Annealing Lehr : Temperature Controlled Production Oven

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Abstract: An annealing lehr is a tunnel shaped furnace that gradually cools glass products in order to relieve internal stress without introducing new ones. Precise controlled temperature gradients and airflow in each zone allow the glass to not deform or crack during the process. Embedding an Internet of Things (IoT) layer on top of the traditional control system provides continuous remote supervision and data optimization. This project presents a six zone Lehr prototype implemented on an Arduino WiFi Micro-controller. With 3 burner zones to provide the initial heat to the glass objects, a middle zone responsible for thermal neutrality, and two end zones to handle the cooling and smoke extraction. All fans, heaters, and conveyor belt motor are found in a secure web resource, establishing real time adjustment from a browser or application.

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1 Requirements

Fig. 1: Requirements Diagram

2 Sensors List

- 1x Smoke Detector Sensor (Zone 6)
- 3x Burner Simulator (Zone 1,2,3) - Lamp, resembling heat being given out
- 1x Conveyor Belt Motor - DC Motor
- 1x Cooling fan (Zone 5) - fan pointing outwards
- 1x Exhaust Fan (Zone 6) - fan pointing inwards

3 Declaration of Originality

We, Arya Karimi Jafari, Muhammad Mustafa Qaiser, and Omar Abdellatif, herewith declare that we have composed the present paper and work by ourselves and without the use of any other than the cited sources and aids. Sentences or parts of sentences quoted literally are marked as such; other references with regard to the statement and scope are indicated by full details of the publications concerned. The paper and work in the same or similar form have not been submitted to any examination body and have not been published. This paper was not yet, even in part, used in another examination or as a course performance. I agree that my work may be checked by a plagiarism checker.

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Bibliography