Ben DiBuono

Mechanical Engineering Student · Dalhousie University

Engineering Design Portfolio

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ABOUT

The Engineer

EDUCATION

BEng, Mechanical Engineering
Dalhousie University
Expected 2028 · 3rd Year

CAREER FOCUS

Motorsport Engineering
Aerodynamics · Performance · Simulation

EXPERIENCE

2 Engineering Co-ops
Product Development · 8 months
Supply Chain Solutions · 4 months

Profile

Mechanical engineering student with hands-on experience across the full product development lifecycle: CAD modelling, prototyping and testing, data analysis, workflow automation, and AI-driven process improvement. My work has reached retail shelves, automated workflows for a global team, and supported real engineering decisions backed by data.

I approach every problem with an engineering mindset, structured, analytical, and focused on the most efficient path from problem to result. Long-term, I am working toward motorsport engineering with a focus on aerodynamics, drawn to environments where precision and performance are the baseline.

Technical Skills

- SolidWorks / CAD Design
- 3D Printing & Prototyping
- Product Testing & Benchmarking
- Engineering Drawings (GD&T)
- Data Analysis & Power BI
- Power Automate Workflows
- Microsoft Copilot Studio (AI)
- Technical Documentation

Product Engineering & Development

Full-lifecycle product work spanning physical prototyping, custom test rig design, fluid-dynamics redesign, and commercial product analysis — much of it tied to projected retail revenue.

1

PRODUCT ENGINEERING

Hitch Basket Tote Bins — Volumetric Mock-ups

Physical prototyping • SolidWorks • Dimensional verification

$695K

PROJECTED ANNUAL RETAIL SALES (COMBINED SIZES)

CHALLENGE

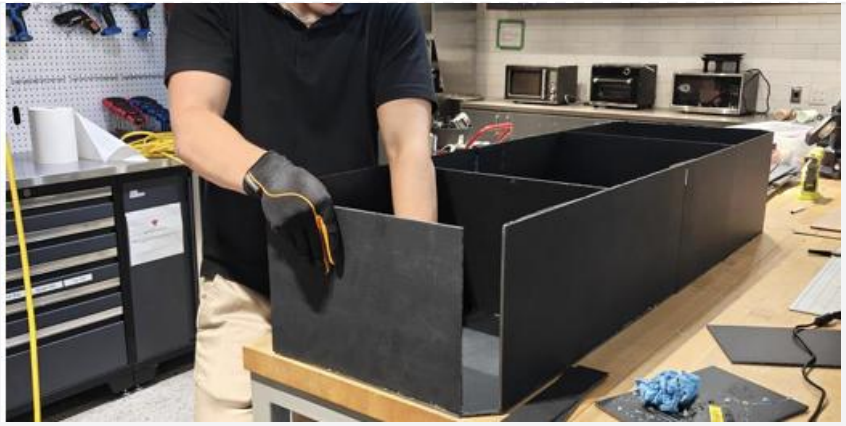
Buyers needed an accurate, tangible size reference for two hitch-basket tote products before committing to a direction.

ACTION

Verified tote dimensions against SolidWorks models, planned the required foam-core panel layouts, then sourced, measured, cut, and assembled full-scale mock-ups for each tote size. Each build was produced to match the hitch-basket geometry closely enough for buyers to evaluate size, fit, and visual proportion before committing to a direction.

RESULT

Buyers made a confident, informed sizing decision with zero ambiguity, accelerating sign-off on the product direction.



PRODUCT ENGINEERING

Hitch Basket Tote Bins — 3D-Printed Scale Models

SolidWorks • 3D printing • Assembly tolerancing

$695K

PROJECTED ANNUAL RETAIL SALES (COMBINED SIZES)

CHALLENGE

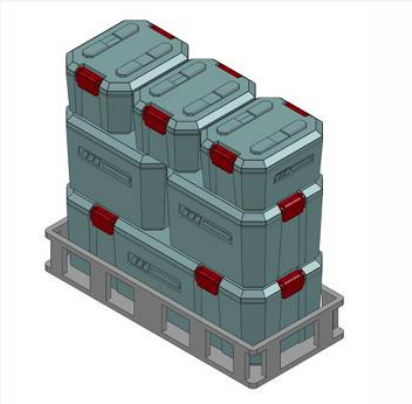
The team needed to visualise tote proportions and fit on a model vehicle before investing in full-scale tooling.

ACTION

Reworked supplied CAD from the design team so the tote assemblies could scale cleanly for a model vehicle, remodeling the lid clasp, adjusting faces for print tolerances, and realigning top and bottom notches to preserve stackability. Printed the models at 1/8 scale to communicate mounted fit, proportion, and basket interaction before full-scale production planning.

RESULT

Delivered accurate scale models that clearly communicated fit and proportion, de-risking the move into production planning.



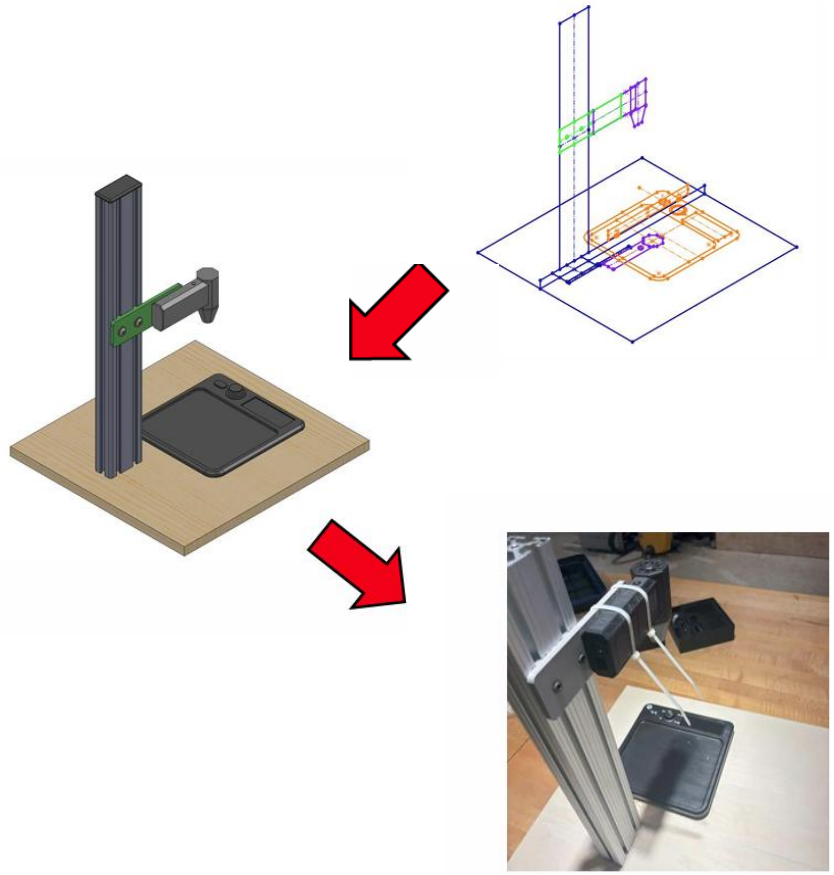
PRODUCT ENGINEERING

Compact Detail Blowers — Testing & Benchmarking

Custom test rig • SolidWorks • Data collection

$120K

PROJECTED ANNUAL RETAIL SALES



CHALLENGE

Several competing mini-turbofan blowers had to be evaluated fairly to choose the best option to sell under our brand.

ACTION

Designed and fabricated a custom SolidWorks test rig so each mini-turbofan could be evaluated under identical conditions. Planned the test process in advance, ran multiple trials for each data point, and averaged results to reduce outlier influence, producing a reliable comparison of performance, quality, and value.

RESULT

Generated a clean, defensible dataset that became the empirical basis for the final product recommendation.

PRODUCT ENGINEERING

Compact Detail Blowers — Engineering Drawings

SolidWorks drafting • GD&T • Assembly documentation

CHALLENGE

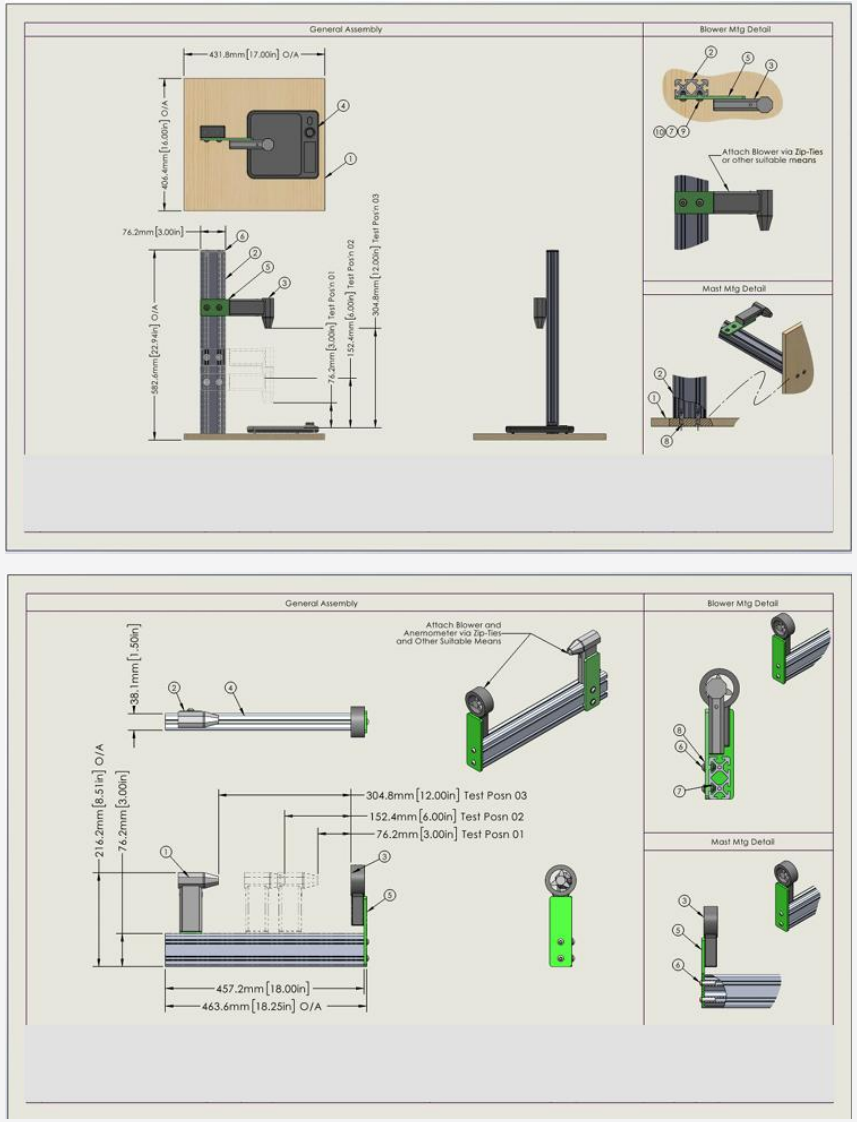
The test-rig design needed complete, professional documentation suitable for reproduction or manufacturing handoff.

ACTION

Produced full engineering drawing sets for both rig configurations, general assembly views, dimensioned component details, and mounting-hardware callouts.

RESULT

Delivered a manufacturing-ready record of the design, demonstrating drafting rigour and command of GD&T conventions.



PRODUCT ENGINEERING

Compact Detail Blowers — Analysis & Recommendation

Data synthesis • Technical presentation • Decision support

CHALLENGE

An extensive test dataset had to be distilled into a clear, defensible recommendation leadership could act on.

ACTION

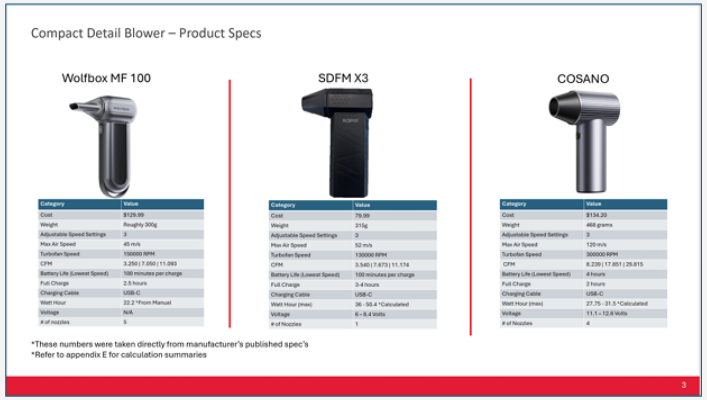
Condensed a large multi-source test dataset into a clear recommendation deck, drawing conclusions from performance graphs, product specs, and direct comparison data. Pressure-tested every conclusion against the raw results so the recommendation could be defended under management review and clearly justify the selected blower as the best balance of performance and value.

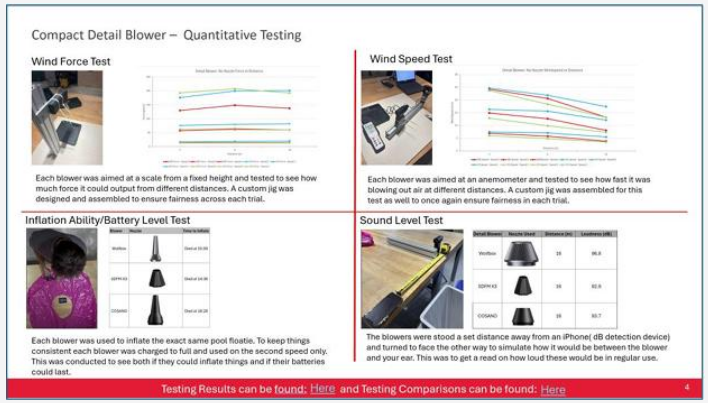
RESULT

Recommendation accepted by management; the selected blower advanced to the next stage of development based on a clear, defensible performance-and-value case.

$120K

PROJECTED ANNUAL RETAIL SALES

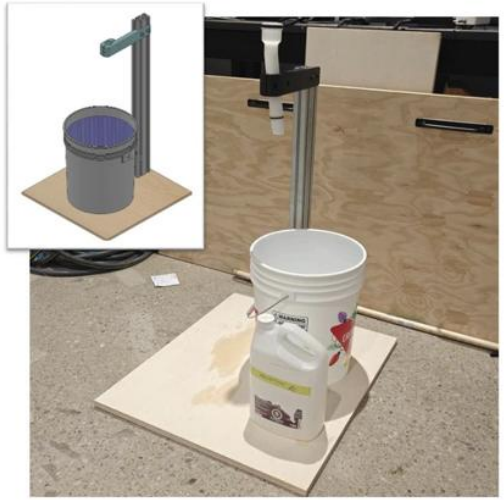




PRODUCT ENGINEERING

Washer Fluid Bottle — Fluid-Dynamics Redesign

Fluid dynamics • Ethnographic research • Consumer analysis



CHALLENGE

Washer-fluid bottles suffer a “glugging” effect caused by restricted airflow, often leading to spillage during refills. The redesign focused on improving ergonomics and fluid flow while staying within existing manufacturing cost constraints.

ACTION

Ran comparative pour testing between the existing bottle and proposed redesign to validate the fluid-dynamics improvement. In parallel, conducted ethnographic research and a consumer survey to confirm whether the issue was a meaningful user pain point and whether customers valued the improved experience.

RESULT

Physical testing confirmed the redesign eliminated glugging and delivered a smoother pour. Consumer research showed users were unlikely to pay a premium for the improvement, an equally valuable finding that guided the commercial decision.

DATA ANALYSIS

Washer Fluid — Market & Sales Data Analysis

Power BI • Sales analytics • SKU-level insights

CHALLENGE

The team needed to know which fluid variants dominated Canadian sales, and how seasonality drove buying, to target the redesign.

ACTION

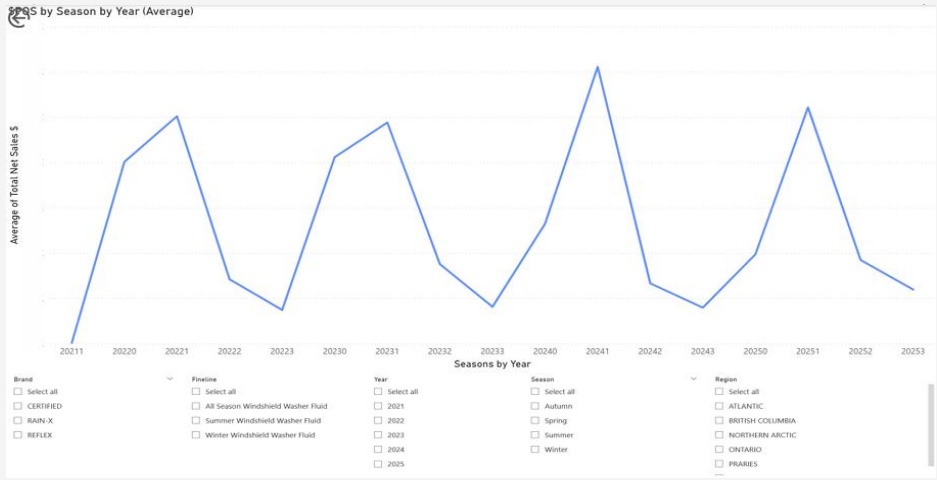
Cross-referenced multi-year seasonal, regional, and SKU-level sales data in Power BI to determine which washer-fluid variants dominated Canadian sales. Visualized trends across winter, summer, and all-season products to identify the highest-volume targets for a potential bottle redesign.

RESULT

Found that nearly half of consumers buy winter fluid year-round, giving the team a data-backed reason to target the redesign toward the highest-volume SKUs.

~50%

OF CONSUMERS BUY WINTER FLUID YEAR-ROUND (KEY INSIGHT)



QUALITY ASSURANCE

Sherwood Mini Sticks — QA & Packaging Rework

Root cause analysis • Process documentation • QA

CHALLENGE

A mini-hockey-stick product failed to stay sealed in-bag when displayed vertically on shelves. Analysis isolated the issue to the bottom seal rather than the packaging material or structure, allowing for a targeted fix without major design changes.

ACTION

Sourced an affordable chip resealer available through store channels, resealed multiple mini-stick bags, and validated the fix through repeated shake testing. Once the method proved reliable, produced a step-by-step instructional video for employees and distributors to ensure consistent application.

RESULT

Fix adopted across employees and distributors; the documented method allowed anyone to reproduce the repair consistently, even without prior packaging knowledge.

PRODUCT ANALYSIS

Tech Packs — Market Research & Product Analysis

Competitive benchmarking • Cost modelling • Documentation

CHALLENGE

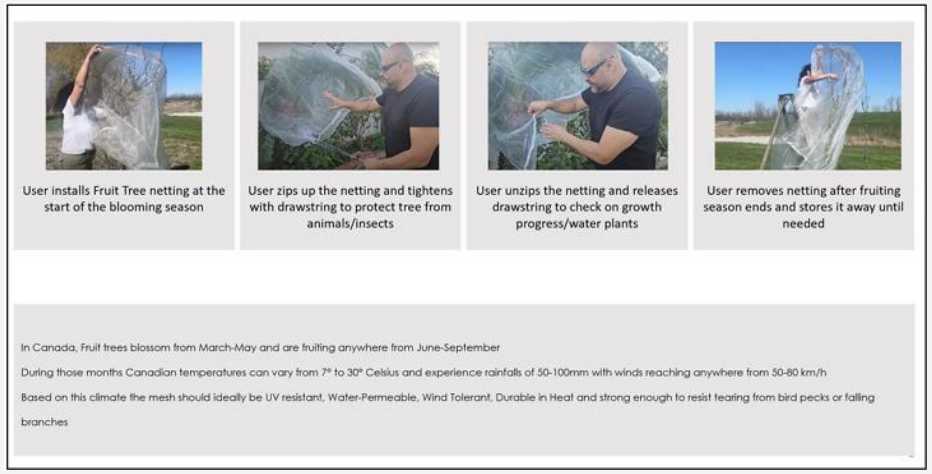
Product proposals needed rigorous backing, life-cycle evaluation, competitor pricing, and viability analysis across multiple categories.

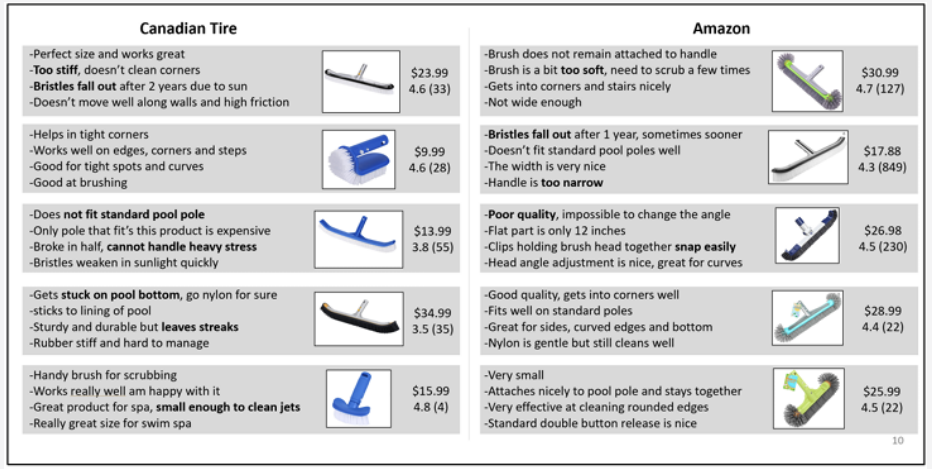
ACTION

Benchmarked internal assortment against competitor listings, customer feedback, pricing, feature gaps, and projected sales volume across multiple product categories. Structured the findings into detailed tech packs covering life-cycle evaluation, cost projections, market viability, and product recommendation logic.

RESULT

Produced data-backed product recommendations with significant revenue potential, combining competitive benchmarking, customer insight, and commercial analysis into clear proposal support.





PRODUCT ENGINEERING

Oil Drain Pan — Custom Bonding Fixture

SolidWorks • Electronics • 3D printing • Fabrication

$1.2M+

PROJECTED ANNUAL RETAIL SALES (10L + 15L)

CHALLENGE

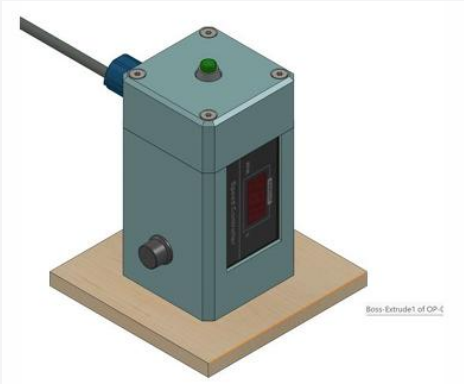
A manufacturer needed a way to apply adhesive evenly to an insert, requiring a compact, variable-speed device engineered to fit the insert geometry.

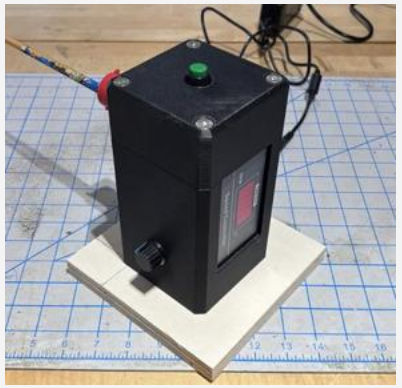
ACTION

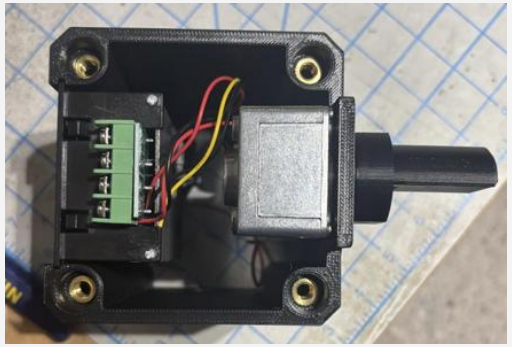
Sourced all electrical and mechanical components, measured and modelled each part in SolidWorks, then combined them into a compact assembly built around the insert geometry. Designed and printed a minimal-footprint enclosure, soldered the wiring, and assembled and tested the variable-speed fixture for adhesive application.

RESULT

Integrated into the manufacturer's production process; 36-hour inverted leak testing confirmed zero leakage, validating both the adhesive method and fixture performance. The full project was completed in roughly 7 hours from initial request to shipment.







DESIGN & FABRICATION

Office Storage Unit — Design & Build

Carpentry • Fabrication • Workspace design

CHALLENGE

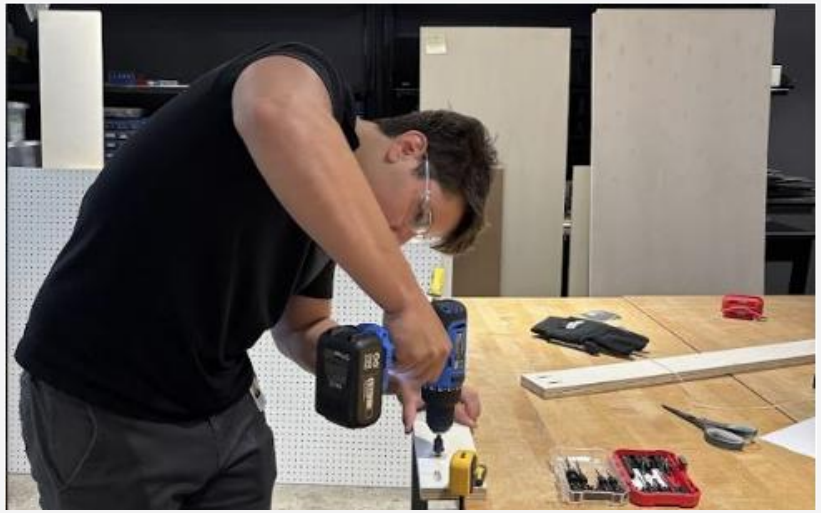
An office needed a storage unit that could hold tools over 8 ft tall while looking clean enough to double as a display piece.

ACTION

Built the 8 ft cabinet from wood using pocket-hole joinery, edge banding, and frame-first assembly to maintain level floors and perpendicular walls. Finished the unit with pegboards and caster wheels so it could function as both tool storage and a clean office display piece.

RESULT

Installed and adopted as a functional storage solution, improving office organization while maintaining a polished appearance suitable for a visible workspace.



Systems, Automation & AI

Workflow automation, knowledge-management systems, and a custom AI agent built to eliminate manual effort and accelerate decision-making across a global product development team.

2

AUTOMATION & ANALYTICS

Vendor Capability Intake System

Power Automate • Power BI • Excel • Process automation

CHALLENGE

At the AVP's request, the global PD team needed a faster way to collect, store, and query supplier capability data when scoping new product categories.

ACTION

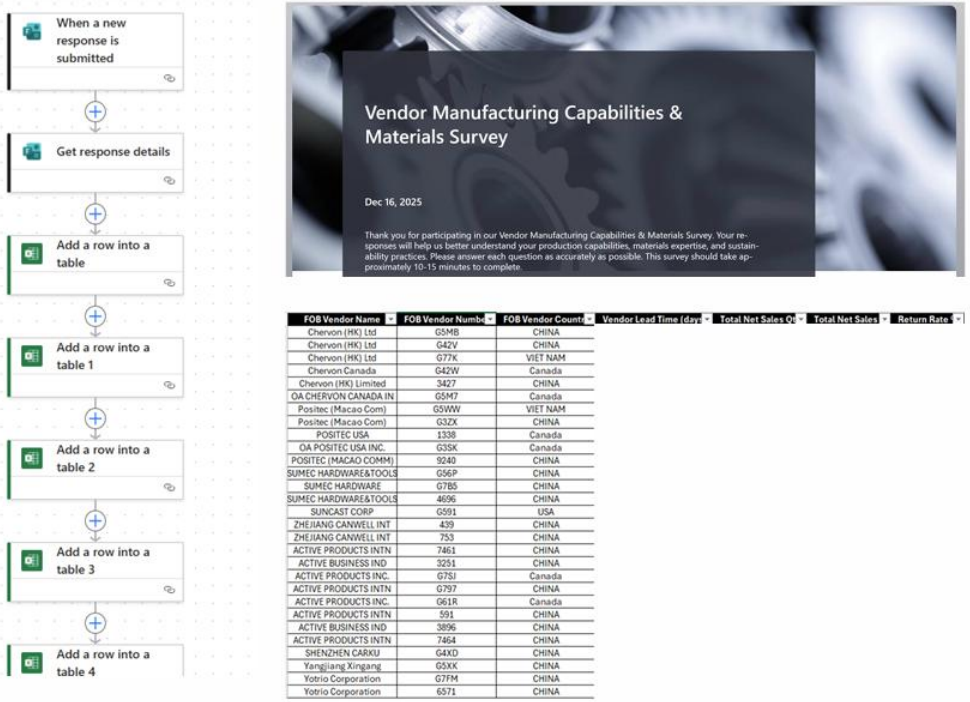
Consulted multiple team managers and the AVP to define the required vendor fields, including factory details, manufacturing materials and methods, and sustainability certifications. Built a vendor-facing intake form, engineered a Power Automate flow to pipe submissions into a structured Excel database, and developed an interactive Power BI dashboard to surface supplier capabilities for cross-functional use.

RESULT

Automated the collection-to-insight pipeline, accelerating vendor onboarding and sourcing decisions across the global PD team while saving an estimated 60 hours per week in manual effort.

~60 hrs

ESTIMATED TIME SAVED PER WEEK, GLOBAL PD TEAM



KNOWLEDGE MANAGEMENT

Product Development Wiki — Knowledge Base

Documentation • Information architecture • Content creation

CHALLENGE

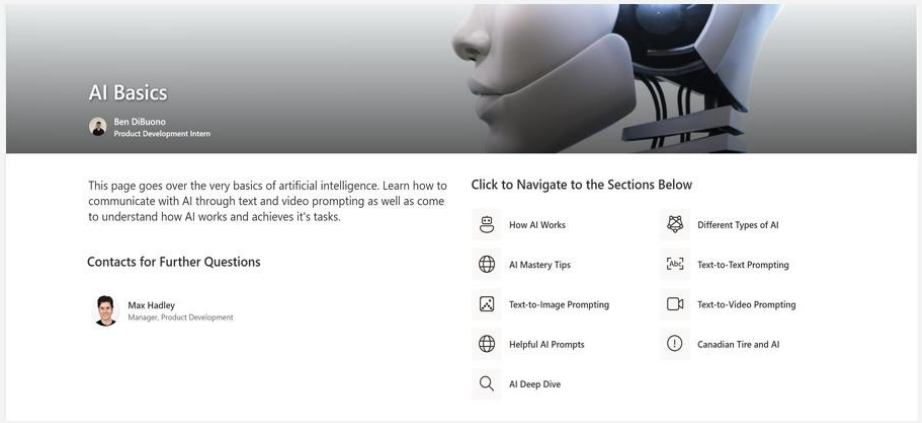
The team's central wiki was underused and hard to navigate, costing time in repeat questions and lost information.

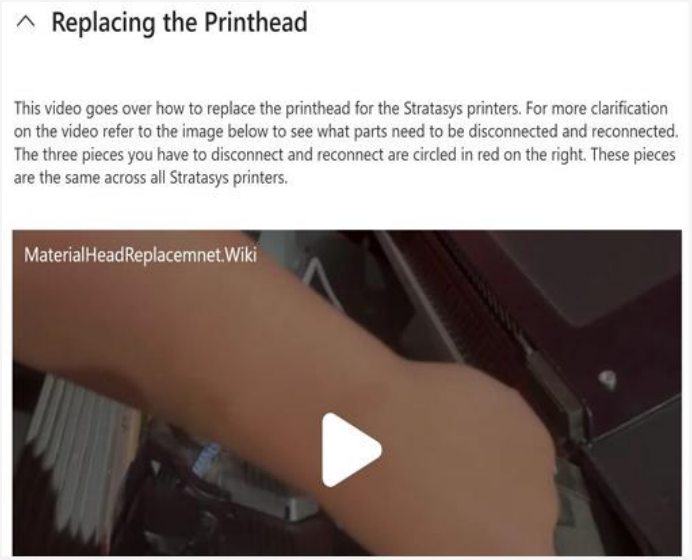
ACTION

Authored detailed new wiki pages including AI Basics, 3D-printer calibration, and AI-tool guides, while restructuring older resources to improve discoverability. Edited long meeting recordings into usable segments, organized share-outs, and uploaded content in a format that made technical knowledge easier for the team to find and reuse.

RESULT

Turned the wiki into a more practical and widely used knowledge base, reducing repeat questions and making internal technical information easier to access across the team.





AI DEVELOPMENT

AI Wiki Agent — Microsoft Copilot Studio

Copilot Studio • SharePoint • Prompt engineering

CHALLENGE

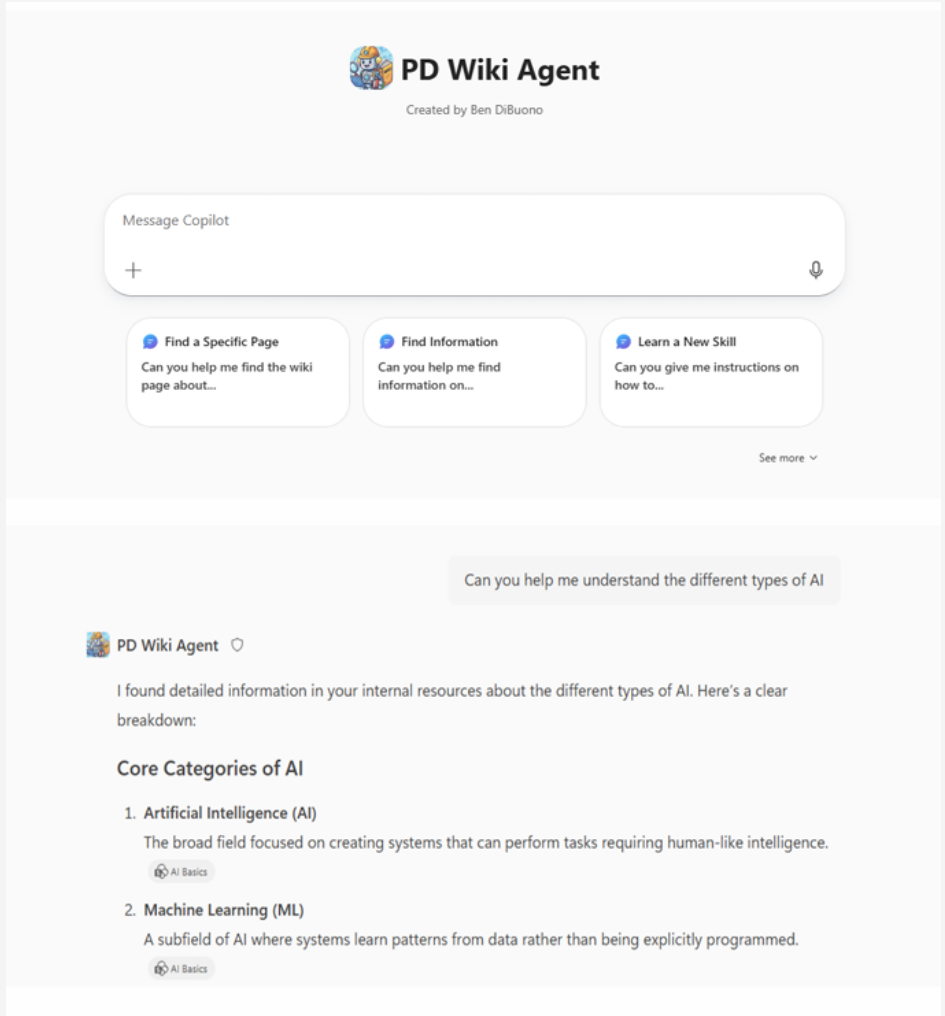
Even an improved wiki still required manual searching, an opportunity to let an AI agent retrieve and navigate it for users.

ACTION

Trained a custom Copilot agent on the SharePoint knowledge base, using an existing Learning Coach template as the foundation before customizing its instructional logic for accurate retrieval. Released a beta version to a controlled user group, then iterated through multiple design cycles based on feedback, refining prompts and improving response accuracy.

RESULT

Adopted across multiple workflows, giving the team faster access to shared wiki content and demonstrating measurable productivity gains from practical AI integration.



COMMUNICATION

Company Town Hall — Technical Presentation

Public speaking • Live demonstration • Stakeholder buy-in

83

TEAM MEMBERS REACHED IN ONE SESSION

CHALLENGE

The team needed a concise way to communicate recent wiki and AI-agent improvements, drive adoption, and align users on the next phase of development.

ACTION

Delivered a six-minute town hall presentation to 83 team members, including approximately 55 in person, using live demonstrations of both the wiki and AI agent to show workflow improvements in real time. Prepared through multiple rehearsals to keep the presentation clear, technically accurate, and tightly timed.

RESULT

Generated strong engagement and positive feedback, with team members expressing interest in contributing new wiki pages and using the AI agent to improve their own workflows.

CAD & 3D Modelling

Precision CAD work from concept to printed part — custom fixtures, scaled assemblies, material-reference systems, and a gallery demonstrating range across surfacing, multi-body parts, and assemblies.

CAD & 3D PRINTING

3D-Modelled Trophies — Concept to Print

10+

CUSTOM TROPHIES DESIGNED & DELIVERED

SolidWorks • Bambu 3D printing • Design for manufacture

CHALLENGE

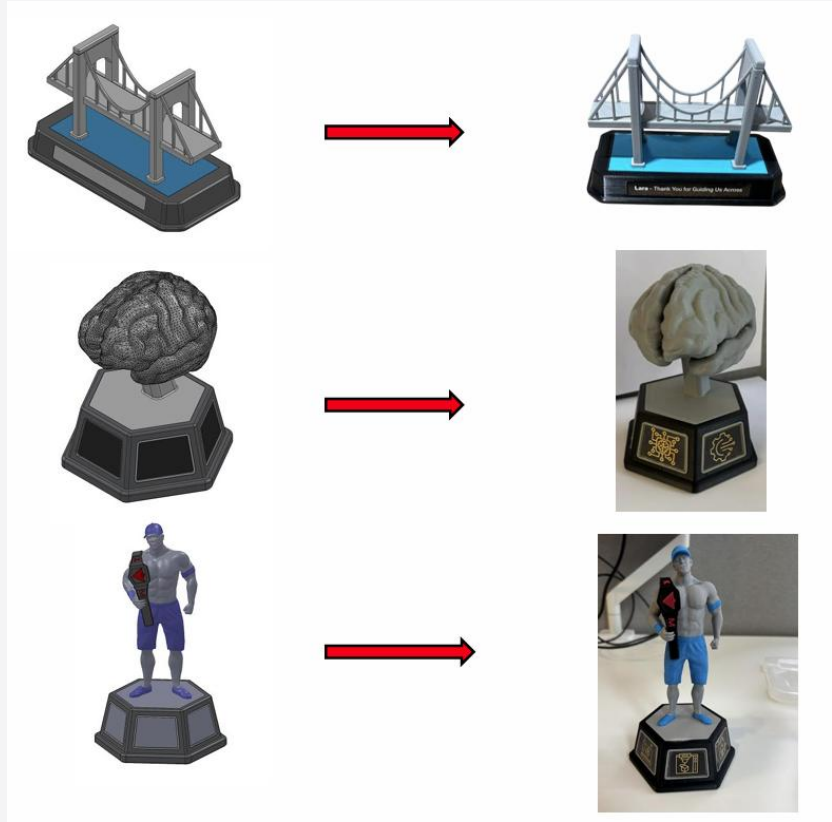
Creative trophy concepts had to become precise, print-ready models that captured intent while meeting manufacturability limits.

ACTION

Ran a structured workflow, sourcing or building the featured 3D element, printing components, producing and laminating decals, and assembling each piece to a polished standard.

RESULT

Delivered a high volume of custom trophies, each receiving positive feedback, proof that precision CAD translates directly into quality physical output.



DESIGN & FABRICATION

Stratasys F770 — Build Sheet Storage Shelf

SolidWorks • Fabrication • Workspace optimisation

CHALLENGE

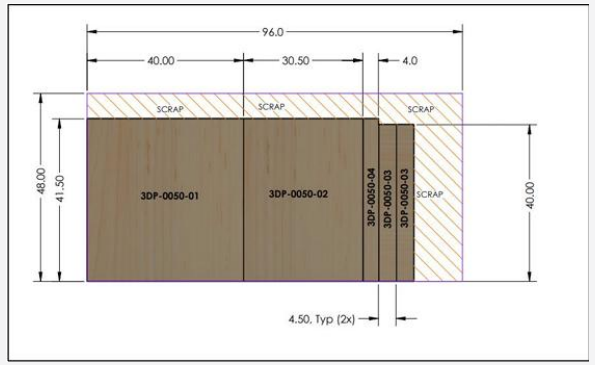
Large F770 build sheets were stacked ad-hoc on a cabinet, inefficient and a constant source of workflow friction.

ACTION

Compiled design options, modelled the shelf to scale in SolidWorks with a detailed cut sheet, then sourced, cut, and assembled the final unit to fit the printer's footprint.

RESULT

Shelf fit precisely inside the F770 and worked exactly as intended, earning positive feedback from every user of the 3D-printing room.



CAD CAPABILITY

SolidWorks CAD Sample Gallery

Surface modelling • Multi-body parts • Assembly design

CHALLENGE

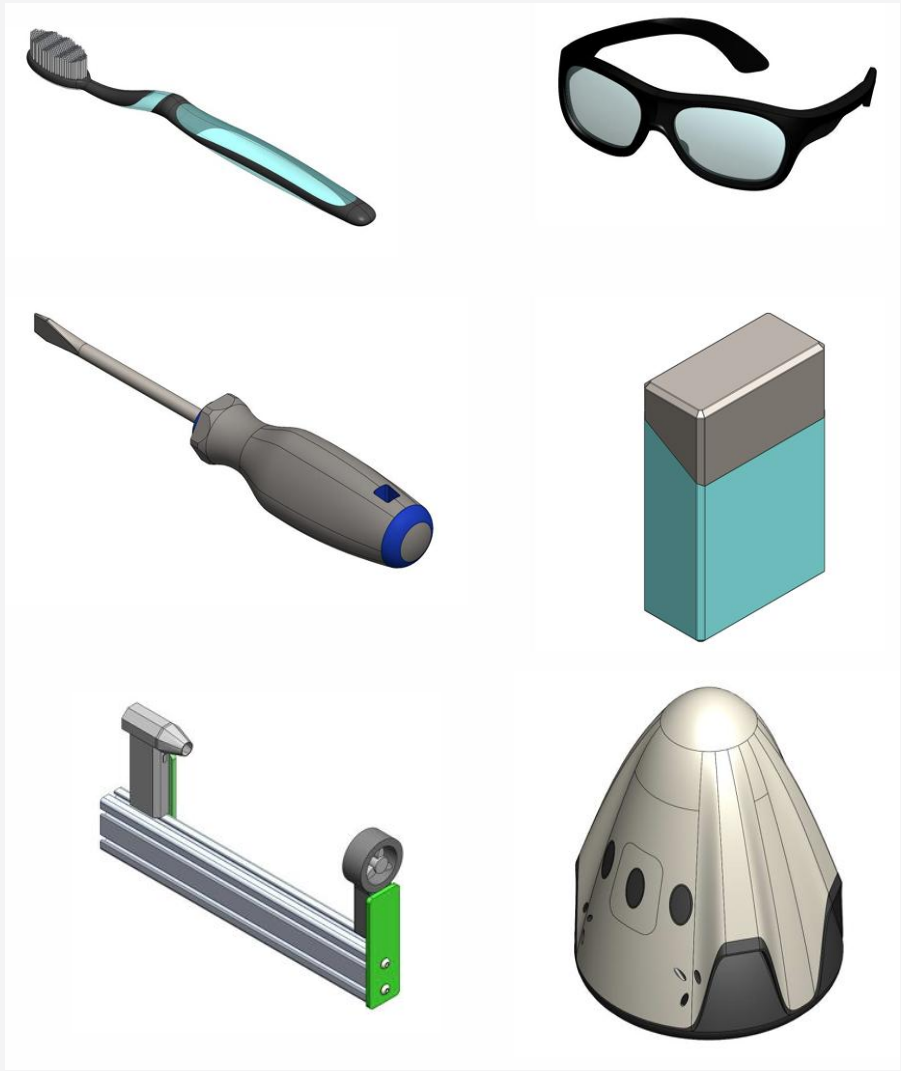
Demonstrate CAD range across consumer products, hardware, and complex geometry beyond any single project.

ACTION

Modelled a set of standalone parts targeting specific techniques organic surfacing, lofted features, part configurations, and assembly constraints.

RESULT

Built a portfolio of work showing a growing command of SolidWorks across challenges from simple mechanical parts to complex product forms.



3D PRINTING OPERATIONS

Filament Colour & Profile Library

Bambu Studio • Print-profile optimisation • Materials

CHALLENGE

Colleagues repeatedly needed help choosing filament colours and print-quality settings for their jobs.

ACTION

Designed a low-material benchy-holder display to show available filament colours across both high-fidelity and high-speed print profiles. Used the build process to fine-tune Bambu print settings and resolve defects such as stringing and adhesion issues, improving profile reliability for future jobs.

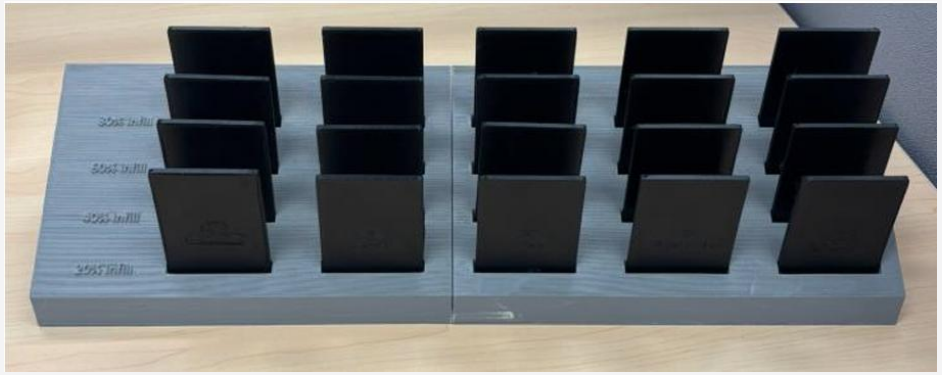
RESULT

Gave coworkers a hands-on reference for colour and profile selection, improving print decisions while reducing failed prints and rework.

3D PRINTING OPERATIONS

TPU Card Library — Flexible-Material Reference

Bambu Studio • Materials research • Custom housing



CHALLENGE

With flexible TPU becoming available for the Bambu AMS system, the team needed a practical way to compare rubber-like material behavior before selecting it for prototypes.

ACTION

Researched Bambu infill patterns to balance pliability and shape retention, then printed TPU samples from 20% to 80% density. Designed a compact 20-card SolidWorks housing so users could compare flexibility side-by-side without removing the samples.

RESULT

Enabled quick, tactile TPU selection for prototype applications, helping the team integrate flexible materials into future 3D-printed parts with less trial and error.

PRODUCT RESEARCH

Gridfinity System — Commercialisation Research

3D printing • Market research • Viability assessment

CHALLENGE

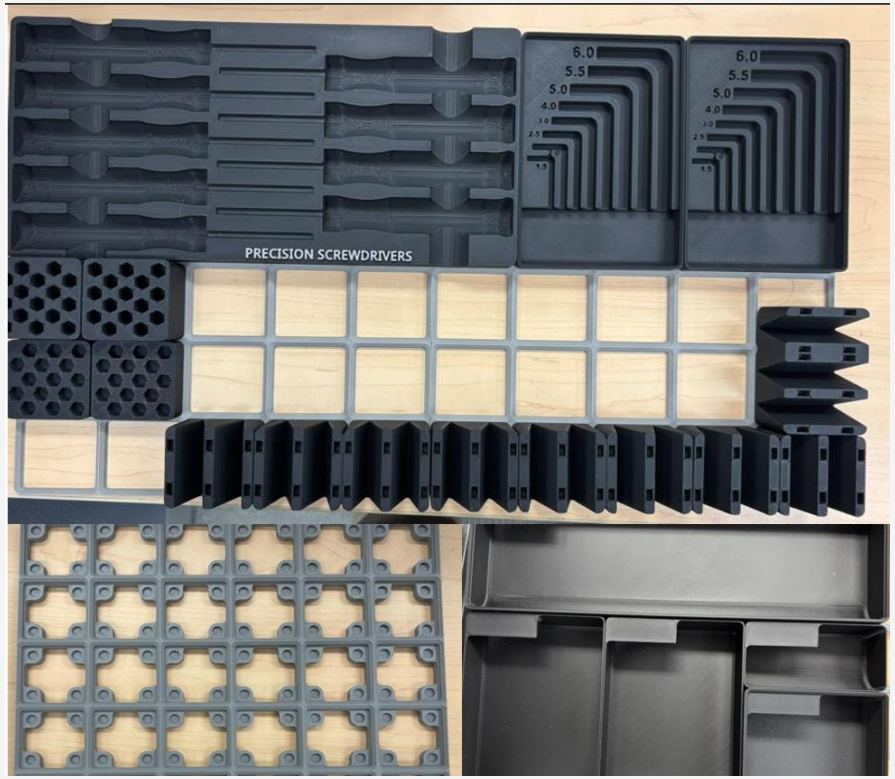
Evaluate whether Gridfinity, a modular grid-based organiser popular in the 3D-printing community. was viable to sell with pre-designed tool bins.

ACTION

Sourced and tested magnetic and snap-fit variants, researched the best-selling screwdriver sets, and sourced compatible bin files to demonstrate the system with relevant tools.

RESULT

Gave the team a clear read on commercial potential, the existing file ecosystem, and positioning alongside core product lines.



Community & Applied Engineering

Engineering with direct human impact — an accessible therapeutic device built with a children's hospital, and community fundraising that turns surplus product into youth sport access.

4

ACCESSIBILITY ENGINEERING

Project Liberi — Accessible Therapeutic Bike

SolidWorks • Electronics • iOS integration • Accessibility

CHALLENGE

Build an interactive bike-powered game for children with cerebral palsy, accessible for limited mobility and cheap enough for clinics and families. Partnered with Bloorview Children's Hospital.

ACTION

Solved iOS connectivity with a music-based signalling interface (each pedal stroke a note, cadence driving in-game speed, no Bluetooth needed), then re-engineered the bike for mounting: lowered seat, expanded adjustability, planned rotating seat and support bars.

RESULT

Built and tested a working prototype with Bloorview staff that validated the approach and demonstrated the therapeutic gameplay; next steps move toward production sourcing.

COMMUNITY IMPACT

Engineers for Jumpstart — Sample Sale Events

Event coordination • Community fundraising

$1000s

RAISED ANNUALLY FOR YOUTH SPORT ACCESS

CHALLENGE

Surplus product-review samples were going to waste, a chance to convert them into funding for youth sport access.

ACTION

Packed and organised samples at the company's mock store, priced and merchandised them, promoted the sale across company channels, and ran on-site logistics during each event.

RESULT

Sample sales raise thousands of dollars annually for Canadian Tire Jumpstart Charities, directly funding sport access for Canadian kids.

Let's build something fast.

Thank you for reviewing my work.

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