

HEATING SYSTEM DESIGN FOR UNIVERSAL TEST FRAMES

By:

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Bachelor of Science

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Abstract

This project aim to build a high efficient and low cost heating device using a heat band nozzle and a simple PID controller within the time and budget limit. Acquiring a heating device will allow exploration of the behavior of all materials to study the behavior of materials under high temperature (up to 600°C). This device can be used in fracture, fatigue, and creep failure mode tests.



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INTRODUCTION

Over the last couple of years, many interesting researches of high temperature experiments have been ongoing with interesting results.

All these researches have been using different heat sources to heat up metals alloy during experiments.

Acquiring a heating device will expand the research facility in engineering to explore the behavior of all materials to study the behavior of materials under high temperature. This device can be used in fracture, fatigue, and creep failure mode tests.

PROJECT OBJECTIVES

This project aim to build a high efficient and low cost heating device using a heat band nozzle and a simple PID controller within the time and budget limit.

Acquiring a heating device will allow exploration of the behavior of all materials to study the behavior of materials under high temperature (up to 600°C).

This device can be used in fracture, fatigue, and creep failure mode tests.

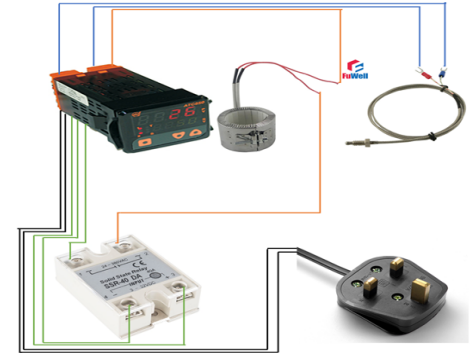
FIGURES / CHARTS / TABLES

NUMBERS	NAME OF PARTS	NUMPER OF PARTS	COST/piece
1	Ceramic Band Heater	1	20.13 \$
2	Thermocouple + Controller	1	14.90 \$
3	SSR	2	9.95 \$
4	Thermocouple	2	26.99 \$
5	Steel Stand	1	1500SR
6	High-temperature specialized safety gloves	2 pairs	58 SR / pair

PROJECT FRAMEWORK / METHODOLOGY

The project follows clear research steps to help the team carry out and complete the project. The first step is collecting information out of good literature review to understand the art of status. The second step is to develop a project plan to determine the time and cost needed. The third step is to design the heating device. The forth step is to purchase the needed parts for the project within the determined budget. The fifth step is to assemble all the parts and make sure the final product works fine (QC) which is the sixth steps.

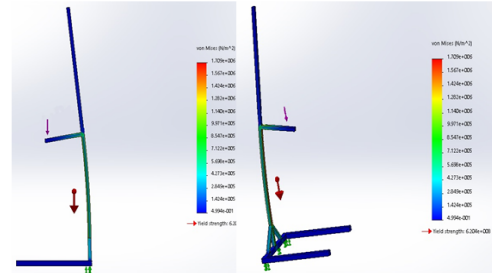
- 1 • Collect literature review
- 2 • Develop project plan
- 3 • Device Design
- 4 • Parts purchase
- 5 • Assembly
- 6 • Quality control (QC)



RESULTS AND DISCUSSION

The results of the temperature clearly show that PID and the ceramic band heater nozzle are accurate and well synchronized.

The stand of the heating system is well designed to prevent overload and maintain safe operation.



CONCLUSION AND RECOMMENDATIONS

CONCLUSION

We built a high efficient and low cost heating device using a heat band nozzle and a simple PID controller within the time and budget limit. The final product emerging from this project will expand the research facility and serve the researchers in the Mechanical Department to explore the behavior of all materials under high temperature.

Recommendations:

We recommend designing a heating system with higher temperature range and operating the system by wireless controllers.

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