

## TechCOAT—AUTOMATIC FILM COATING UNIT



## INTRODUCTION

**TECH INC** offers TechCOAT-2000UV120, an Automatic Film coating unit for coating or casting a variety of thin films with consistent thickness, repeatability. It's user-centric design allows the user to control key aspects of the coating process by controlling thickness of coating, along with improved control of parameters like temperature, UV exposure, speed of coating with a robust holding mechanism in the form of a vacuum chuck, which enables fast clamping and de-clamping of the film. This is especially ideal to be used for casting uniform flat sheets/films in laboratories for research and development applications.

Tech Inc., with engineers from prestigious institutions like IITs, NITs, Anna University and Stanford University with a combined experience of over 6 decades in the field of films, filters and membranes, has designed this versatile product for use in various different applications na use cases in mind. Having used film applicators from many companies around the world in their own academic careers, TechCOAT is an effort by our engineers to maximize the merits of using automatic film coaters, while doing away with most of the disadvantages and difficulties while using these sophisticated equipment.

Research on thin films, coatings, filters and membranes have been exponentially growing over the last two decades across the world. In such sophisticated fields of research there are a wide range of parameters that have to be controlled or mastered to produce thin films/coatings of desired specifications. TechCOAT enables researchers to control temperature of coating, speed of coating, precisely control thickness of coating, UV and light exposure.

### Solving the heat problem

In Thin Films and Coating Research (TFCR), temperature is an important aspect of the manufacturing process, since it is known and reported that temperature during manufacture affects thickness, porosity, pore size distribution, density, color, surface roughness, contact angle, zeta potential and many other important parameters. Before Automatic Film Coaters like TechCOAT, the film used to be coated/formed and post-heating was achieved by keeping the casted film/coating in a hot air oven with a regulated temperature. In such cases, precise temperature control was hard, with temperatures exceeding set temperatures most of the time; combined with the lack of uniformity of temperature distribution made it very hard to achieve the required properties of film/coating. Repeatability was also very hard to achieve.

In addition, during transfer of uncured cast films to oven, they are disturbed due to handling during such transfers. Also, only post coating/casting heating was possible. Heating and control during casting was very hard to achieve. TechCOAT is able to provide a in-process heating mechanism which can distribute heat evenly with its highly conductive bed, also

eliminating worries about disturbance of coating/film during transfers, thereby enabling the user/researcher to achieve repeatability more easily, saving valuable time and increasing effectiveness of usage of expensive and limited quantity of chemicals used in TFCR. To cover a wide range of temperatures, the heating system can go up to a high temperature of 120 °C.

### **Solving the UV problem**

In many cases of TFCR, UV exposure to the casted coating or film helps in better curing, faster formation and improved properties of the coating/film. Generally, a top mounted UV bulb is used to achieve required exposure. In such cases, Uniform UV distribution is not achieved, one can find concentric areas of different levels of exposure resulting in a wide range of properties across the film/coating.

TechCOAT solves this by providing multiple UV sources, in-built into the instrument, mounted on a UV reflective top surface, thereby increasing uniformity of distribution of UV rays across the film/coating.

Importantly, the exposure of UV rays is self-contained inside the instrument thereby preventing exposure of UV rays to the lab area around the instrument and also protecting the personnel working beside the instrument.

### **Solving the holding problem**

In TFCR, the formed films and coatings are generally of thin thickness in fractions & multiples of millimeters. In many cases, very delicate handling of these films and coating is required. Traditionally, after coating is formed, the substrate is handled by hand to transfer to ovens for further post processing, thereby inadvertently disturbing the integrity and uniformity of coating.

To solve this TechCOAT is provided with a vacuum chuck that enables vacuum holding of substrate/coating/film in order to reduce impact of holding. Vacuum chuck is designed to also consider to maintain the uniformity of heating across the surface. The vacuum chuck is driven by an oil less vacuum pump, which enables an uniform and clean method of holding.

TechCOAT can be used for a wide variety of applications, that include, but are not limited to the following –

1. Fuel Cell Membranes
2. Specialized Hydrophobic/Hydrophilic coatings
3. Paint coatings
4. Battery Research
5. X-ray research
6. Material Science Research
7. Medical coatings research
8. Gas and Liquid Separation
9. Oil and Gas research
10. Minerals and Ores research
11. Lighting, LED and Silicon-Chip Industry

## OVERVIEW

TechCOAT is a smart Automatic film applicator, which enables compact tape casting.

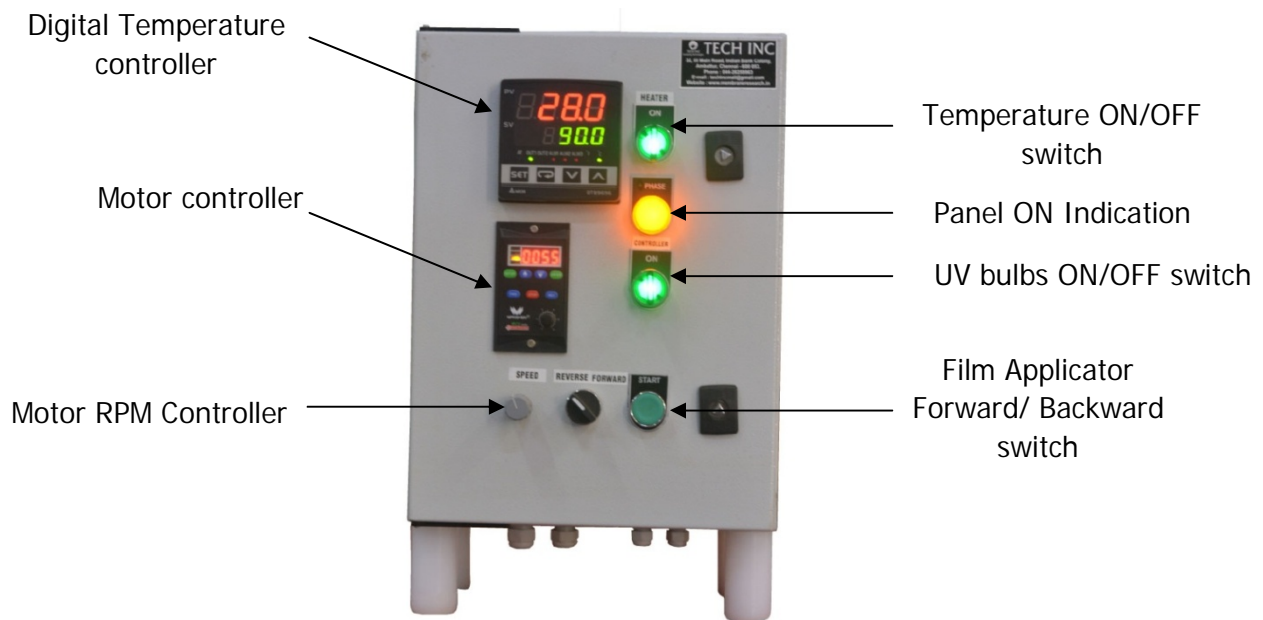
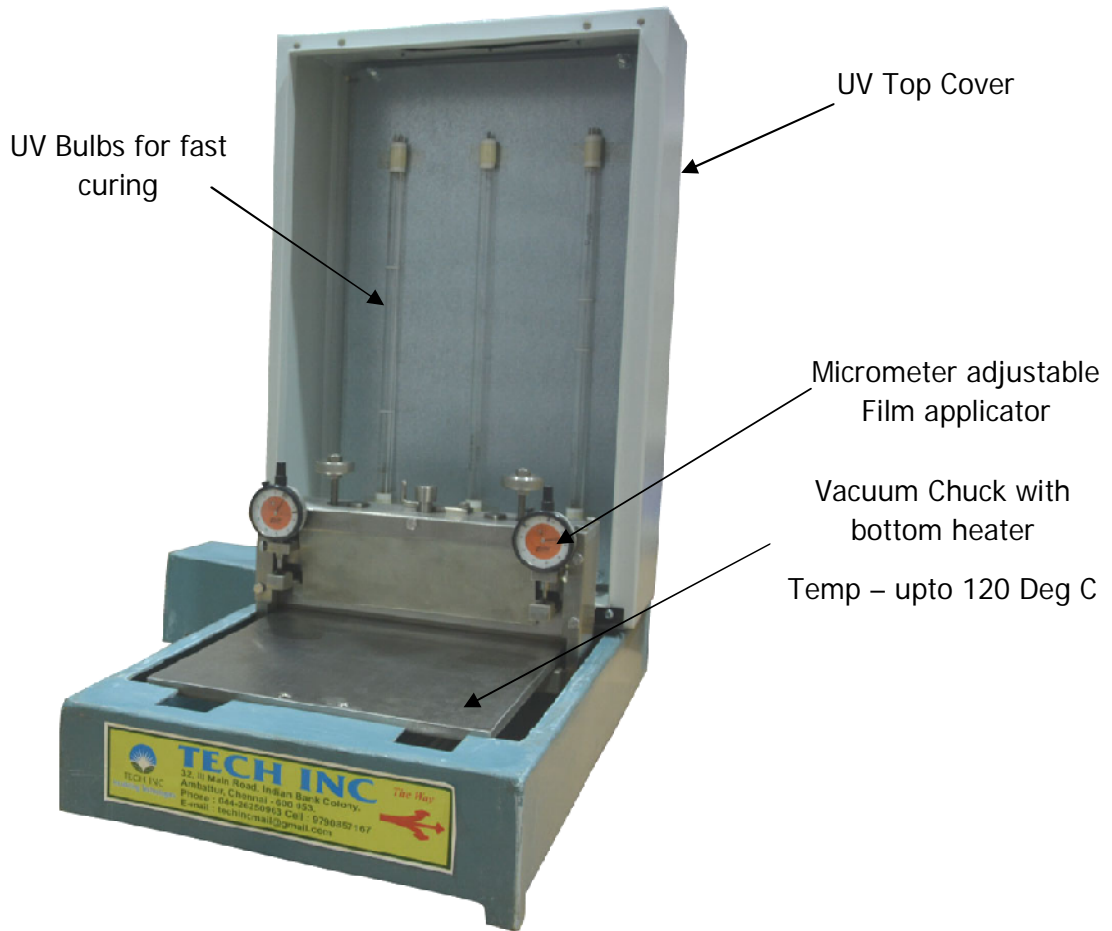
Film/coating thickness can be precisely controlled using micrometer adjustments. Heater is attached to the bottom of the vacuum chuck which allows the temperature to spread evenly throughout the plate.

An Electrical panel is provided with temperature sensor with PID controller to set the temperature of the coating surface, Motor controller, switches and knobs. This same panel also contains the controls to modify casting/coating speed and the controls to modify UV exposure.

Suitable Motor is provided with speed controlling facility. Toughened glass plate is provided to withstand the high temperature.

The Vacuum chuck (with <1mm hole) is made of Aluminum and is used to uniformly hold the substrate or coating. The vacuum chuck is capable of withstanding temperature up to 120 °C. Vacuum pump connection is provided in vacuum chuck.

## PARTS OF THE MACHINE



*Note: Picture shown is symbolic/ typical for reference only. Size/ shape and control shall change at the time of manufacturing depending on the requirement of the end user and with improvement/advancement in technology.*

## TECHNICAL SPECIFICATION

| S.No | Product Description |   |
|------|---------------------|---|
| 1    | Traverse Speed      | 10 – 100 mm/sec<br>Accuracy +/- 10mm/ sec   |
| 2    | Coating Area        | 320mm(L) x 180mm(W) due to the width and occupied area of the 100mm applicator<br><br>Suggested Maximum: 350mm(L) x 180mm(W) Reduced width to avoid slurry spilling off the vacuum bed<br><br>Length 10 - 350 mm adjustable by using Adjustable Position Switch |
| 3    | Vacuum Chuck        | Vacuum chuck made of Aluminum alloy/SS with < 1.0 hole<br><br>Vacuum Chuck Dimensions: <b>365mm(L) x 200mm(W)</b> 14"L x 8"W). Dimensions are approximate and may change based on improvements to the instrument.<br><br>Heatable upto 120°C                    |
| 4    | Film Applicator     | One 180 mm width micrometer adjustable film applicator is included (thickness adjustable from 0.01 - 3.5 mm)<br><br>One fixed thickness coating bar is included to coat film less than 10 microns   |
| 5    | Oilless Vacuum Pump | 1 No Included<br>120 L/min approx.- Oil less vacuum pump  |
| 6    | Heating cover       | 1 No included<br>Provided with 3 UV lights for faster drying<br>Suspension support for easy opening and closing   |



| S.No | Product Description                          |   |
|------|--|---|
| 7    | Thickness adjusting mechanism                |   |
|      | Rollers for thickness adjustment             | : 2 Nos Provided  |
|      | Vibration resistant springs & adaptors       | : provided  |
|      | Dial Gauges                                  | : 2 Nos provided  |
|      | Make of gauge                                | : Yamayo/ eqvt  |
|      | Gauge holding mechanism                      | : provided  |
|      | High precision casting blade                 | : provided  |
|      | Flat sheet membrane size                     | : 200mm x 250mm   |
|      | Casting Bed                                  | : Glass Plate   |
|      | Film thickness control                       | : 50 -100 mm/ Sec   |
|      | Head Control Accuracy                        | : 10 Microns  |
|      | MOC of blade                                 | : SS316   |
|      | Thickness of blade                           | : 5mm Min   |
|      | Blade lifting rod                            | : provided  |
|      | Side Roller mechanism for precision movement | : Provided  |
|      | Thickness Range                              | : 100 to 500 microns (0.1 to 0.5mm)   |
| c    | Electrical, Temperature and UV panel         |   |
|      | Location                                     | : Remote Stand alone, isolated from machine. Electrical parts away from chemical and heat exposure. |
|      | MOC  | : MS powder coated  |
|      | Make of the panel                            | : Schneider/ BCH/ Reputed make  |
|      | Make of the MCB                              | : Schneider/ Reputed make   |
|      | Rotary Switch                                | : Provided  |
|      | Switch control for switch ON the Motor       | : Provided  |
|      | Switch control for switch ON the Heater      | : provided  |
|      | RPM Controlling system                       | : provided  |
|      | RPM controlling knob                         | : provided  |
|      | Digital RPM Indicating panel                 | : provided  |
|      | Toggle switch for forward/ backward movement | : Provided  |
|      | Make of the cables                           | : Polycab/ reputed make   |
|      | Length of the power cable                    | : 2 mtrs min  |
|      | Length of the cable from Panel to motor      | : 2 Mtrs min  |
|      | UV ON-OFF Switch                             | : Provided  |

|   |                                     |                                    |
|---|-------------------------------------|------------------------------------|
| 8 | Heating Mechanism                   |                                    |
|   |                                     |                                    |
|   | Type of heating mechanism           | : Plate                            |
|   | Heater plate mounting plate & frame | : provided below the casting plate |
|   | Temperature sensor                  | : provided with sensing RTD        |
|   | MOC of the RTD                      | : SS                               |
|   | Length of the RTD cable             | : 2 Mtrs                           |
|   | Make of Temperature sensor          | : Delta/ Eqvt                      |
|   | Temperature range                   | : 0 – 120 °C                       |
|   | Motor Protecting cover              | : provided                         |
|   | MOC                                 | : FRP                              |



TECH INC OFFERS...

### MEMBRANE CASTING EQUIPMENT

Flat Sheet Membrane Casting Machine  
Flat Sheet Membrane Roll Casting Machine  
Hollow Fiber Membrane Casting Machine  
Large scale Hollow Fiber Membrane Casting Machine  
Large scale Automatic Roll Casting of Flatsheet  
Large scale Interfacial Polymerisation Coating machine

### MEMBRANE DISTILLATION AND CONTACTORS

Membrane Distillation Skid  
Membrane Distillation Stack

### MEMBRANE TESTING EQUIPMENT

|                       |                    |
|-----------------------|--------------------|
| FO & RO Test Skid     | Contact Angle      |
| UF Membrane Test Skid | Membrane Strength  |
| Lab Scale MBR         | Pore size/Porosity |

### MEMBRANE TEST CELLS

Rectangular Cell  
Circular Cell  
MD Cell  
FO/RO Cell

### STIRRED CELLS

High Pressure Stirred Cell  
Low Pressure Stirred Cell  
Solvent Stirred Cell

## CONTACT INFORMATION

No.32, 3rd Main Road,  
Indian Bank Colony,  
Ambattur, Chennai-600053

Phone : +91 44-26250044  
Mobile: +91 9840097830  
9790857167

Email: [mail@techinresearch.com](mailto:mail@techinresearch.com)  
Website: [www.techinresearch.com](http://www.techinresearch.com)