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### CONCEPT OF FABRIC COATING MACHINE FOR LAB TESTING

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#### ABSTRACT

The present work deals with the concept of fabric coating machine for testing purpose. Coating is a process in which a polymeric layer is applied directly to one or both surfaces of the fabric. Coating apparatus to produce a stably coating on a flat surface of sheet and also enhances and extends the range of functional performance properties. Different methods are used for coating the fabrics. The direct coating method is used in the present work for coating purpose. In testing the various parameters like uniformity of coating surface, tension on fabric and distortion or stretch. In the present work different types of liquid solutions and different types of fabrics could be used for coating, which will enhance the finishing of fabric and also increase its life in easy and economic way.

*Keywords: Fabric, Coating, polymeric layer.*

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#### I. INTRODUCTION

In last few years the constant research is carried out on waterproof and porous fabrics which can satisfy the necessary requirement of the economic cost. Now at present days many such fabrics are commercially available in the market for different commercial and industrial application with various brands. A coating method of this embodiment makes it possible coating at highly accurate from the start of coating line. For achieving good adhesive and mechanical properties the rubber have been used in larger scale in these types of meet to develop water proof porous fabric with cotton or rubber as based fabrics. The present work deals with the concept of fabric coating machine for testing purpose.

The coated fabric is needed to be checked for different aspects such as air tightening, water tightening, stress etc. The fabric is needed to be test in the lab is cut into small peace and the coating is done on this specimen, as it would be difficult and cost incusing to test the fabric after coating entire lot size. The early practice followed in most of the industries is that the specimen or test piece was prepared by traditional method like four workers holding the piece of fabric and the other worker use to apply the coat manually. This early method leads to inaccuracy and huge consumption of time and labour. By understanding this problem we put forward the concept of fabric coating machine which is use to prepare the coated test piece which is further used to undergo the different tests.

#### II. COATING TECHNOLOGY

Coating is a process in which a polymeric layer is applied directly to one or both surfaces of the fabric. The polymer coating must adhere to the fabric and a blade or similar aperture controls the thickness of the fabrics. This thick coating is required we built up the successive coating layers; layer on layer, this layer is repeated 2-3 layer. Finally a thin layer may be a top layer applied or technical enhancement of the coating. While other uses such that clothes, rubber may require coating weights very low. The chemical formulation of the coating, the coating weight and thickness, the number of layers, the form of the fabrics and the nature before any treatment process such as to decide the fabric dimensions to coating are importance. In recent days development also enhanced the coating technique into various process of the future in many other field. Last decade coating has been done by to woven technical textiles and fabrics, but increasingly production demands and nonwoven fabrics must be coated on the same line. The machinery and method of application of the coating formulation must be versatile, reduces tensions on the fabric that may lead to distortion or stretch, and eliminate problems in knitted fabrics such as curling selvedges.

The following will explain some of the fabric coating processes we can choose to use when we need to coat our fabrics.

**Knife Coating or Direct Coating:**

It is also known as floating knife. This is one type of simplest method where the fabric is stretched flat to form an even uniform surface as a knife moved forward direction it is scraped by the knife. When Knife Coating, the liquid solution such as solvent is applied on the fabric while being developed a tension under a floating knife blade. The distance between the fabric and the knife blade is determined the thickness of coating. The blade can be manipulated and angled, while consisting of different profiles the blade can be manipulated an angled, that affects on coverage. The liquid coating must be viscous enough to prevent it from penetrates through the fabric thus for this process to be effective. After completing, the coating is then dried or cured. The potential for sticking out is dependent on the thickness of the applied coating. For knife coating to become most appropriate, the weave structure must be extremely tight, and the fabric capable of being held instructor.

**Direct Roll Coating:** In this process involves the rolling coating liquid onto the fabric with the help of roller that has been suspended in the coating liquid solution. Many times, a particular type of blade is positioned close to the roller to protect from a coating.

**Calendar Coating:** In this process fabric passing through a set of heated rollers, and after will properly add luster and smoothness to the fabric.. However, with this process, The coating is applied simultaneously to both sides of the fabric, with the thickness of the coating determined by the width of the knife between the rollers. Additional rollers should be used if a thinner coating is more desirable.

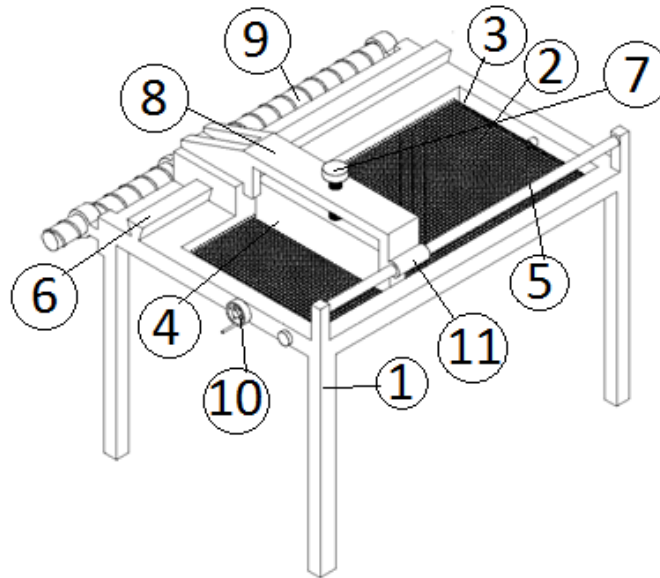
**Hot Melt Extrusion Coating:** Hot melt extrusion coating is applied in the same way as the Calendar Coating process, with the coating melted by granules fed to heated rollers, which then adhere the coating to the fabric. Hot Melt Extrusion Coating is used to produce unsupported films, and these produced films are added directly to the fabric. The need for this kind of coating process are mainly for Thermoplastic Polymers, such as Polyurethane, Polyolefin, and PVC etc.

**TYPES OF FABRICS** Different manufacturing of fabrics like Rubber Coated Fabric of Cotton, Nylon, Polyester are used.

**Technical Specifications:** 1) Rubber Coated Fabrics: A) Thickness: 0.2 mm to 6.0 mm, B) Width: upto 1300 mm, C) Rubber Polymer: Natural, Neoprene, etc. D) No. of Plies: upto 4 plies 2) Rubber Sheets: A) Thickness: 0.3 mm to 6.0 mm, B) Width: upto 1100 mm, C) Rubber Polymer: Natural, Neoprene, Nitrile, Butyl, Silicon, etc.

IV. CHARACTERIZATION

- **Coating viscosity:** Using Brooke Field Viscometer the coating viscosity was measured . The torque required for measuring the viscosity and rotating the spindle through different type of solution like solvent solution.
- **Bending length:** Shirley stiffness tester are used to measured the bending length of fabric. The test was carried out according to standards.
- **Air electromagnetism:** Different types of textured instrument are used to measured The air electro magnetism of coated.



## V. COMPONENT NAMES

1. FRAME
2. FABRIC
3. FIXTURE
4. KNIFE BLADE
5. GUIDING SHAFT
6. GUIDE WAYS
7. ADJUSTABLE SCREW
8. CARRIAGE
9. LEAD SCREW
10. HANDLE
11. BALL BEARING

### Components

The following various components are used :

**Table** : It is one type of supporting member. It is used to hold the different components. It is made up of mild steel.

**Frame** : It is used to hold a fabrics at a proper place with the help of fixture. It is a one types of fixtures.

**Fabric** : Fabric is a woven, non woven and knitted fabrics and netting fabrics tight in a main frame with the help of pins. It is easily available

**Carriage** : It is a one type of passage. The carriage is slides on the guide way which support the jig. It is travels the linear direction.

**Guideways** : One side of the frame there is a guide way is provided which is fixed on the frame by welded joint. It is used for slide knife blade for forward to reverse direction.

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**Bearing** : A ball bearing is a type of rolling element bearing. The use of a ball bearing is used to support radial and axial load and reduce rotational friction. This is simply supported to the frame by means of ball bearings and fitted to handle. Locking nut is used to lock the supporting frames.

**Lead screw** : It is also known as power screw or translation screw. Lead screw mechanism is the most important mechanism of this machine. Lead screw is used as a linkage in machine to convert the rotary motion into the linear transfer motion. It is used to transmit the power with the help of gear train or manually. Generally square thread is used for lead screw.

**Handle** : Fabric is attached to a main frame of machine. After completing one side of coating handle is used for turning the fabric.

## VI. CONSTRUCTION:

The lab coating machine consists of a main frame having all other parts of the machine mounted on it. The frame is having a guide way is provided on the one side and having inverted trapezoidal shape. This is used to provide smooth slide to the jig which is placed on the guide way. The jig carries the knife-edge. The jig allows us to set the proper position of the knife-edge. To achieve the desired thickness of the layer of the coat there is a bolt which is welded to the knife-edge and fit to the jig, jig has the hole drilled in it and threads are made such that the bolt meshes with it. There is a linear scale which is attached between the end of jig and knife-edge. To provide the forward and reverse motion to the knife-edge there is a lead screw mechanism which is the most important mechanism of this machine. This is made to convert the rotary motion into the linear transfer motion. This is simply supported to the frame by means of ball bearings and ball bearing coupling. These are fixed on the left side of the guide way. To transfer the motion there is a nut provided which is attached to the carriage, the carriage slides on the guide way which supports the jig. Thus the nut takes the power from the lead screw and provides to the carriage. The lead screw with the ball bearing assembly is fastened to the frame by nuts and bolts. The extended end of the lead screw there is a pulley and on the opposite side a pulley provided with handle and the pulleys are having the belt to provide the rotary motion to the lead screw. There is a fixture assembly which consists of the mild steel strips on the front end and back end each consists of a set of two strips and between which the fabric is fixed. To ensure the proper fitting of the fabric the additional mechanism is provided i.e. to the back side strips the nut bolt is provided. To turn the fabric to coat foam both sides other the set of strips are welded to the short shaft which passes through the frame having the bush or ball bearing. On the front strip shaft the handle is provided by which the fabric can be turned. To the front strip the locking pin is provided to restrict the mish mashing of fabric during the operation.

## VII. WORKING

Firstly cut the piece of fabric according to the size of fixture. Fixture assembly which consists of the mild steel strips on the front end and back end each consists of a set of two strips and between which the fabric is fixed with the help of bolts. To ensure the proper fitting of the fabric then according to requirement of coating adjust the thickness of knife blade by using bolt which are fixed on jig. Then give power to the lead screw and nut takes power from lead screw and provides to carriage. Carriage slides on guide ways which are attached to jig, the pulleys are having the belt to provide the rotary motion to the lead screw. Then lead screw converts rotary motion to linear motion. This linear motion takes knife blade and moves forward to backward. At the starting of fabric solvent liquid solution sprayed manually then pour the solution in a fabric and knifed blade moves 2-3 times forward to reverse direction and at that time one side of coating is done then check the thickness of coating by using linear scale. If coating thickness is not proper then we should again coat on fabric. After completing one side of coating fabric is turned. On the front strip shaft the handle is provided by which the fabric can be turned. Then also coat to another side of fabric and check the thickness of coat with the help of linear scale. To the front strip the locking pin is provided to restrict the mish mashing of fabric during the operation. In this way coating is done on fabrics.

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ISSN 2348 – 8034  
Impact Factor- 5.070**Advantages:**

- It is a portable machine
- Reduce labor cost.
- Increase efficiency
- Easily maintained.
- Less maintenance cost.
- Good Reproducibility.
- High precision thin flame coating.
- Flexible organic substrates.
- Less expensive and no hazardous.

**Disadvantages:**

- It takes more time because doing a manually inspection
- Waste a material at the time of testing.

**Features:**

- A feature of present invention is to provide a coating on a substrate which reduces the mottle on the substrate without reduces the brightness unacceptably.
- Perform uniform coating across the whole thickness.
- Special arrangement to set a thickness

**Application:**

- It is used to test a various parameter of fabric coater like stress, strain, air tightening etc.
- It is use to check a uniform surface.
- This machine is also used in different types of fabric industry for testing the coating.

**Future scope:**

- In future used different types of fabrics and liquid solution for coat the fabrics.
- If we need to tested large size of fabrics. then making big size of machine.
- In a future if we required printed coating then changes in a machine component.
- For improving the finishing of coating we also add different mechanism.

**VIII. CONCLUSION**

It provides opportunities to provide coating to different fabrics material for testing purpose with uniform film and adjustable thicknesses. Thus saves lots of time, money and human efforts which were prior required for coating a fabric for testing purpose.

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