The impact of loading conditions on the development of creep-fatigue damage.

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***Abstract***

This research investigate the performance of a spring stiffness machine with an attempt to design ,develop and evaluate it's performance. This work is fabricated as an experimental rig for Engineering laboratory. The inception of this machine was prompted by the lack of laboratory equipment in many facilities in this region. It was designed to prioritize affordability, operational efficiency, and ease of use for students during practical sessions. The materials used in its construction were sourced from Owode Onirin market, located on the outskirts of Lagos, Nigeria. Autodesk Inventor software was utilized to create design diagrams, and the construction process involved various fabrication techniques such as cutting, benching, welding, grinding, drilling, machining, casting, and screw fastening. Tests conducted on the machine validated its functionality, yielding a linear equation representing spring stiffness (k) values of 0.153, 0.268, 0.458, and 0.024 for tension springs A, B, C, and compression spring D, respectively. These findings demonstrate the machine's adherence to Hooke’s Law and its ability to maintain a consistent force against extension relationship.

***Keywords*** *–* Cycling frequency, Loading conditions, Stress levels, Temperature effects, : Creep-fatigue.