PENGEMBANGAN ALAT TERAPI OKSITOSIN BERDASARKAN KONSEP *REVERSE ENGINEERING*

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan alat terapi pijat oksitosin berbasis konsep *reverse engineering* melalui modifikasi desain casing alat pijat genggam dari satu laras menjadi dua laras. Metode penelitian meliputi proses *disassembly*, pemindaian geometri menggunakan 3D scanner, pemodelan ulang menggunakan perangkat lunak CAD (SolidWorks), analisis struktur menggunakan metode *Finite Element Method (FEM)*, serta pembuatan prototipe menggunakan teknologi *3D printing* dengan material PETG. Hasil penelitian menunjukkan bahwa desain laras ganda mampu meningkatkan cakupan area pijatan dan berpotensi meningkatkan efektivitas terapi pijat oksitosin. Analisis FEM menunjukkan bahwa struktur desain berada dalam kondisi aman terhadap beban kerja, sedangkan hasil pencetakan menunjukkan bahwa temperatur 250°C menghasilkan kualitas cetakan terbaik dibandingkan temperatur 180°C dan 220°C. Secara keseluruhan, integrasi teknologi *reverse engineering*, 3D scanning, CAD, dan 3D printing terbukti efektif dalam menghasilkan prototipe alat pijat yang fungsional dan sesuai kebutuhan pengguna.

Kata kunci: Reverse Engineering, 3D Scanning, CAD, 3D Printing, PETG, Alat Pijat Oksitosin

DEVELOPMENT OF AN OXYTOCIN THERAPY DEVICE BASED ON THE REVERSE ENGINEERING APPROACH

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ABSTRACT

This study aims to develop an oxytocin massage therapy device based on a reverse engineering approach by modifying a handheld massage gun casing from a single-barrel design into a dual-barrel configuration. The research methodology includes disassembly, 3D scanning for geometric data acquisition, CAD modeling using SolidWorks, structural analysis using the Finite Element Method (FEM), and prototype fabrication using 3D printing technology with PETG material. The results indicate that the dual-barrel design improves the massage coverage area and has the potential to enhance the effectiveness of oxytocin massage therapy. FEM analysis confirms that the modified structure remains within safe limits under applied loads, while the 3D printing results show that a nozzle temperature of 250°C produces the best print quality compared to 180°C and 220°C. Overall, the integration of reverse engineering, 3D scanning, CAD, and 3D printing proves to be effective in producing a functional prototype tailored to user needs.

Keywords: *Reverse Engineering, 3D Scanning, CAD, 3D Printing, PETG, Oxytocin Massage Device*