

## Textile Dyeing Machineries

The basic aim of **dyeing is achieving a level dyeing** that is of **correct shade**. The Dyeing machine helps to achieve these aims by: -

- Providing **correct and effective dye liquor** interchange for the goods.
- Monitoring and effective **control of rate of temperature** rise, and holding on at the set dyeing temperature.
- **Checking of the dyestuff and chemical** additives to the dye bath.

Some of the popular categories of dyeing machines are those used for **textile dyeing, leather dyeing** and for a variety of other industries that includes paints printing inks etc.

In the textile industry a variety of dyeing machines are used for dyeing. Some of these machines with minor operational modifications can easily accommodate new types of dyes and take advantage of the latest advances made in the dyeing equipment technology.

### Methods of Dyeing:

There are mainly three methods of dyeing:

- ✓ Exhaust Dyeing
- ✓ Pad Dyeing
  - Semi-Continuous Dyeing
  - Continuous Dyeing

### Exhaust Dyeing:

In exhaust dyeing, a **finite amount of textile materials** (in the form of fibers, yarn or fabric) is placed in the dye liquor and remains in its contact throughout the dyeing time, during which the dye molecules **gradually move (or exhaust)** from the liquor toward the fabric, for absorption and fixation in the textile material.

### Pad Dyeing:

In pad dyeing method, a **continuous batch of fabric in open width, passes through an impregnator (or padding trough) containing dye liquor**, followed by a passage between a pair of **squeeze rollers**. The pressure of the squeeze rollers can be adjusted to obtain a desired wet pick-up.

## Types of Textile Dyeing Machineries:

Most of these machineries **utilize latest advancement** in the dyeing technology to give high capacity dyeing along with **uniformity and smooth finishes**. For our convenience we have numbered below some of the popular categories of dyeing machines **although no claim is made here that this list is fully exhaustive**.

- Beam Dyeing Machine



- Hank Dyeing Machine



- Jet Dyeing Machine
- Jigger Dyeing Machine



- Paddle Dyeing Machine



➤ Package Dyeing Machine



➤ Winch Dyeing Machine



➤ Sample Dyeing Machine

## Winch Dyeing Machine

Winch dyeing machines comes with the **lucrative options of low-cost design, simplicity in operation and maintenance** yet **uncompromising** features when it comes to versatility.

The dyeing machine derives its name "**Winch**" as the fabric **rope gets circulated** in the machine by way of a **mechanical action of a horizontal rotor or reel**, called as a **winch** or sometimes **wince**.



### Advantages

- **Nozzle system** that gives **high liquor flow** that ensures a smooth process
- Savings in utility consumption and reduction in the **production cost**
- Can **scour, bleach and dye** various kind of fabrics
- **Ease of operation and maintenance.**

## Cold Pad Batch (CPB)

Cold Pad Batch Dyeing is one of the widely used **semi-continuous dyeing** process. It is mainly used in the **dyeing of cellulosic fiber like cotton or viscose** (knit and woven fabric) with **reactive dyes**. Now a days this process widely used in our **Woven dyeing industry** and it is a **development process for Knit dyeing** industry in Bangladesh. It is primarily a cold method where the dyeing temperature is **20-25°C** and use **Cold to Medium Brand Reactive Dyes**, and so it is called Cold Pad Batch (CPB) Dyeing.

### Advantages of CPB

- ✓ **Maximum color yield** as compared to other methods.
- ✓ Less requirement of Energy, Water and Chemical since **fixation is carried out at room temperature**.
- ✓ **Cost effective** Dyeing Method.
- ✓ **Good levelness** of dyeing.
- ✓ **Longer yardages** possible to dye.
- ✓ **Elimination of salt** during dyeing. (100% Salt Free Dyeing)
- ✓ **Less impact** on environmental pollution.

### Recipe for CPB Dyeing Process

Reactive Dyes = 9.00 g/l

Urea = 40 g/l

Soda Ash ( $\text{Na}_2\text{CO}_3$ ) = 20 g/l

Caustic Soda ( $\text{NaOH}$ ) = 6 g/l

Levelling Agent = 1 g/l

Sequestering Agent = 1 g/l

Wetting Agent = 1 g/l

**Urea** used to keep the Dye bath cool and it acts as a **Hygroscopic Agent**. Here (**Soda Ash & Caustic**) – Chemical (Alkali) is used as a **Fixing agent** and also control the **pH of Dye Bath**.

## Thermosol Dyeing Machines

Thermosol dyeing machines are specialized equipment used primarily in the textile industry for **dyeing polyester and other synthetic fabrics**. They operate using a **continuous dyeing process that applies dye at high temperatures**, allowing for vibrant colors and improved color fastness.

### Key Features:

- **High Temperature and Pressure:** Thermosol machines use high heat (typically around 200°C) and pressure to ensure that the dye penetrates the fibers effectively.
- **Continuous Process:** Fabrics are continuously fed through the machine, which allows for efficient dyeing of large quantities.
- **Low Water Usage:** Compared to traditional dyeing methods, thermosol dyeing typically uses less water, making it more environmentally friendly.
- **Quick Color Change:** These machines often feature quick change capabilities, allowing for rapid switching between different dye colors.

### Benefits:

- **Vibrancy:** Produces bright, long-lasting colors.
- **Efficiency:** Reduces dyeing time and resource consumption.
- **Versatility:** Suitable for a variety of synthetic fabrics, including polyester and nylon.

### Applications:

- Used in various sectors, including fashion, home textiles, and industrial fabrics.

### Thermosol process involves the following operations:

- ✓ **Padding the dye liquor** on to the textile substrate
- ✓ **Drying** the goods
- ✓ **Fixation** of the dyes (**Thermosol treatment**)

### The key factors for faultless Thermosol dyeing:

- ✓ Careful and **uniform pre-treatment** of the textile material
- ✓ Use of dyes and auxiliaries **specially selected** for this process
- ✓ **Uniform operation** of the thermosol dyeing range