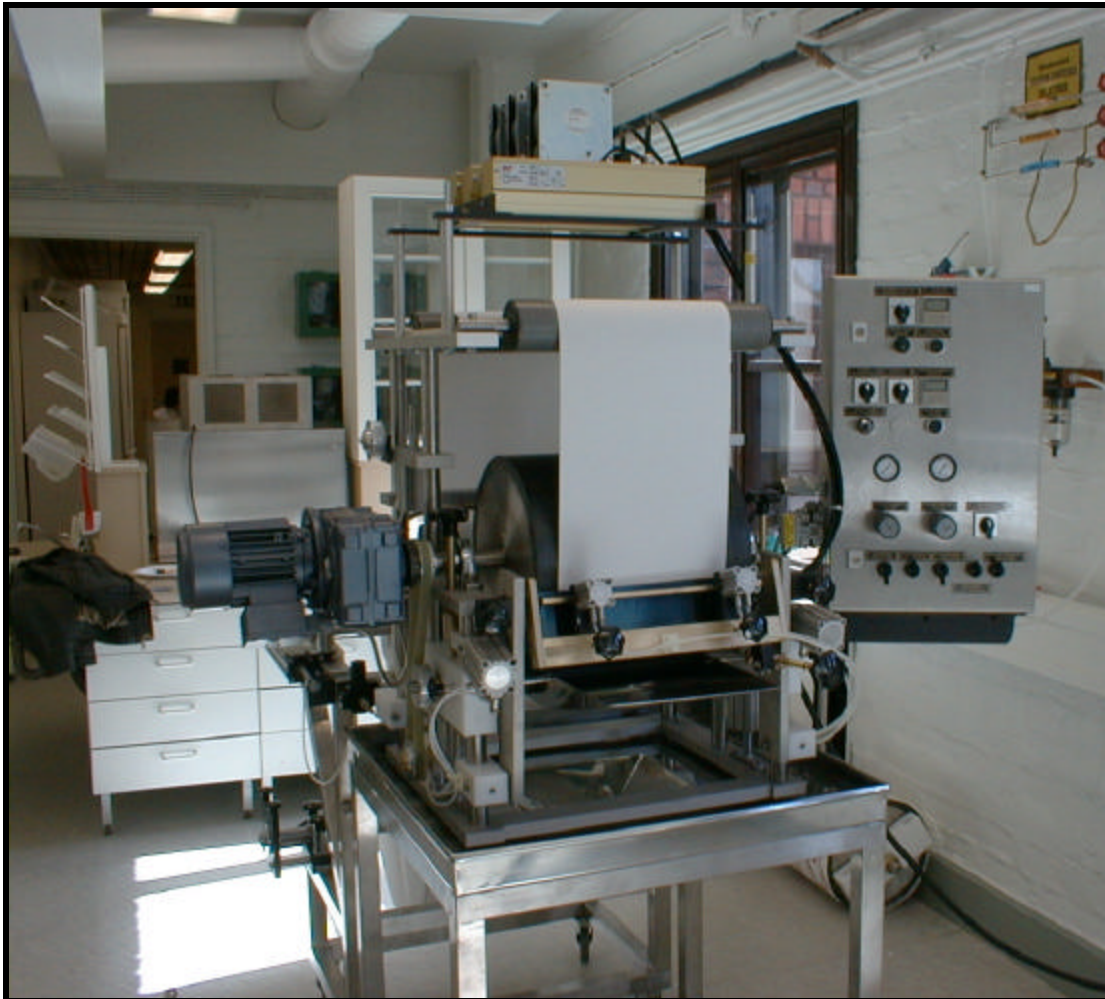


# Technical Description

## DT Laboratory Coater



**KALTEC SCIENTIFIC, INC.**

22425 Heslip Drive

Novi, Michigan 48375-4138

t: 248.349.8100 f: 248-349-8909

## **1. GENERAL**

## **2. DESCRIPTION OF THE MAIN UNITS**

### **2.1 BLADE COATING UNIT**

- 2.1.1 Backing roll
- 2.1.2 Applicator roll
- 2.1.3 Blade unit

### **2.2 FILM/SIZE PRESS**

- 2.2.1 Film Transfer Press
  - 2.2.1.1 Backing roll
  - 2.2.1.2 Applicator roll
- 2.2.2 Size Press
  - 2.2.2.1 Backing roll
  - 2.2.2.2 Applicator roll

### **2.3 WEB UNWIND**

### **2.4 WEB REWIND**

### **2.5 DRYERS AND HEATERS**

- 2.5.1 Description
- 2.5.2 Air Dryer
- 2.5.3 Infrared Heater
- 2.5.4 Air handling equipment for Air Dryer and IR Heater

### **2.6 GUIDE ROLLS**

## **3. DIMENSIONING DATA**

### **3.1 GENERAL DIMENSIONING DATA**

- 3.1.1 Dimensions of the coater
- 3.1.2 Blade Coating Unit
- 3.1.3 Film Press Unit
- 3.1.4 Unwind
- 3.1.5 Rewind
- 3.1.6 Air Dryer
- 3.1.7 Infrared Heater
- 3.1.8 Air Handling Equipment fo Air Dryers and IR Heater
- 3.1.9 Dimensions of blade and rod

## **4. DRIVES**

### **4.1 MOTOR LIST**

### **4.2 CONTROLS**

## **5. SCOPE OF DELIVERY**

### **5.1 REQUIREMENTS OF THE BUYER**

### **5.2 DOCUMENTATION**

## 1. GENERAL

The DT Laboratory Coater is a small, versatile and efficient laboratory coater especially developed for pigment coating and surface sizing of paper and board. The three coating units (blade coating, film coating, and size press) represent the three most industrially used coating processes. One of the unique features of the DT Laboratory Coater is the possibility to coat sheets as well as a web. The DT Laboratory Coater is made for a sheet width up to 350 mm. The coater is also planned for web coating. The maximum width of the web is 300 mm and the coated width is 265 mm. The maximum roll diameter is designed approximately for 500 mm. The main building material of the DT Laboratory Coater is stainless steel. The Laboratory coater requires only a little space and can be used in a regular laboratory environment.

## 2. DESCRIPTION OF THE MAIN UNITS

### 2.1 BLADE COATING UNIT

The basic blade coater is of the type flooded nip trailing blade. It consists of a backing roll, applicator, and a blade unit. The drive can be connected in such a way that the backing roll either makes one single revolution (fast acceleration - constant speed - braking), or works continuously. Continuous rotation is used for web coating, and during washing of the coater. The coated width is max. 265 mm.

#### 2.1.1 Backing roll

- Diameter 313 mm (350 mm wide)
- Material Stainless Steel
- Cover thickness 20 mm
- Cover hardness 42 +/-3 P&J (The cover hardness can be discussed according to customer specifications)
- Cover AKHYDRIL™ ZP 42 J (The type of cover can be discussed according to customer specifications)
- Shaft Stainless steel D30

#### 2.1.2. Applicator roll

- Diameter 75 mm
- Material POM polymer (The type of cover can be discussed according to customer specifications)
- Shaft Stainless Steel D20
- Distance to backing roll Adjustable 0 - 10 mm
- Color pan Stainless Steel
- Drive Mechanical chain connection to the backing roll of the coater

### 2.1.3 Blade unit

The blade unit is of the type inverted blade. A metering rod can be used instead of the blade. The blade coating head is moved pneumatically to its working position. The blade unit has the following characteristics:

- Blade tip angle                      Adjustable between 0 and 50 deg., which makes it possible to run the coater either in the bevelled blade, or in the low angle mode.
- Blades                                      Normal coating blades are used. For 84 mm and 100 mm blades the blade tip is at the rotation point of the blade table. Other blades can be used e.g. longer blades for bent blade.
- Blade load                                a) Adjustable with pneumatic pressure cylinders  
b) Adjustable with micrometer screws to obtain a preload and a constant blade load. This loading mode is commonly used in bent blade.
- Blade attachment                      Mechanical
- Blade free length                      Adjustable
- Rod holder and rod                      10 mm rod and a dephorian rod bed, prof 302 is provided

## 2.2 FILM/SIZE PRESS

### 2.2.1 Film Transfer Press

The film press coater is one sided. The applicator roll is driven and the backing roll is mechanically connected by a chain to the applicator roll. The blade coating backing roll works as applicator roll in the film press. The unit can be run either with sheets or with a web.

#### 2.2.1.1 Backing roll (upper roll)

- Diameter                                313 mm (350 mm wide)
- Material                                 Stainless Steel
- Shaft                                      Stainless Steel D30
- Cover hardness                        42 +/-3 P&J (The cover hardness can be discussed according to customer specifications)
- Cover thickness                        20 mm
- Cover                                      AKHYDRIL™ ZP 42 (The type of cover can be discussed according to customer specifications)
- Distance between rolls               >50 mm in the open position
- Pressure between rolls               max. 7 kN/m

### **2.2.1.2 Applicatorroll (lower roll)**

The backing roll of the blade coating unit (2.2.1.1) is used as applicator roll in the Film Press coater.

### **2.2.2 Size Press**

The Size Press coater is one/two-sided. The same unit as for Film Press coating is used. The lower roll is driven and the upper roll is mechanically connected by a chain to the lower roll. The angle between the lower and upper rolls is 45° and the sizing material is poured into the nip during the run. The unit can be run either with sheets or with a web. A special soft sizing roll is an option to consider if used often.

#### **2.2.2.1 Backing roll (upper roll)**

The backing roll (upper roll) of the Film Press coating unit (2.2.1.1) is used as upper roll in the Size Press.

#### **2.2.2.2 Applicatorroll (lower roll)**

The backing roll of the blade coating unit (2.2.1.1) is used as lower roll in the Size Press

## **2.3 WEB UNWIND**

The unwind takes place from an unwind/rewind stand with mechanical or pneumatical brake.

- Max. roll diameter 500 mm
- Core diameter 76.2 mm (3") other sizes are available
- Shafts expandable shaft for 3" other sizes are available
- Adjustment The unwinding of the roll can be adjusted on one side in the machine direction
- Tension Manually adjustable from the brake unit

## **2.4 WEB REWIND**

The rewind takes place on a unwind/rewind stand with a surface contact type (pope) of a system. The pope is driven by a driver roll without brushes, without gears and virtually without noise. Only the roller tube of the driver roll rotates. The speed of the roll can be varied from 0.15 to 1.5 m/s. The pressure of the core against the pope roll is adjusted manually by pneumatic cylinders.

- Max. roll diameter 500 mm
- Core diameter 76.2 mm (3") other sizes are available
- Shafts Expandable shaft for 3" other sizes are available.
- Adjustment The pressure of the pneumatic cylinders of the pope roll can be regulated in order to obtain even rolls.
- Tension Speed (Torque) is adjustable with a potentiometer from control console

## **2.5 DRYERS**

### **2.5.1 General description**

The laboratory coater is equipped with an electrically powered air dryer and an electrically powered Infrared heater (IR).

### **2.5.2 Air Dryer**

The air dryer is a single-sided electrically powered impinging jet dryer. The air circulates within the air dryer, only a minimum amount of air is hence used and replaced with the fresh air. Circulated drying air and fresh air are heated electrically. The circulation fan is located at the side of the dryer. Fan and dryer are connected together by insulated air ductwork. The power to the dryer is adjustable from the control panel at the control console. The temperature adjustment is done manually from control console by choosing the needed energy input. The fan is automatically turned on when using any dryer from the control console including automatic cooling. The cooling time is controlled by a timer located in the control console to cool off the resistant and the IR-lamps after usage. The heater and the dryer are connected to a timer for a safety purposes (see 2.5.3).

### **2.5.3 Infrared Heater**

The infrared unit consists of a complete, encapsulated IR-cassette for heating and drying, and has an external fan for internal cooling. The infrared unit is provided with 3 IRT-Monocassettes. The cassettes have built-in overheating protection, which can be reset on the IRT monocassette unit. The noise level does not exceed 70 dB.

The IR-heating is electrically powered for heating and drying, the sheet and the web. The unit has a fire proof plate under the web draw line to put the sheet on when heating or drying a single sheet. The plate works also as a protection of the polymer covered rolls from overheating. The unit can be installed in front of the coater (very close to backing roll or on top of the coater. The power to the IR Heater can be adjusted one cassette at the time by switches on the control cabinet, every step lightens an other monocassette. A minimum of three cassettes is recommended to ensure a 60 - 70° C temperature of the web (paper) after the infrared heating unit. For sheet coating the infrared dryer can also be put on a table for easy use. The infrared unit is equipped with timer for sheet drying. The setting of the drying time is easy and protects the sheet from burning when recommended times are used.

### **2.5.4 Air handling equipment for Air Dryer and IR Heater**

The air dryer has one circulation air fan. The fan is of radial type and operates at ambient temperature. The cooling fan for the infrared dryers is of radial type and operates at ambient temperature.

## 2.6 GUIDE ROLLS

Guide rolls are of the same size (diameter 75 mm) used throughout the machine. The guide rolls are mounted on a fixed shaft with the bearing between the shaft and the baffle. The rolls are made of anodized aluminium, the shaft is in stainless steel.

## 3. DIMENSIONING DATA

### 3.1 GENERAL DIMENSIONING DATA

#### 3.1.1 Dimensions of the coater

- Length of the coating unit 800 mm (approx.)
- Minimum working space 800 mm (approx.)
- Length of the unwind/rewind standbuck 1000 mm (approx.)
- Minimum working space 800 mm
- Width 1600 mm
- Height 2400 mm
- Height of room 2500 mm min.
- Machine frame with guide rolls 250 kg (approx.)
- Unwind/rewind excluding paper roll 100 kg (approx.)

#### 3.1.2 Blade coating Unit

- Web width 300 mm
- Coated and cut width 250 mm
- Applicator width 268 mm
- Backing roll width 350 mm
- Max. speed sheet 100 m/min
- Max. speed web Depending on dryer options

#### 3.1.3 Film Press Unit

- Web Width 300 mm
- Coated and cut width 250 mm
- Applicator width 268 mm
- Backing roll width 350 mm
  
- Max. speed sheet 100 m/min
- Max. speed web Depending on dryer options

#### 3.1.4 Unwind

- Expanding shaft 3" (76.2 mm)
- Max. core length 500 mm
- Weight of shaft 13 kg

#### 3.1.5 Rewind

- Expanding shaft 3" (76.2 mm)
- Max. core length 500 mm
- Weight of shaft 13 kg

### 3.1.6 Air Dryer

- Nozzle width 300 mm
- Drying length 460 mm
- Dryer hood length 460 mm
- Installed heating power 7.5 kW
- Operating temperature max. 200° C

Total of 7 kW connected to 3 phase, 220 Volt

### 3.1.7 Infrared Heaters

One coater includes 3 IR-cassettes. Specifications below are for one IR-cassette.

- Type LE360-1; 126117
- Voltage 230 V
- Power 2 kW/Cassette
- Current 8.5 A/Cassette
- Frequency 50 Hz
- Dimension (LxWxH) 363 x 64 x 144 mm
- Weight 2.3 kg

Total of 6.2 kW connected to 3 phase, 220 Volt

### 3.1.8 Air Handling Equipment for Air and IR Dryers

1 pc circulation air fan for two dryer pairs

- Radial type
- Flow rate 0.15 m<sup>3</sup>/s
- Motor 0.20 kW, 1000 rpm
- Operation temperature ambient

1 pc infra cooling fan

- Radial type
- Flow rate 0.10 m<sup>3</sup>/s
- Motor 0.14 kW, 1000 rpm
- Operation temperature ambient

### 3.1.9 Dimensions of blade and rod

- Regular coating blades
- Blade table is pre-drilled for blade lengths 100 mm and 84 mm
- 10 mm rod to be used at 100mm blade adjustment
- 10 mm rodholder and rod

## 4. DRIVES

### 4.1 LIST OF MOTORS AND STEERING

Item	Location	Qty	kW	rpm n1	Drive	Steering	Velocity m/min (Note)
UW	Unwind	1			Friction Plates	Pneumatic Valve with analog display	
CU	Backing roll	1	0.37	1370	Gear	AC Inverter	100
CU	Applicator roll	1			Chain		20% of Backing roll
FP	Backing roll	1			Chain		1:1 of Backing roll
FP	Applicator roll				See CU		
CU/FP	Rod unit pneumatic	1			Gear	Pneumatic Valve	Easy direction change
RW	Rewind	1	0.55			AC Inverter	0 - 1.5 m/s D135
IRF	IR Cooling Fan	1	0.105	1000	Direct		
CAF	Circulation Air Fan	1	0.2	1000	Direct		

### 4.2 CONTROLS

Tension control is carried out with potentiometers situated in the main console for the rewind and at the unwind/rewind frame for the brake.

Item	Unit	Qty	kW	Inverter type / option
UW	Unwind			
CU	Backing Roll	1	0.55	Yaskawa VS-606V7
CU	Applicator Roll			
FP	Backing Roll			
FP	Applicator Roll			
RW	Rewind	1	0.55	Yaskawa VS-606V7
CAF	Circulation Air Fan			

## 5. SCOPE OF DELIVERY

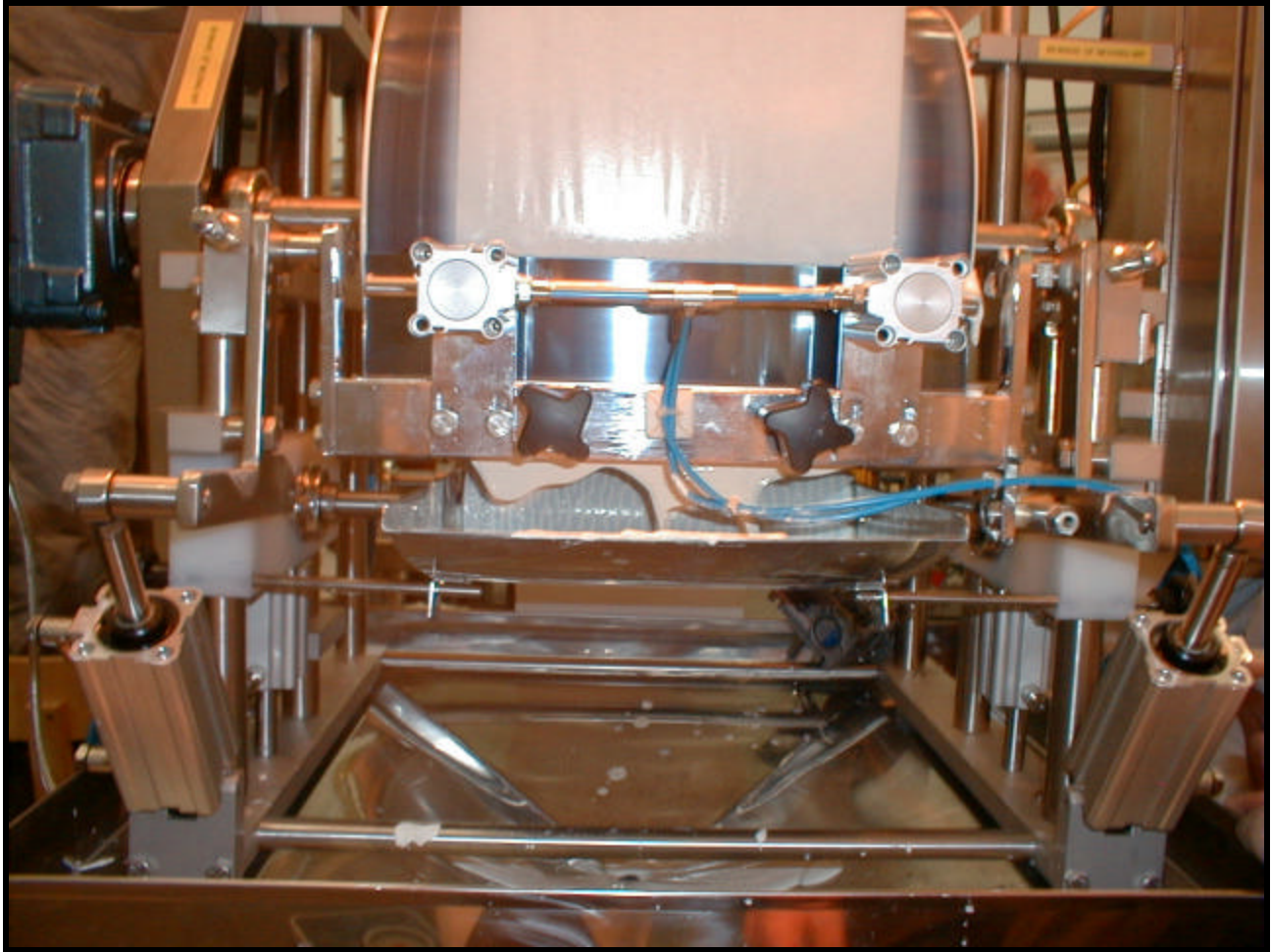
### 5.1 TO BE ARRANGED BY THE BUYER

- Air conditioning of the room
- Air for instrumentation
- Pure dry oil free air. Min pressure 6 bar.
- Minimum pipe diameter to machine 8 mm.
- Water, mainly for cleaning
- Sewage
- Architectural works, grouting, openings, lead-throughs
- Electricity (220 Volt, 3 phase, 75 amp with grounding)
- Special safety arrangements
- Safety shields if special arrangements

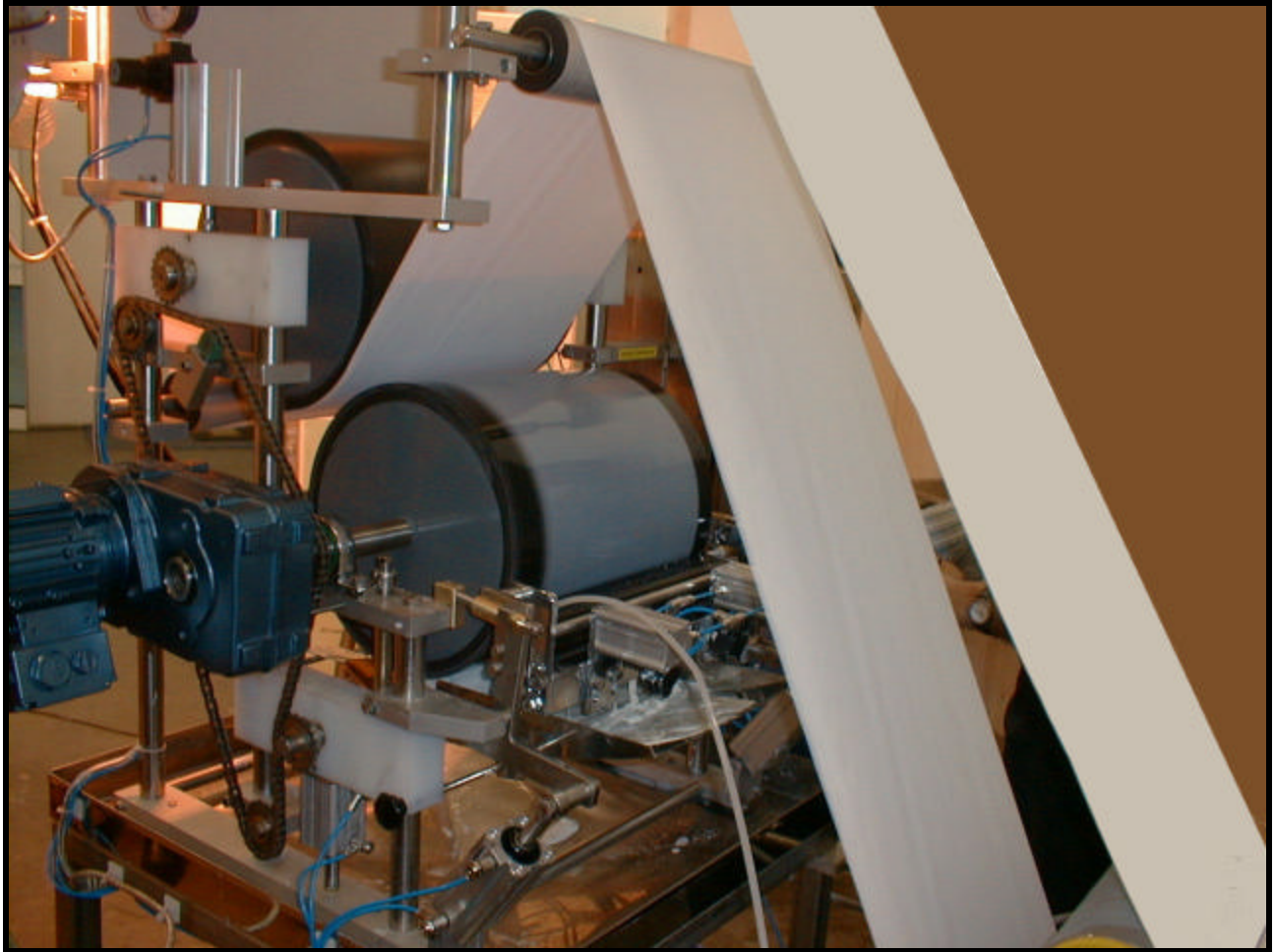
### 5.2 DOCUMENTATION

Following documentation will be supplied:

- Owners manual, one paper copy in English
- Electrical drawings, one set of paper copies (A4)
- One papercopy of main parts of the coater, coater bladetable and unwind/rewind



**Blade Coating**



**Film Press**