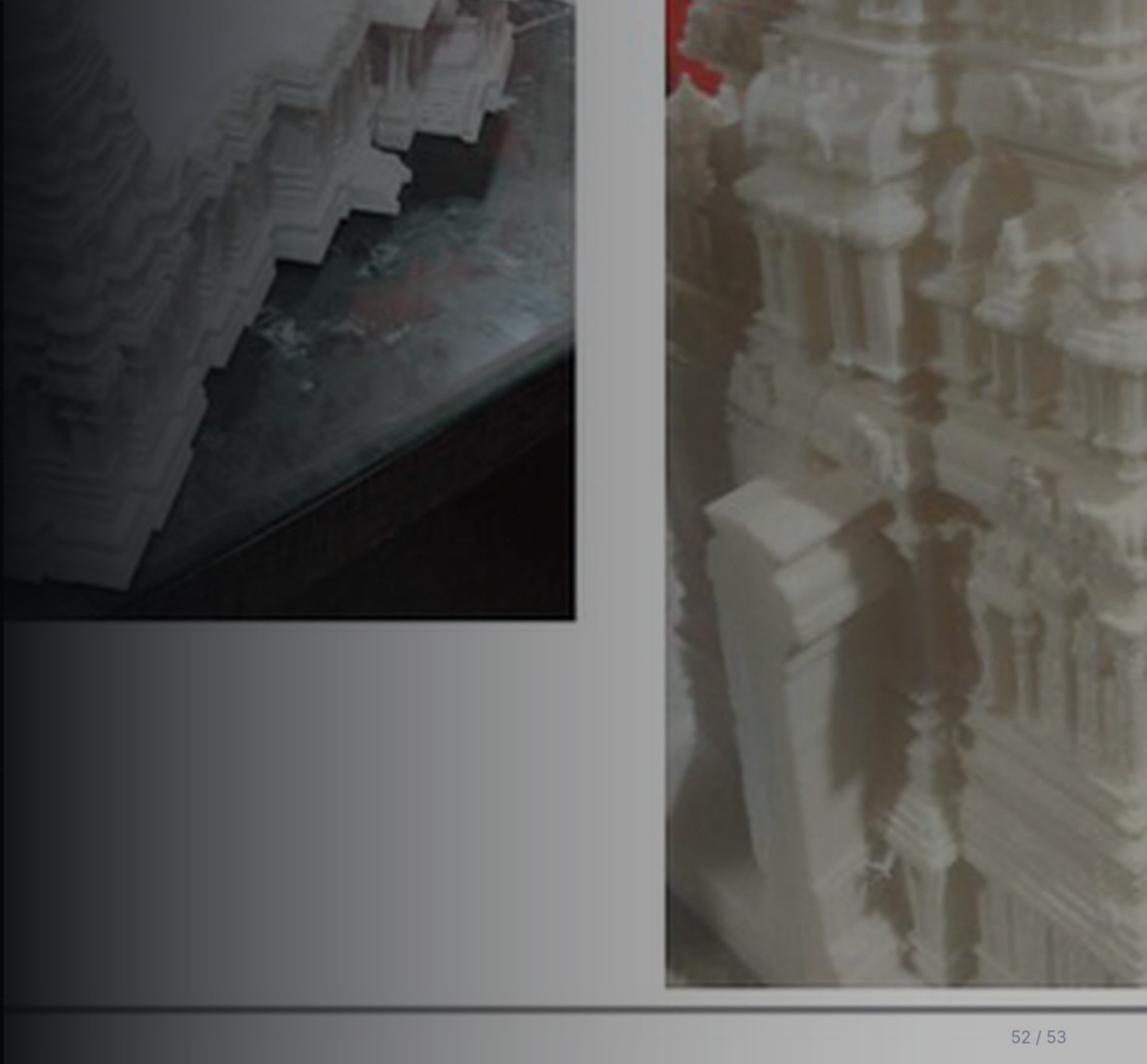
Jewelry Prototype

SLA prototype-build exposure across small, detailed geometries.

SUPPORTING WORK

Large-Format Additive Model

Large-format 3D-printed presentation-model work.



CONTACT

Let's build something useful.

Mechanical product design, prototyping, simulation, and manufacturing execution.

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