



UpperShell New Materials Development

Equipment Specification

Tape Casting Machine

Model: US-MTCM-350A



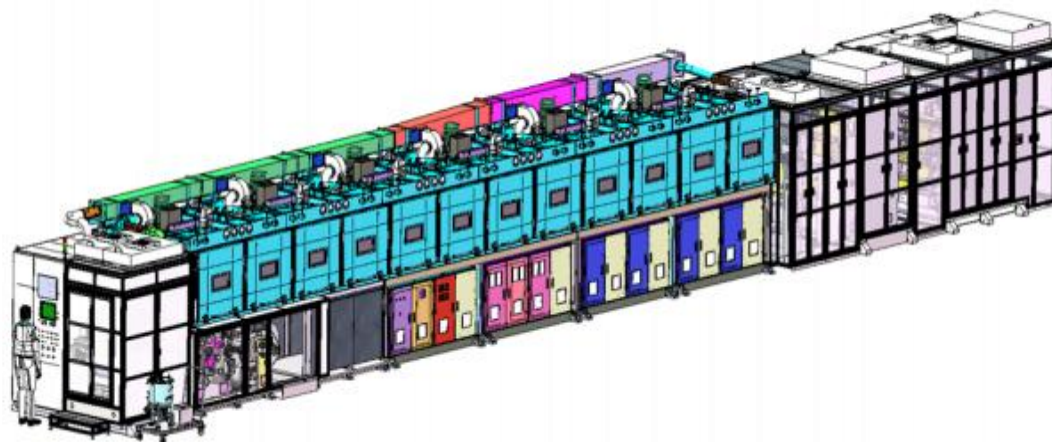
1. Overview

This tape casting machine is a new type of high-precision, high-reliability, and highly stable high-speed film casting machine designed for ceramic capacitors. It consists of manual unwind and rewind units, a casting unit, an oven exit traction unit, and an electric heating drying system.

Key features of the equipment include:

- The oven uses a high-efficiency drying system with an over-roll plus suspended drying tunnel design.
- The tape caster employs a PLC control system, imported motors, and precision gear reducers to achieve precise motion control according to process requirements.
- A reserved MES system communication interface allows integration with the customer's MES system.
- Digital tension control for the substrate with constant tension during unwinding, casting, and taper tension during rewinding.
- Centralized system parameter control with a touchscreen human-machine interface (HMI) featuring hierarchical control. Process parameters can be locked, stored, and recalled.





2. Substrate and Slurry Parameters

Substrate and Slurry Parameters	
PET Film Width	160- 400 mm
PET Film Thickness	26-38 μ m Density: 1.4 g/cm ³ (uniform film dispersion)
PET type	Single-side silicon
Tape Casting Slurry	Ceramic slurry (solid content fluctuation $\leq \pm 1\%$ within the same batch)
Solvents	Toluene, Ethanol
Solutes	Barium titanate, Alumina, Silica
Casting Thickness (dry)	1-20 μ m, Accuracy within 3%-5%
Casting Width	140-350mm
Solid Content	45%-60%
Slurry Density	1.5-2.5g/cm ³
Viscosity	100-1000mPa.s

3. Equipment Parameters

Equipment Parameters	
Roller Width	600mm
Casting Speed	Max 12 0m/min
Casting Thickness	1-20 μ m, Accuracy within 3%-5%
Unwinding	■ Roll Diameter: Max ϕ500 mm ■ Air shaft load capacity: 250 kg ■ Core Size: 3-inch inner diameter ■ Core Material: Metal, ABS
Rewinding	■ Dual-shaft rewinding with cantilever air shaft; feeding trolley docking ■ Single roll diameter: Max ϕ500 mm ■ Air shaft load capacity: 250 kg ■ Core Size: 3-inch inner diameter ■ Core Material: Metal, ABS ■ Each rewinding shaft equipped with 3-inch to 6-inch expansion sleeve
Tension Range	■ Max: 150 N / full width ■ Tension fluctuation: $\pm$1.5% FS
Safety Protection	Emergency stop switches configured on both unwind and rewind units
Static Removal Devices	Explosion-proof static elimination bars installed at unwind, head, traction, and rewind stations
Oven Heating Method	Air nozzles blow air from top and bottom
Oven Temperature	Max:120°C

Electrical Installed Power	Approximately 280 kW (subject to actual machine)
Dimensions	Approx. L 20 m × W 2.6 m × H 2.4 m

4. Safety Protection

The equipment must consider relevant safety issues for operators, including protection against sharp edges, pinching, burns, entanglement, impact, cuts, crushing, pressure injuries, punctures, abrasions, and other related hazards. Key areas must have signs, warnings, and alerts to prevent mechanical injuries. A detailed safety protection design plan must be provided.

The wiring inside the equipment power cabinet must be reasonably designed, and the cabinet should have drying measures to prevent condensation and water accumulation that could cause short circuits.

All switches on the equipment must be equipped with leakage protection switches.

4.1 The turret must have a locking (holding) function (this can be omitted if there is no automatic roll change function).

4.2 The rewind turret must have a photoelectric safety protection function to prevent personnel from entering the turret (omit if no automatic roll change function).

4.3 Safety protection design is required for the unwind and rewind rolls in case of sudden power failure.

4.4 Emergency stop buttons must be installed at the rewind, unwind, and outside protective cover areas.

4.5 Safety warning signs must be placed at dangerous areas such as moving parts, pressing, cutting, and heat sources.



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- 4.6 Consider the insulation rating of the hydraulic system and electronic components.
- 4.7 If the equipment is used in high-altitude regions, it must be designed accordingly.
- 4.8 For high-altitude use, consider the insulation rating of hydraulic systems and electronic components specific to such environments.
- 4.9 Consider static electricity protection for all switches.
- 4.10 All equipment switches must be leakage protection switches.
- 4.11 Emergency stop buttons and safety pull cords must be reasonably arranged in internal maintenance areas.
- 4.12 Safety guards must be installed on transmission parts.