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Redesign of Cleat Dryers for Athletes

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Abstract

This study examines the detrimental effects of wet cleats on athletes' performance and health, including compromised traction, increased injury risks, and infections. We propose a humidity-controlled cleat dryer featuring a DHT11 sensor, LED indicators, and a fan system, ensuring optimal drying conditions to enhance foot health and athletic performance.

Introduction

Persistent moisture in athletic cleats presents significant challenges, impacting immediate performance and long-term foot health by compromising traction, stability, and increasing injury and infection risks. To combat these issues, we introduce a humidity-controlled cleat dryer equipped with a DHT11 sensor and LED indicators, ensuring efficient moisture removal. Featuring a high-performance fan system with a 120mm computer fan, offering multi-speed control, it delivers consistent drying with airflow rated at 95.8 cubic feet per minute and speeds ranging from 700 to 2800 RPM. Operating quietly at under 41 decibels, consuming only 3.3 watts, and boasting a lifespan of 50,000 hours, this solution prioritizes cost-effectiveness and functionality, aiming to enhance athlete comfort and performance.

Cost and Results

To start our production, we face an initial fixed cost of $387.51. While looking at Fig. 1, the cost to produce each unit is estimated at approximately $23.50. Consequently, our upfront investment totals $411.01 after factoring in the fixed cost and the construction of one unit. Pricing each unit at $45.00, we would need to sell 19 units to reach the breakeven point. Priced at an affordable $60, our product not only offers a competitive cost advantage but also has a more durable base with much stronger materials, ensuring durability and a longer lifespan.

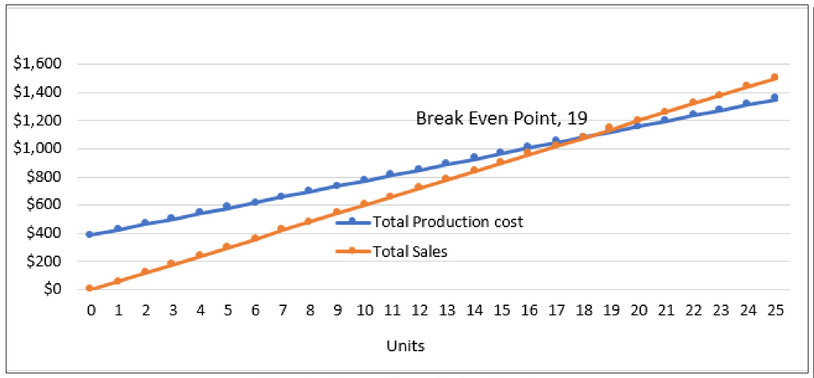

Fig. 1 – Break Even Point Graph

Fig. 2 – Original Prototype

Fig. 3 – Completed Prototype

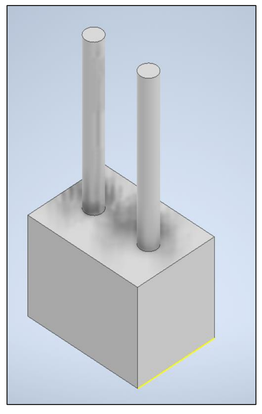

Fig. 5 – Original CAD Design of Shoe Dryer

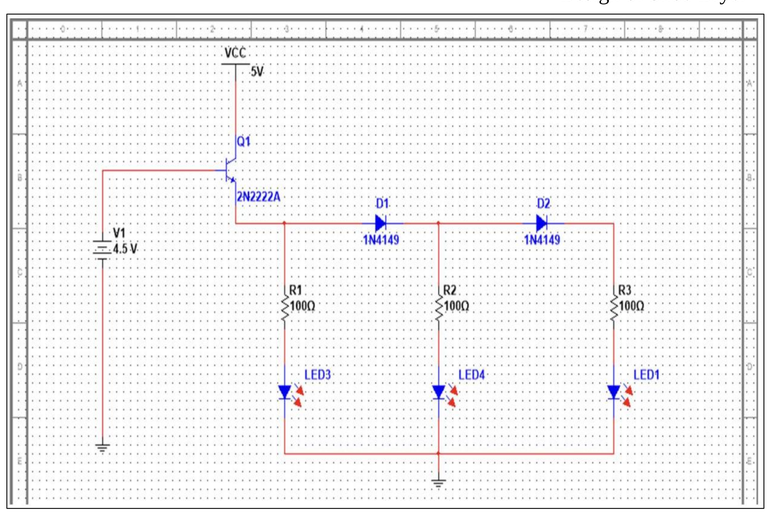

Fig. 4 – Humidity Sensor ad LED Circuit Diagram

Rationale

As football players familiar with the challenges of wet cleats, we recognize the need for a specialized solution—a cleat dryer. Common practices like using large fans lack effectiveness and fail to meet athletes' specific needs. Our envisioned dryer, equipped with stands for multiple pairs, ensures thorough and even drying, enhancing comfort and performance. With fan-controlled humidity sensors, it conserves energy and maintains optimal drying conditions.

Future Work

Looking ahead, our plans for the cleat dryer line include building 25 units, perfecting circuitry and programming, reducing labor costs through automation, adding customization options, designing stands for multiple pairs, and potentially incorporating glove dryers. These initiatives aim to meet growing demand, enhance efficiency, and offer tailored solutions for users, ensuring continued innovation and customer satisfaction

Acknowledgments

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