

Development of Electromagnetic Picking System for Weaving Loom

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Abstract: In the weaving industry, the picking speed is the key factor which determines the production rate. There are various types of modern picking systems available in weaving industry such as air jet, water jet, and projectile picking systems. However, the developments of cheaper and high speed picking mechanism still has been a huge challenge in the textile industry. The present study describes the electromagnetic picking system which can be portable and simply integrated with conventional shuttle weaving looms to increase the picking speed with low cost.

Keywords: Electromagnetism, Solenoid, Projectile, Picking speed

1. Introduction

In the present weaving industry, the shuttle weaving loom's picking motion has to be enhanced for several reasons such as, its limited speed, high energy consumption, and less quality. The weaving looms had been used to produce woven fabric for past 850 years [6]. The picking motion determines the production rate and appearance of woven fabric. Therefore, the weaving looms are categorized on the basis of picking systems used in weaving looms; shuttle weaving looms and modern shuttle-less weaving looms. The production rate of conventional shuttle weaving looms are significantly low due to the more time consumption for picking motion.

According to the energy consumption in conventional shuttle weaving looms, the picking system consumes more than half of the total energy, i.e. the picking system consumes 61% of the total energy consumption of conventional shuttle weaving looms [7]. Hence that, the development of picking speed has been studied by many researchers in various times because of the importance for economic benefit. The development of high speed picking system with low cost still has been a challenge for engineers. The conventional shuttle weaving looms cover 85% of weaving production, and the weft insertion speed has been varied from 6 m/s to 11 m/s [8] which is considerably slow picking speed. Therefore, weaving machine engineers/developers have invented modern high speed weaving looms such as air-jet loom, water-jet loom, rapier loom, and projectile looms. These development of modern shuttle weaving loom overcomes the problem of low picking speed whereas, the picking speed of projectile weaving loom varies from 10 m/s to 26 m/s, rapier loom is around

23 m/s, air jet weaving loom is 42 m/s, and water jet weaving loom is 44 m/s [7].

However, the initial and maintenance cost of the modern high speed looms are significantly high, hence that, the use of modern high speed weaving looms are considerably low in developing countries. Therefore, developing countries still rarely focus on modern looms due to the huge investment and high maintenance cost. The development of high speed picking system with low cost paves a platform for weaving entrepreneurs in developing countries.

This paper proposes an electromagnetic picking system, the prime motivation to develop the electromagnetic launching method is the possibility to achieve relatively high speed with significantly low cost compare to the modern method.

The relevant research was carried out by Mirjalili, however, the maximum speed of 8 m/s was achieved by the above research, which is relatively lower than the picking speed of conventional shuttle weaving looms. This model was not further developed presumable

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