



Design and Development of Rotocure Cutting and Windup Unit

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ABSTRACT

As mentioned above, we had worked on the Rotocure cutting & windup unit. A Rotocure is a shortened name for rotary curing press. This machinery is designed for continuous vulcanization of technical rubber products, so if you are manufacturing rubber belts, roof covering, rubber belts with textile inserts, sealing plates, etc. To reduce the complicated cutting processes, save labor, and improve cutting accuracy and production efficiency. According to the old cutting machine evaluation, the study of the shortcomings enhances the design. Our work is about finding a solution to the given problem, which is initially inculcated in the given machine and make it more productive, more efficient, and reduces wastage. We designed, manufactured, and upgraded the machine by considering different rubber cutting processes.

KEYWORDS: Rotary curing press, Vulcanization, Inculcated, Wastage.

1. INTRODUCTION

As mentioned above, there are initially two problems that are coming at the time of operations.

1) If we see the initial structure of the machine, there are only one nip roller; because of it, the total load is exerted on only one nip roll, which creates a problem.

2) The second problem was about the fixed position of the cutter, which can't be moved as per requirement, and at the time of rubber cutting, it creates enormous wastage.

So, our task was to resolve these two issues.

Different rubber cutting methods are available in the

market, discussed as follows:

The car wiper rubber cutting machine consists of a motor, servomotor, crank-connecting rod mechanism, cutter, and feed roller. It controlled the feed roller through the servo motor, motor, plus crank connecting rod control cutter to achieve cutting rubber [1,2]. The traditional rubber cutting process is abbreviated as follows:

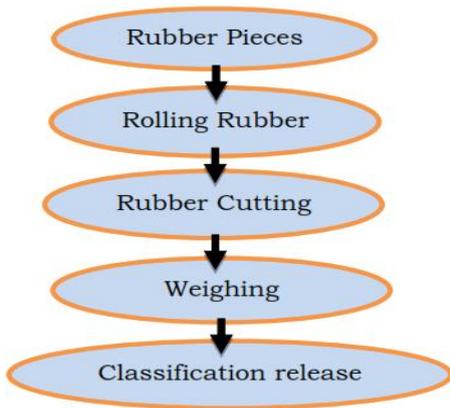


Fig. 1 Optimization of rubber cutting process

The car wiper rubber cutting machine must go through a machine out of the film when cutting rubber. In a machine-chip stage, manual detection of hand-held detection of thickness compared to the corresponding standard form. And then, according to the difference, adjusted repeatedly until the required range. The thickness of the rubber sheet depended on the experience to determine that there was a greater risk of thickness changes. Thickness changes in the cutting weight of the cutting machine had a more significant impact on the cutting weight. His cutting process was too complex, wasted a lot of labor, had low cutting accuracy, and occupied a larger workspace. [3,4]

2. LITERATURE SURVEY

Ultrasonic rubber Cutting:

The knives are widely used in the rubber industry for cutting tires of the desired size accurately and precisely. Integrated with advanced technology, this Ultrasonic Rubber Cutter for Tire Industries. Ultrasonic cutter vibrates its blade 20,000 - 40,000 times per second (20 - 40 kHz). Because of this movement, the ultrasonic cutter can easily cut resin, rubber, nonwoven fabric, and composite materials. Besides being excellent in maintainability, our products are environmentally friendly as they do not substantially discharge any crumbs, wastewater, noise, or smoke. [5]

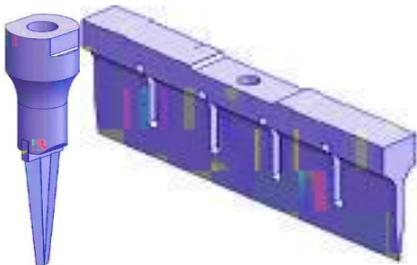


Fig. 2. Stiletto Cutting knife (40kHz) & Cutting knife

(30kHz) [5]

By considering different types of rubber cutting process applications, the angle of the blade, type and thickness of the rubber, and the style of cut ultimately affect the cutting speed. Two main cut styles are prevalent—plunge and traverse, as shown in fig; below.



Fig. 3. Traverse Cut [5]

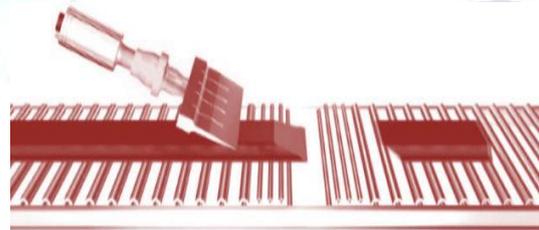


Fig. 4. Plunge Cut [5]

Review 1:-

An Introduction To Rotocure
(Prasant Warrior)

The above article helped us to understand the basics of the Rotocure Unit. I.e., about its structure, parts, assembly, which consists of (A winding let-off unit, Rotocure, Cooling unit, Equipment for edge trimming of products, and a Winding-up equipment.), And about the total operation on rubber which is carried on that machine. (From the Winding Let-off unit, the semi-finished calendared rubber material is led onto the lower roll from there into the pressing space between the heating drum and thrust pressing belt, where it is pressed and vulcanized.) [6]

In all of the above, our main focus of study is on Rotocure.

Review 2:-

Dalian Huahan Rubber & Plastic Machinery CO., Ltd.

This article has given us information about material selection. The specifications table which is given in this slide is really helpful for material selection as well as for selecting suitable dimensions. [7]

Review3:-

VATSN TECNIC Rubber machinery world.

(Asheesh Bajpai)

This article gives us information about various

elements like the diameter of the roller, what the should be line speed, and the power of motors we are using in this machine. Also, on this page, we found a video that gave us a glimpse of the machine's structure. [8]

Review 4:-

Responsibility For Quality.

(R. Balasubramaniam)

This is a fine book to which we are referred for quality control purposes. In this book, the author treats the important properties of three primary types of materials (metals, ceramics & polymers), which gives us an idea about durability, perishability, ductility, strength, load-carrying capacity, etc. [9]

Review 5:-

Rolling contact Bearings.

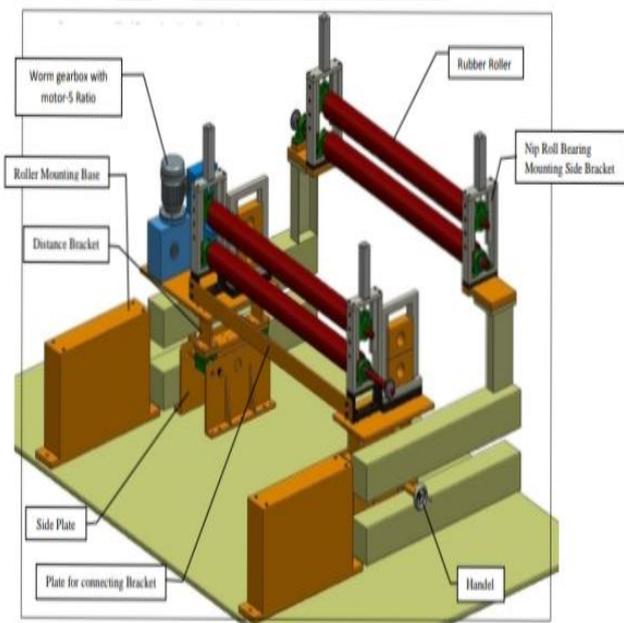
(R. S. Khurmi, J. K.Gupta)

This is also a book to which we are referred, particularly for Bearings. Which type of bearing will fulfill our requirement, which will be more durable, and also which type of shaft is needed for the particular type of bearing for all these factors we had referred this book. [10]

3. OBJECTIVES.

- 1) To reduce human efforts.
- 2) To Reduce Wastage.
- 3) To provide maximum output in low energy input.
- 4) To make the machine more worker-friendly.

4. DESIGN OF MACHINE



5. WORKING OF MACHINE

As mentioned earlier, the above assembly is the modification earlier machine. Now there are two nip rollers for dividing the load. The rubber material passes through these two nip rollers, which can be moved front and back with the help of a handle. These two nip rollers are contracted and distracted with the help of a pneumatic cylinder as per the thickness of rubber. The cutter is adjusted as per the required measurement. The movement of the cutter is supported by motors.

6. ACKNOWLEDGMENT

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Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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