

Sustainable Manufacturing Practices in the Sports Industry: A Review of Biodegradable Polymers for Sports Equipment



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Abstract The convergence of the global sports sector and the entertainment industry has increased sports equipment demand and highlighted the importance of sustainable manufacturing. This transition is driven by environmental concerns and renewable resource potential. Biodegradable polymers, which are environmentally friendly and have excellent physicochemical and mechanical properties, are becoming viable alternatives to non-renewable synthetic fibers. Polymers in sports equipment reduce environmental impact and boost domestic industries. Sustainable sports manufacturing explores and advances eco-friendly fiber-reinforced composites, natural composites, and hybrid fibers with nanoparticles. Natural fibers like coconut tree peduncle fiber are being studied as synthetic fiber substitutes in the automotive and marine industries. Due to their improved mechanical properties, sustainable fiber-reinforced composites like Date palm and Kenaf fibers are gaining popularity in the sports industry. However, manufacturing issues like ultrasonic connection durability in shoe components and titanium marine part surface irregularities must be addressed. The review emphasizes biodegradable polymers in sports equipment. It thoroughly reviews sustainable sports manufacturing research and suggests new directions.

Keywords Sustainable manufacturing · Sports industry · Biodegradable polymers · Natural fiber-reinforced composites · Hybrid fiber-based composites

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