

ABSTRACT

Along with the rapid development of telecommunication technology, optical fiber has become the primary transmission medium due to its numerous advantages, such as large bandwidth, high speed, low attenuation for long-distance transmission, and immunity to electromagnetic interference. However, as the use of optical fiber increases, so do the challenges in maintaining the quality and reliability of its supporting components, like patchcords and precon cables. Telkom Test House (TTH) currently relies on manual testing methods for repeated bending and twist tests, which poses several constraints, such as technician fatigue, inconsistent test results, and low efficiency and accuracy. The main problem with this manual method is its inability to consistently provide precise results that comply with industry standards.

To address these issues, an automated test equipment system was designed to perform repeated bending and twist tests on patchcord and precon cables according to Telcordia GR-326-CORE and IEC 61300 standards. This system integrates stepper motors, a linear actuator, a load cell sensor, and an ESP32-S3 microcontroller to manage mechanical movements, cycle settings, load application, and real-time measurements. With this implementation, testing can be performed automatically, accurately, and consistently, thereby minimizing the dependency on human labor.

Test results indicate that the equipment is capable of precisely completing up to 100 cycles of repeated bending at a 90° angle and performing the twist test with standard-compliant torsion variations while maintaining a constant test load. The accuracy of the load cell reading achieved a deviation of under 2% from the target load. Furthermore, the testing process is two to three times faster than the manual method, with significantly higher consistency in results. Thus, this equipment is proven to be effective in enhancing the efficiency and validity of the cable testing process at TTH.

Keywords: automation, fiber optic cable, mechanical testing, repeat bending, twist test.