



Vehicle Design Project: Project 2 Report

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MECH 200 — PROJECT 2 REPORT

Problem Structure

The problem structure diagram below identifies and organizes the various problems, constraints, and requirements associated with designing a vehicle that can travel 10 meters in a straight line and pass through goal posts 1 meter apart. This structure focuses on the selected roller vehicle, in which the entire body acts as the axle, powered by twisted elastic bands connected to a central wire shaft.

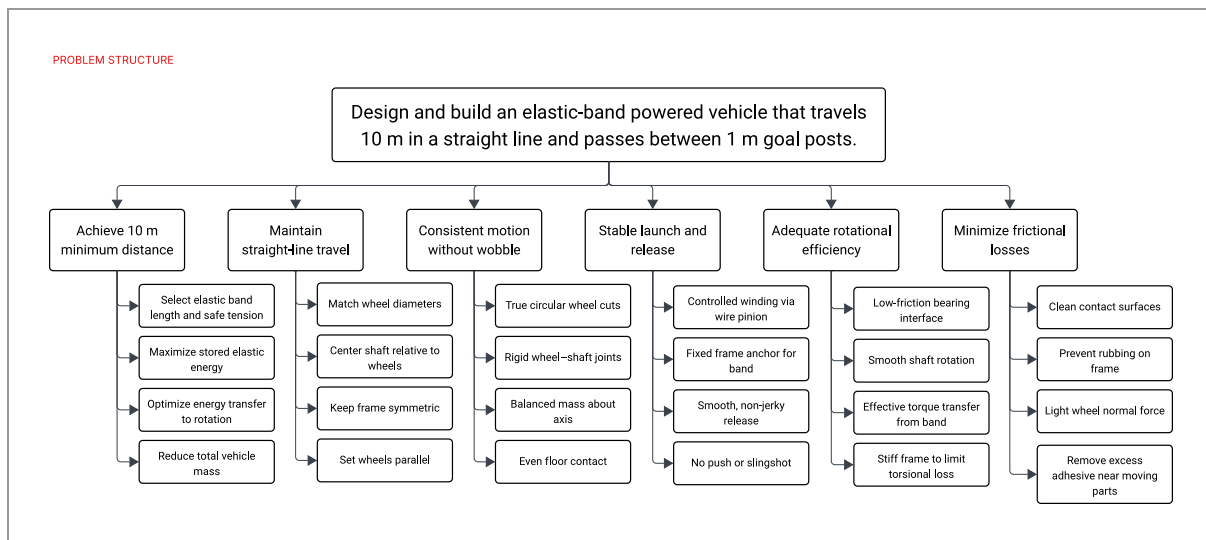


Figure 1.
Problem Structure Diagram Showing ≥ 20 Nodes Representing Propulsion, Structure, Assembly, Performance, and Safety Branches

Objective Tree

The objective tree below breaks the primary design goal into secondary and tertiary objectives to guide development of the roller vehicle.

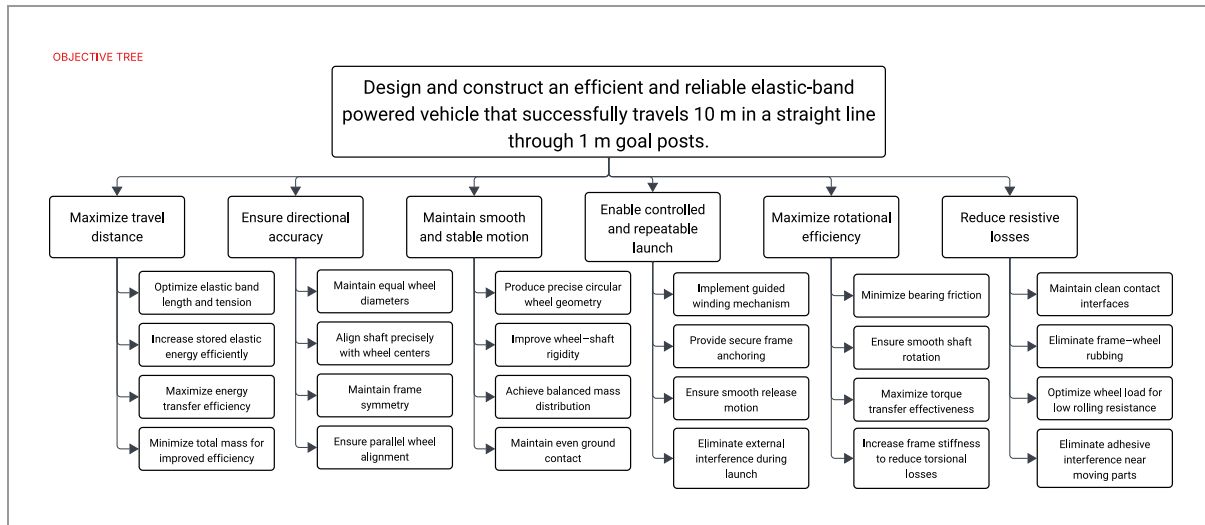


Figure 2.
Objective Tree Showing Primary, Secondary, and Tertiary Levels of Design Objectives

Function Analysis

The function analysis diagram identifies all build-process functions from raw materials to finished vehicle. It uses a materials-flow method rather than energy analysis, representing how each component is transformed into the completed roller system.

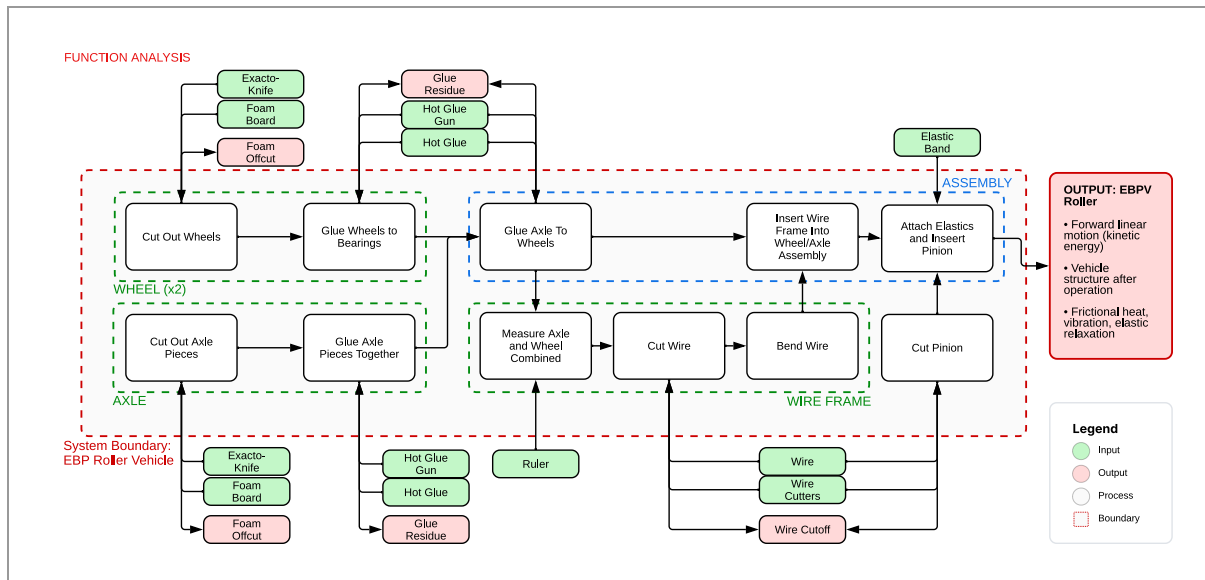


Figure 3.
Function Analysis Diagram Showing Legend, System Boundary, Inputs/Outputs, and ≥ 4 Sub-Functions

Photos of Final Design

The design sketch below documents the Elastic Band Powered Roller vehicle design, showing top, front, and right-side views along with an isometric sketch of the complete assembly. This comprehensive view illustrates frame layout, poster-board discs, central wire shaft, elastic band propulsion system, and overall vehicle configuration.

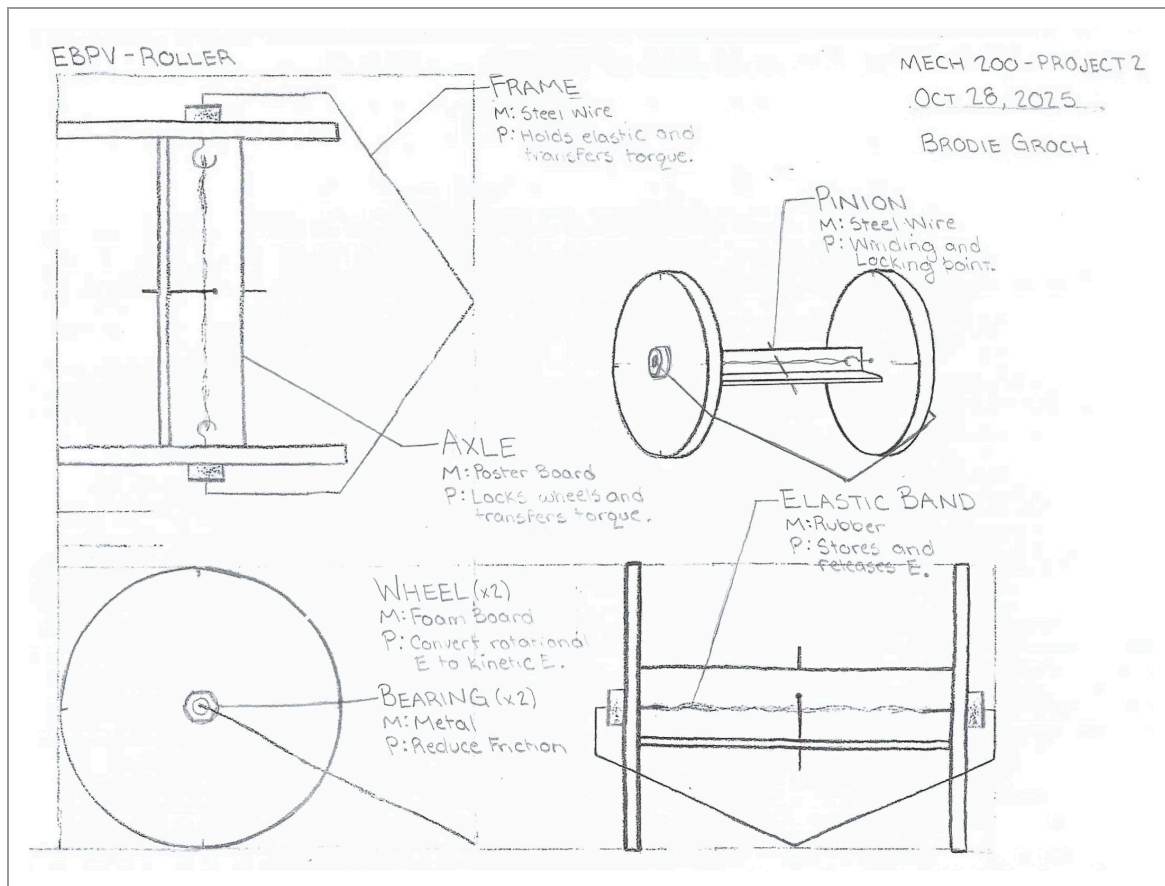
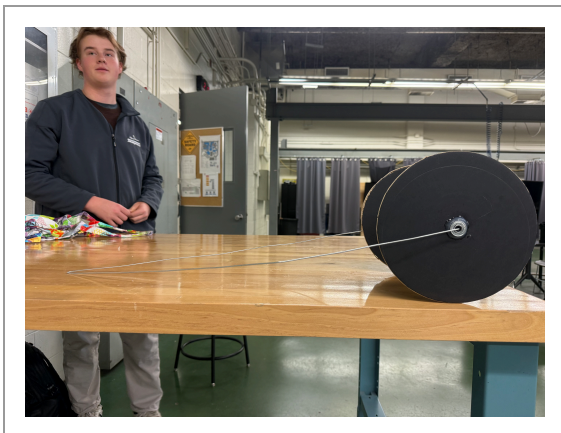
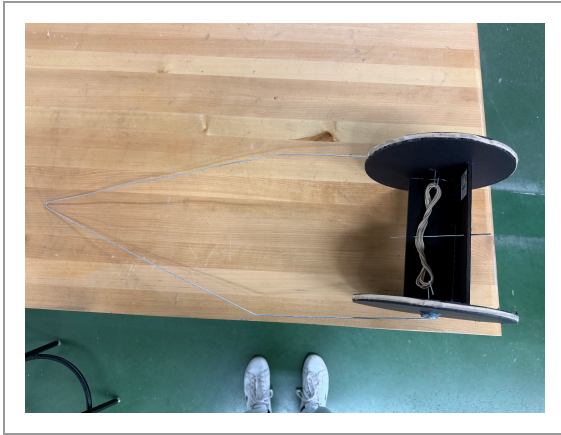


Figure 4.
EBP Roller Design Showing Top, Front, and Right-Side Views With Isometric Sketch

Appendix A: Photographs of Final Prototype

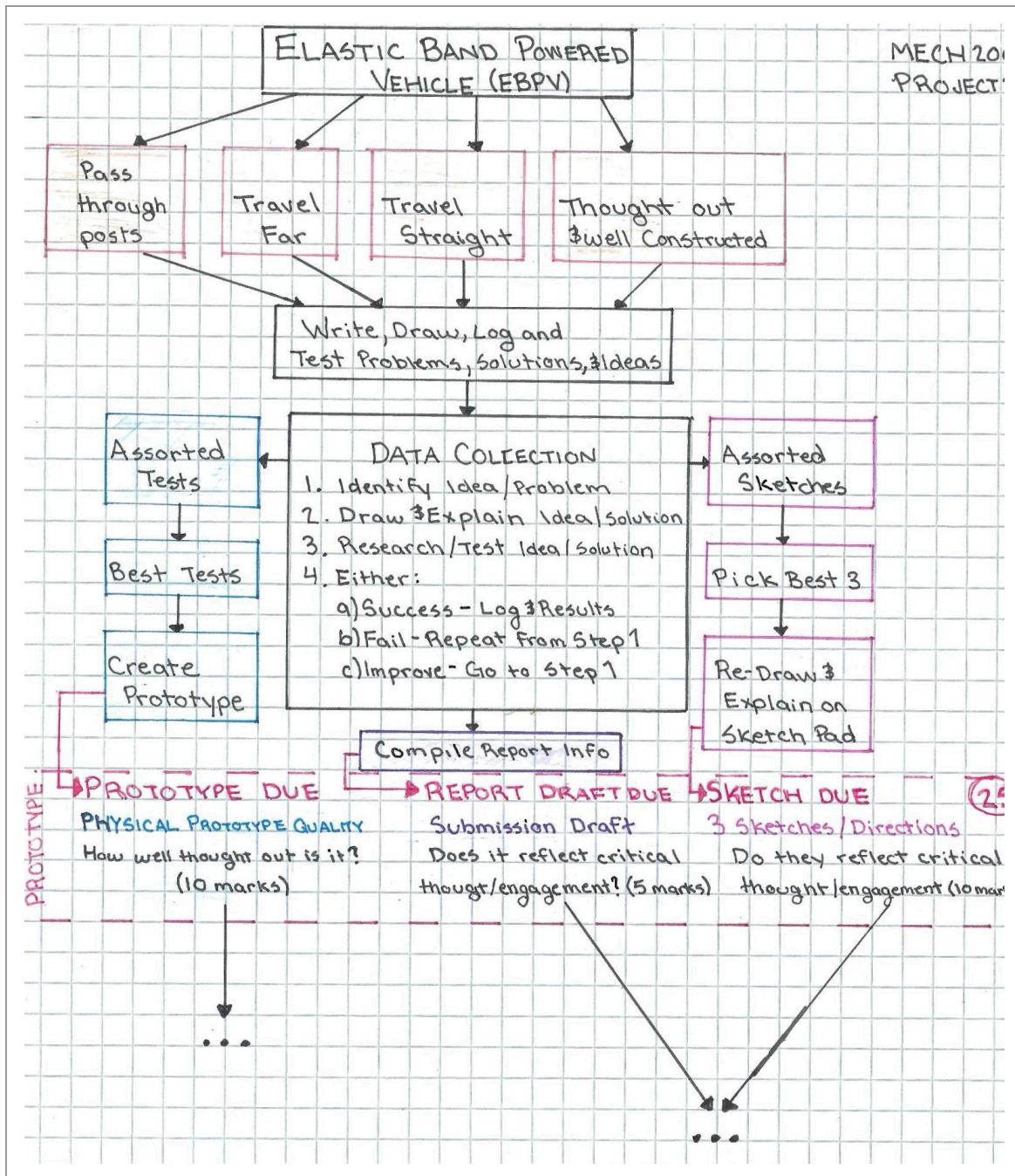
The photographs below document the completed Elastic Band Powered Roller vehicle as built, showing multiple views of the final prototype. These photos provide evidence of the actual constructed vehicle. Prototype constructed by Tye Samoyloff.

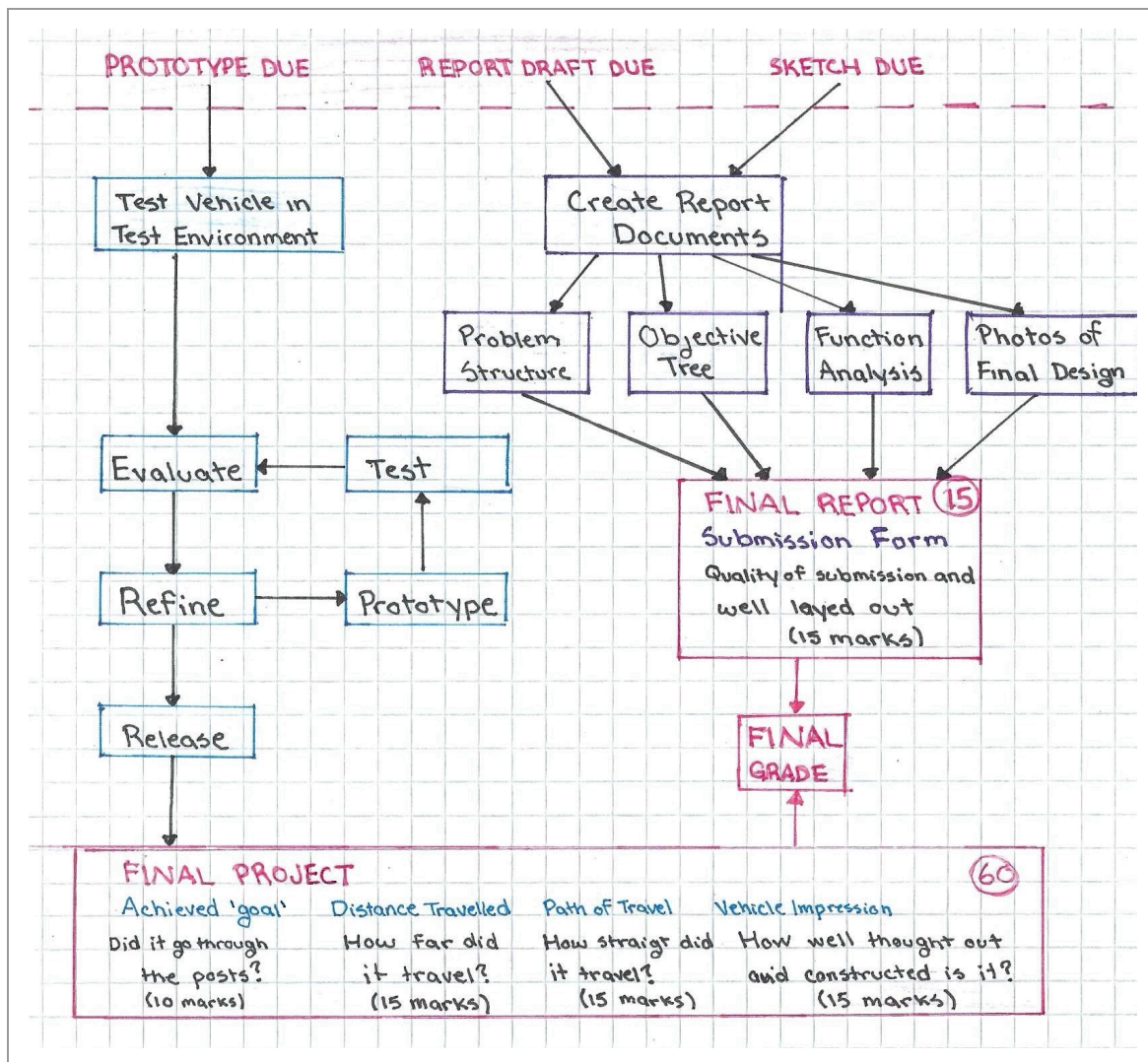


Appendix A. Photographs of the completed EBP Roller prototype showing various views of the final vehicle.

Appendix B: Project Planning

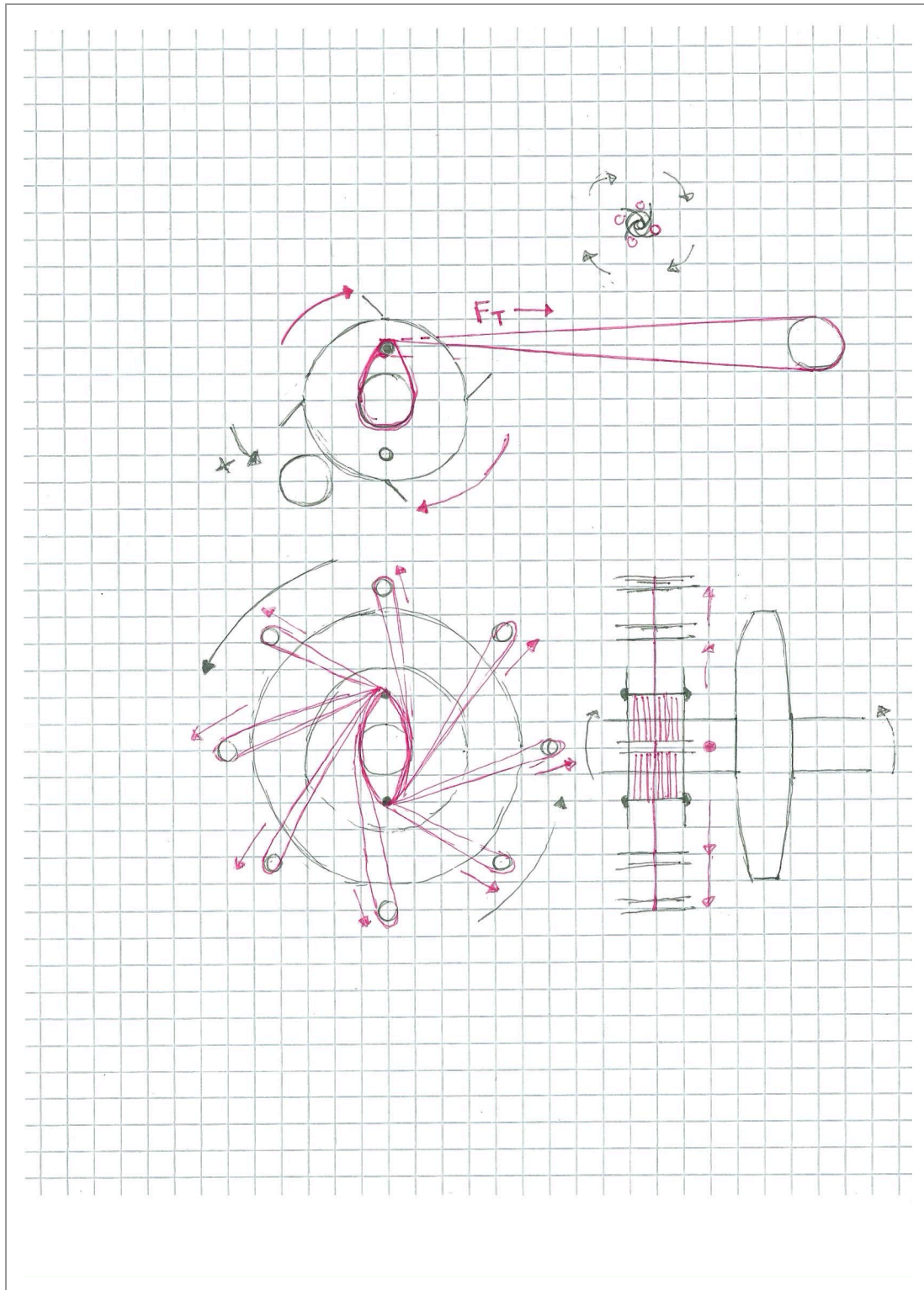
Appendix B-1. Initial project planning and design process

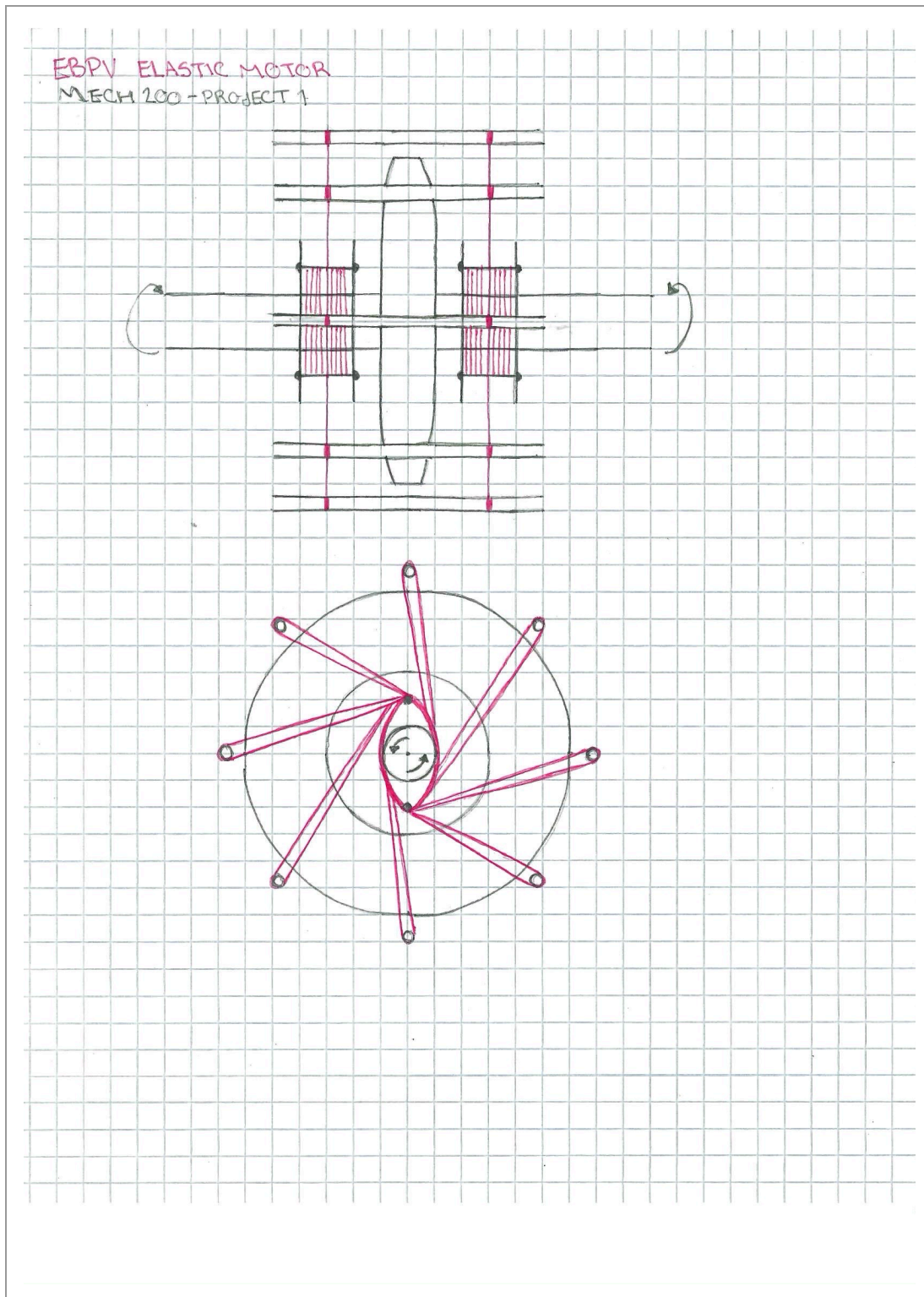


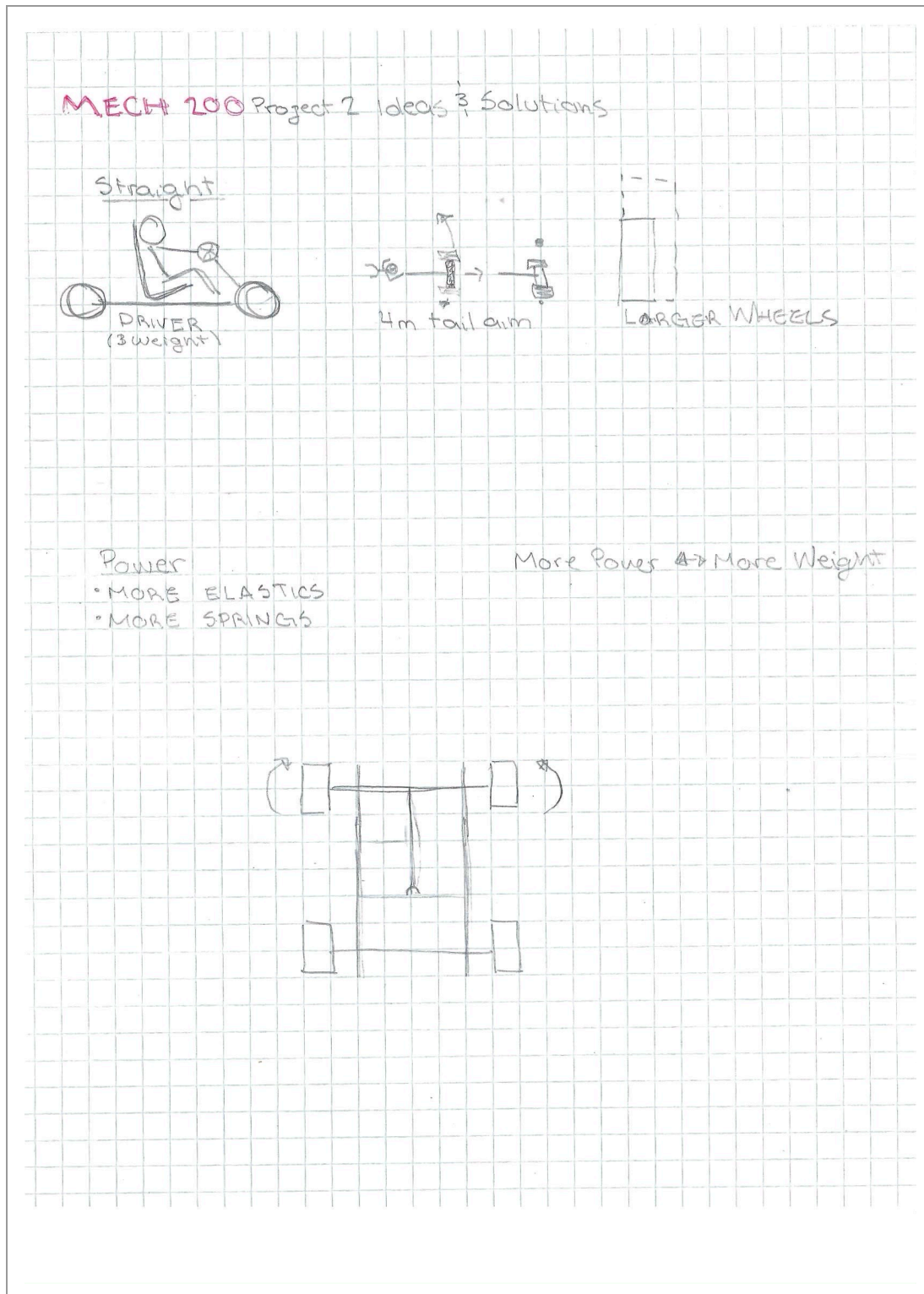
Appendix B-2. Project workflow and marking criteria

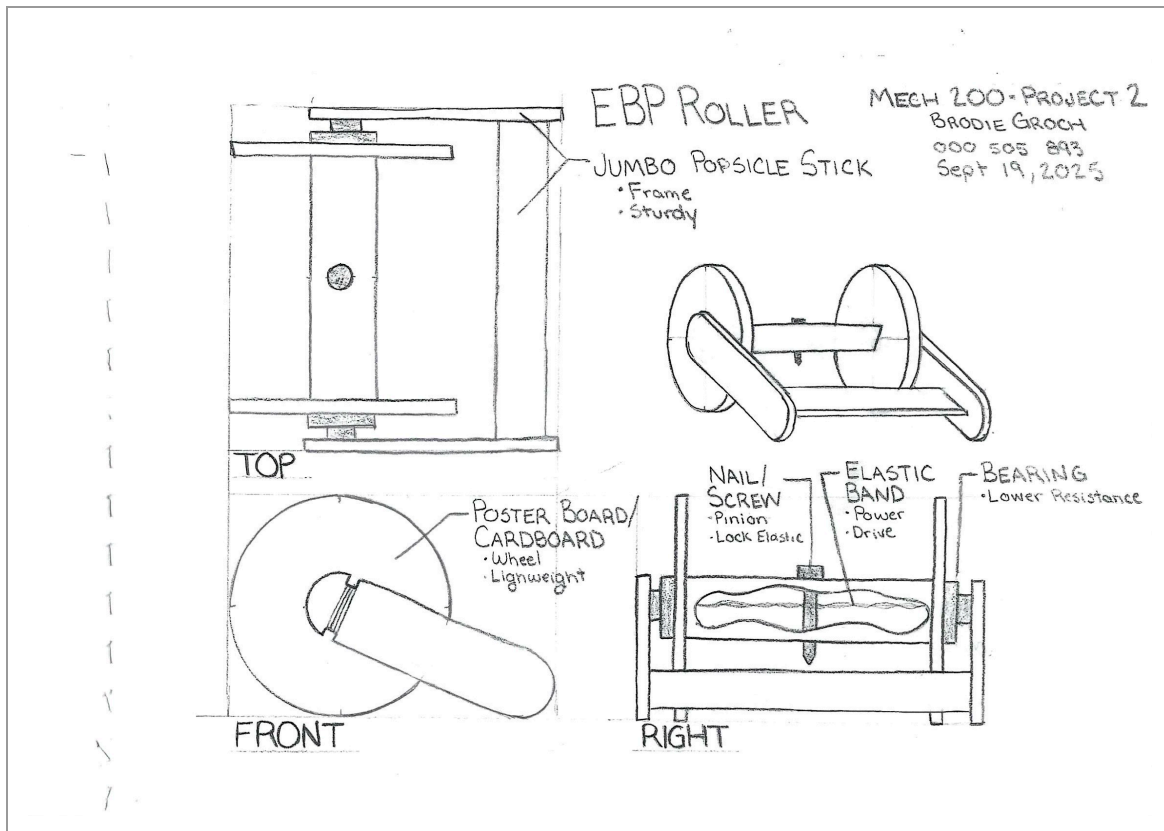
Appendix C: Initial Sketches

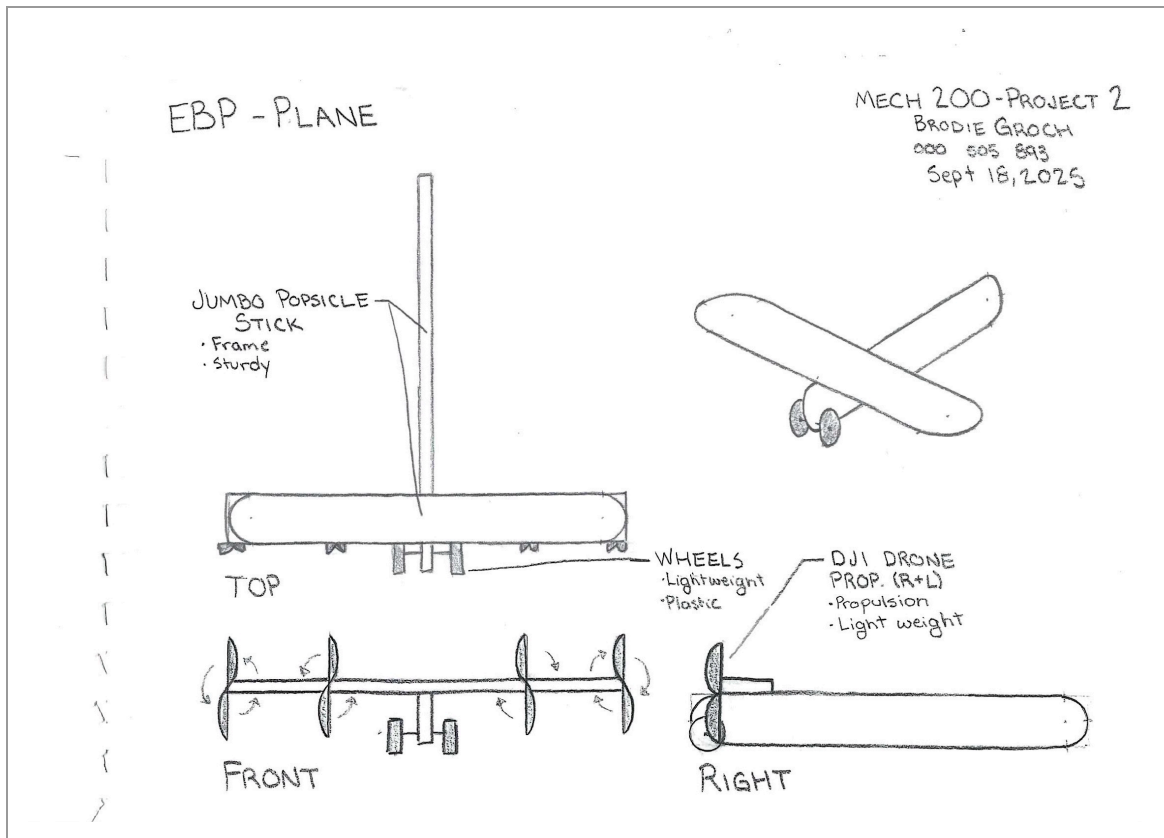
The following pages contain initial handwritten design sketches that document the iterative design and development process for the Elastic Band Powered Roller vehicle.

Appendix C-1. *Design iteration sketch.*

Appendix C-2. *Power transmission mechanism sketch.*

Appendix C-3. Vehicle structure design sketch.

Appendix C-4. EBP Car design concept.

Appendix C-5. EBP Roller design concepts.

Appendix C-6. *Design ideas and solutions sketch.*