

Responses to Reviewers

Response to Reviewer 1

We sincerely thank the reviewer for the comments. We revised the final report to improve figure quality, report organization, and system-level explanation. The major changes are summarized below.

Comment 1: Figure quality needs improvement for Figures 1, 2, and 3.

Response:

Thank you for the suggestion. We revised the figure section and added clearer figure captions and explanations. The revised report now includes a block diagram of the implemented operating sequence, a subsystem overview figure, CAD model, physical PCB photo, integrated assembly photo, resistance-wire heat-preservation module photo, and motor/servo component photo. These figures better support the description of the final prototype and its subsystems.

Comment 2: Figure 4 is meaningless and needs to be removed.

Response:

We agree. The original unclear/less useful figure was removed or replaced in the revised report. The revised report focuses on figures that directly support the implemented prototype, including the final CAD model, physical stirring subsystem, control PCB, integrated rotary assembly, and heating module.

Comment 3: Should include a photo or figure of the whole system.

Response:

We agree. We added system-level visual evidence in the revised report, including the final CAD model of the machine and an integrated rotary extrusion/control assembly photo. These figures show the overall arrangement of the mechanical and electrical subsystems.

Comment 4: Sections are not organized well and there is no table of contents.

Response:

We agree. The report was reorganized into a clearer structure following the final-report rubric. A table of contents/context section was added, including Purpose, Functionality, Subsystem Overview, Equations and Simulations, Design Alternatives, Design Description and Justification, Subsystem Diagrams and Schematics, Cost, Schedule, Completeness of Requirements, Verification Procedures, Quantitative Results, Accomplishments, Uncertainties, Future Work, Ethical Considerations, and Conclusion.

Response to Reviewer 2

We sincerely thank the reviewer for the detailed evaluation. We understand that the previous version was incomplete and read more like a design proposal than a completed final report. Therefore, we rewrote and reorganized the report to better document the completed prototype, verification plan, quantitative evidence, accomplishments, uncertainties, future work, and ethical considerations.

Comment 1: The report is severely incomplete and reads almost entirely as a forward-looking design proposal.

Response:

We agree. The revised report was rewritten as a completed final lab report rather than a proposal. It now describes the completed prototype, implemented functionality, subsystem construction, PCB implementation, firmware timing, and physical testing evidence. The abstract and purpose sections were also revised to clarify that the report documents a completed engineering prototype.

Comment 2: There is no verification section.

Response:

We agree. A new **Appropriate Verification Procedures** section was added. It includes tests for the chopping and mixing module, rolling-drum inversion, tray rotation and heating, functional sequence, stepper timing, servo PWM, batch-volume calculation, thermal power, clogging/moisture behavior, and safety inspection.

Comment 3: There are no quantitative results.

Response:

We agree. A new **Quantitative Results** section was added. The revised report now includes numerical design and control values, including the 200 g target batch mass, assumed 2 g/cm³ material density, 100 cm³ estimated batch volume, approximately 7.96 cm equivalent displacement, 48 W heating power limit, 4.8 kJ heating energy over 100 s, 3600 pulses/s stepper command, 277.8 μs step interval, 22 s stepper window, 7 s servo window, and 29 s total motion window.

Comment 4: There are no accomplishments.

Response:

We agree. A new **Accomplishments** section was added. It summarizes the completed mechanical-electrical prototype, custom PCB, timed embedded control sequence, final interface update, and identified engineering limitations.

Comment 5: There are no uncertainties.

Response:

We agree. A new **Uncertainties** section was added. It discusses material density and moisture content, clogging threshold, motor torque margin, thermal uniformity, temperature-measurement documentation, and food-safety uncertainty.

Comment 6: There is no future work section.

Response:

We agree. A new **Future Work and Alternatives** section was added. It proposes closed-loop heating using PA6 temperature sensing, calibration against an external thermometer, resistance-wire voltage/current/temperature measurement, smoother outlet geometry, motor-current or torque monitoring, and replacement of prototype contact parts with food-

safe materials.

Comment 7: The team needs to write these sections and submit a new full version of the report.

Response:

We agree. A new full version of the report has been prepared and submitted. The revised report follows the final-report rubric and includes the missing sections requested by the reviewer.