

Development of Bobbin Thread Measurement Device for Industrial Lockstitch Machine

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Abstract—One of the main aspects of the sewing process is the interlacing of threads-stitch formation. It has been found that the thread consumption of bobbin thread can provide information about stitch adjustment and serve as a feedback variable for bobbin change. Operator time is wasted in ripping the seam, if the bobbin thread gets over in the middle of seam. It can be reduced if operator knows when the bobbin thread is getting over. If this non value added time is reduced from operator standard time then operator productivity can also be increased.

Aim of the paper is to develop techniques and a device to monitor the bobbin thread measurement. In this paper, an overview of the techniques will be given, with particular focus on the quantification of bobbin thread consumption in lockstitch machines, one of the most widely used type of sewing machine for woven garments.

In this paper different techniques which are used to measure bobbin thread consumption in lock stitch machines are discussed. Finally, a device is developed with Arduino, which is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and of a software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. An IR sensor consists of an emitter, detector and a circuit. The emitter and the receiver is the main part of the infrared sensors. The principle of working of the IR sensor is that the IR LED emits light and when it falls on white surface the light is scattered back and the photodiode receives the signal.

When the device was used in the machine it increased the production by 5% -9%. The technique will give better solution on the bobbin problems that occur in all garment industries. It will save time and as well as the money in the sewing industries. The development of this technique is aimed to be a cost-effective and to be used in all lock stitch based machines.

Keywords: Operator standard time, LED, Integrated Development Environment, lockstitch machines, etc.,

1. INTRODUCTION

In today's competitive marketplace, there is a need for tight cost control. A realistic estimation of potential thread requirements for particular garment styles or contracts will always end up saving you money. In the recent times of the

garment industry the time is considered to be more important to increase the productivity by neglecting unnecessary works. On usage of the lock stitch machines, operator will not be cautioned on the exhaust of thread in bobbin so there will be incomplete stitch formed resulting in damage to the fabric, thread loss and time loss. The damage of the fabric occurs due to the penetration of the needle and as the next stitch will not be in same place, the previous stitch will create marks in the fabric/garment. The time loss is the ripping of the incomplete stitch and re-stitching time.

2. METHODOLOGY

Some sewing manufacturing machines have introduced technologies which can be used for bobbin thread measurement but they are not successfully used by the garment manufacturing companies.(Juki CP 180) The manual of the Juki machine CP 180 is about the thread counter system used in the machine. This option was a failure as it didn't work well when it comes to the industries.

Various concepts were tried to measure bobbin thread in industrial sewing machines. Concept 1,2,3 were unsuccessful but concept 4 could fulfill the requirements.

2.1 Concept 1

The basic idea of this concept is to find the length of the thread wound with the use of the shaft. It was assumed that the thread wound in the bobbin has relation with the shaft, that for every rotation of one shaft the length of thread wound remains the same throughout the bobbin winding process. Subsequently we can find the thread used during stitching process.

It was found that the thread length varies on every rotation as the thread may wind over and over and sometimes not. As a result this method was a failure

2.2 Concept 2

In this concept the idea was to find out the length of the thread wound in bobbin at different level. That is the thread length was studied at different intervals of shaft rotation. Thus we

can frame a constant value and we can make the programming.

This concept was also a failure as the thread length was not increasing constantly.

2.3 Concept 3

In this concept it was aimed to set standard number of rotation of shaft for one complete bobbin. The values were taken for different ticket numbers that are used in the factory. Basically once the bobbin is filled the average number of rotation that it can hold was found out.

2.4 Concept 4

The Final concept

The thread that is winded bobbin is measured by passing the thread through a pulley by use of the bearings. Wherein the sensor will send the number of rotation and the program is made in such a way related to the circumference of the pulley. Thus we can obtain the thread length.

The second sensor is kept in the needle shaft.

3. PROGRAMMING AND CONCEPT DEVELOPMENT

The program is developed with the use of the Arduino software, which is an open-source platform used for building electronics projects. The language used for programming is C++. The program is uploaded in the Arduino board. EEPROM is used to save the data in case of interrupting power supply.

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The minimum value can be updated in the program. So that when it reaches to the minimum level the LED connected will start to blink and indicates that the thread can't be used to stitch next operation.

The ongoing operation is completed and then the bobbin is re filled and thus the device works.

4. RESULTS

The device was developed which when tested on machine gives, the better solution on the bobbin problems that occur in all garment industries. It will save time and as well as the money in the sewing industries. The development of the device is aimed to be a cost-effective product and also user friendly. It will be able to attach in any machinery of the single needle lock stitch. Thus with the use of this device we can

Get an increased production between 5-9% in all lock stitch machines depending on the operations.

5. COSTING

The cost of the device is 1040 rupees, which can be reduced during bulk production and installation.

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