



Recycled waste plastics composite: Possible construction material for wind turbine blades



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Abstract

Electrical power supply in Sub Saharan Africa (SSA) is expensive and very low, and most families have no chance of accessing clean lighting and cooking power. Off grid systems are the best viable solution in SSA and wind energy has a potential. However, the components of this system are expensive and beyond reach of the communities due to the weak economies in SSA. Whereas some researchers have recommended use of wood for construction of wind turbines in the developing countries, wood has many competing uses that lead to destruction of forests, impacting negatively on the environment. This study focuses on the possibilities of recycling waste plastics (mostly High Density Polyethylene), and using steel and copper wires as reinforcements to make a composite as an alternative to wood and other materials currently used for the same purpose. A plastic injection moulding machine was made for production of mechanical test specimens. The materials were subjected to tensile test and Three point Bending test. Scanning Electron Microscopy (SEM) was also carried out to study the microstructure. Specimens at varied content and reinforcement levels were tested for ultimate tensile strength (UTS), modulus of elasticity (E) and interlaminar shear strength (ILSS). Use of increased recycled plastic in samples improved UTS while E declined. Addition of reinforcements slightly improved UTS while E exhibited greater improvement and ILSS showed little improvement. SEM revealed poor bonding between reinforcement and plastics matrix. While improved tensile properties were observed further research work is recommended.

References

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