

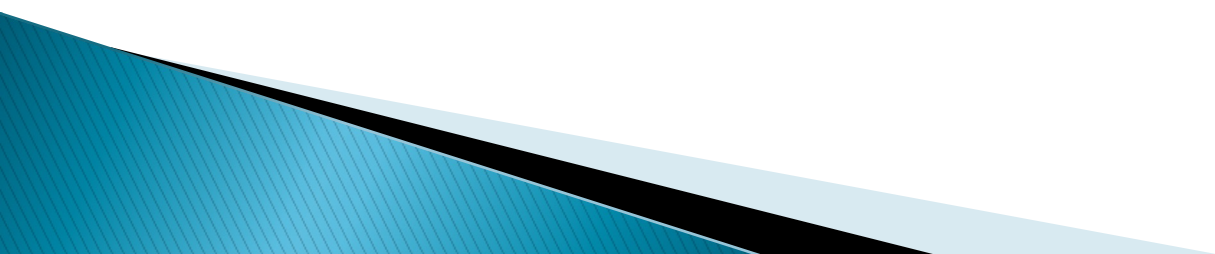


Ragan Technologies, Inc.

Model X4 Tape Casting System

A New Paradigm in Tape Casting Thickness Control

- Automatic thickness control to $\pm 1\mu\text{m}$!
- Closed-loop feedback of wet coating thickness
- Computer controlled doctor blade gap adjustment
- Real-time continuous dry thickness monitoring
- Aqueous or solvent systems
- Advanced film drying techniques result in small footprint





Ragan Technologies, Inc.

Model X4 Tape Casting System





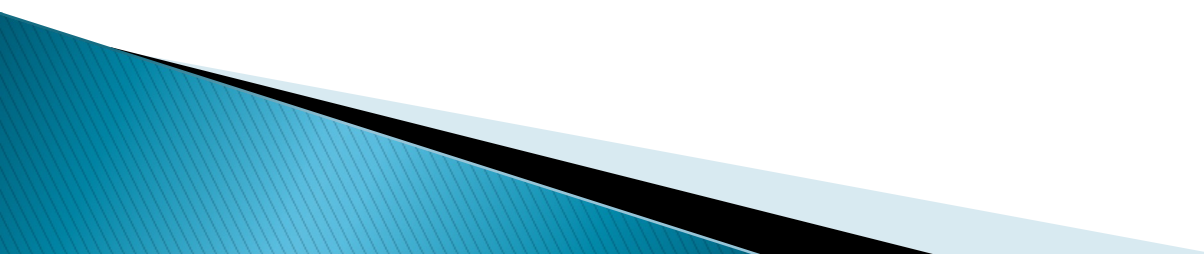
Ragan Technologies, Inc.

Model X4 Tape Casting System

System is designed for precision coating of slurries on polymer films or metal foils.

Thickness range $<10\mu\text{m}$ to $>400\mu\text{m}$ depending on rate / drying capacity.

Drying system designed to dry film from the bottom, atmosphere above controlled to prevent skinning, reducing drying cracks.





Ragan Technologies, Inc.

Model X4 Tape Casting System

System Operation;

Carrier film passes over static eliminators to release the charges that hold the particles to the film. Film then passes through a series of sticky rollers to remove any debris. HEPA filtered air charges the system. Slurry is fed into casting head via peristaltic pump. Optical sensors control the level of the slurry in the casting head. Wet film is monitored via Beta transmission attenuation. Desired film thickness (density) is maintained by computer controlled feed-back loop to doctor blade. Adjustments to doctor blade gap are made via very high ratio gear box to minimize backlash. Wet film travels over heated platens through several zones with independent control. Air flow over the drying wet film is laminar with air input and outflow independently controlled for each zone. Confocal colorimetric sensors continuously monitor the dried film thickness. Cast material is then wound up onto a roll. All process parameters and data are exported into data file.



Ragan Technologies, Inc.

Model X4 Tape Casting System

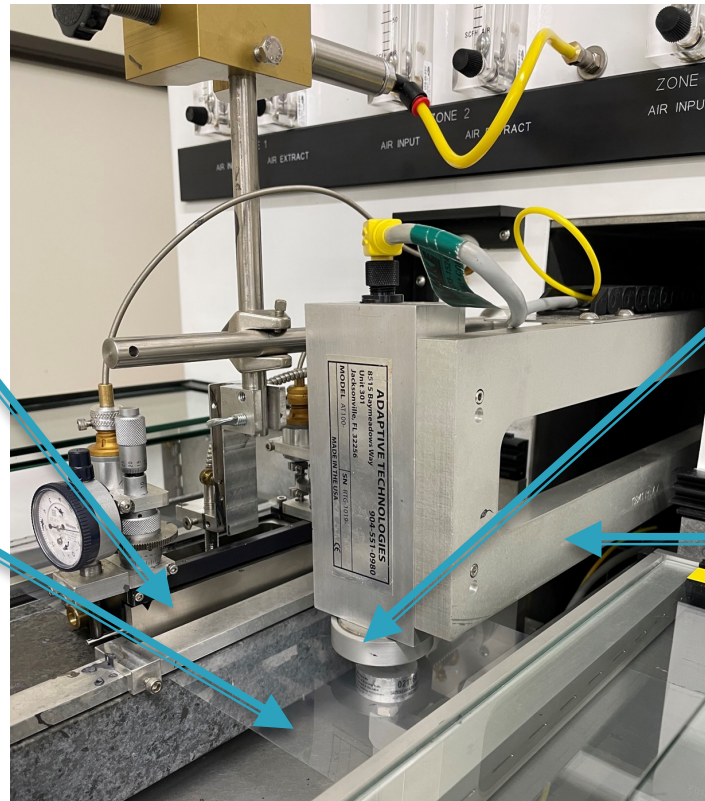
Scanning Wet Thickness Sensor

Casting Head

Mylar Web

Beta Sensor

Scanning "C" Frame





Ragan Technologies, Inc.

Model X4 Tape Casting System Operator Controls and Touch Screen





Ragan Technologies, Inc.

Model X4 Tape Casting System

Casting Head

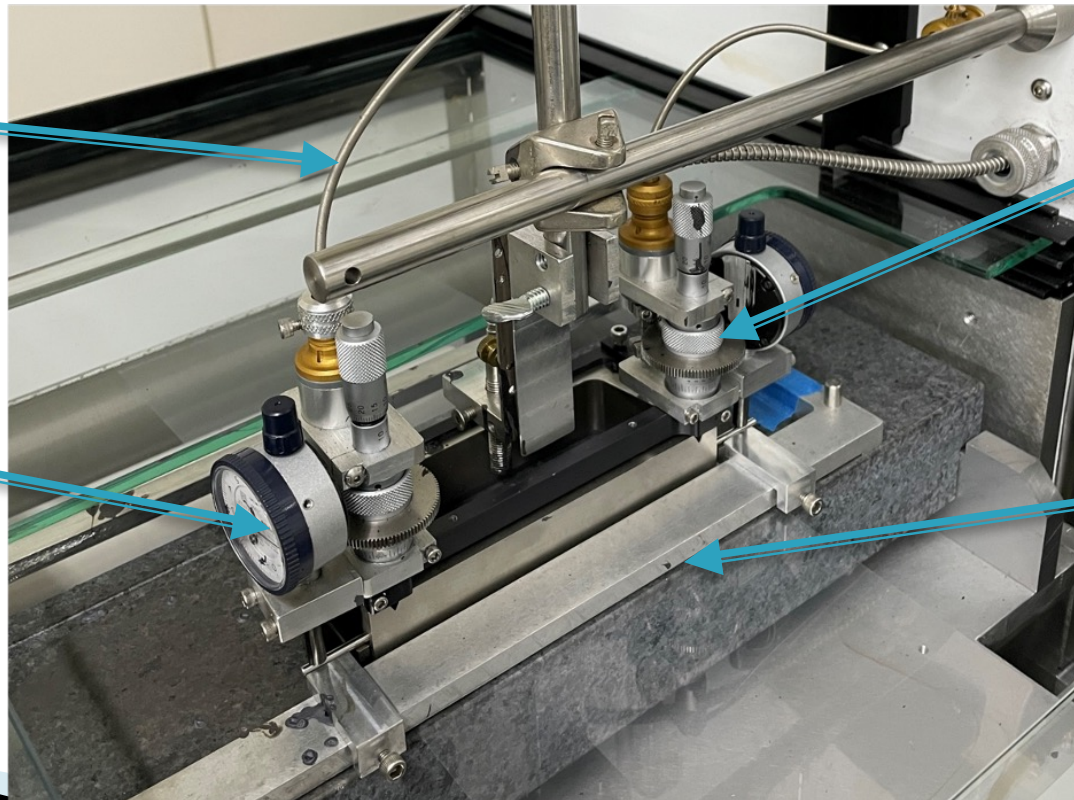
Adjusting Motors Remotely Mounted for Explosion Safety

Flex Shaft

Dial Indicators
reading 0.0001"

Compound micrometer
screws – 25 μ m per
revolution

Granite Surface





Ragan Technologies, Inc.

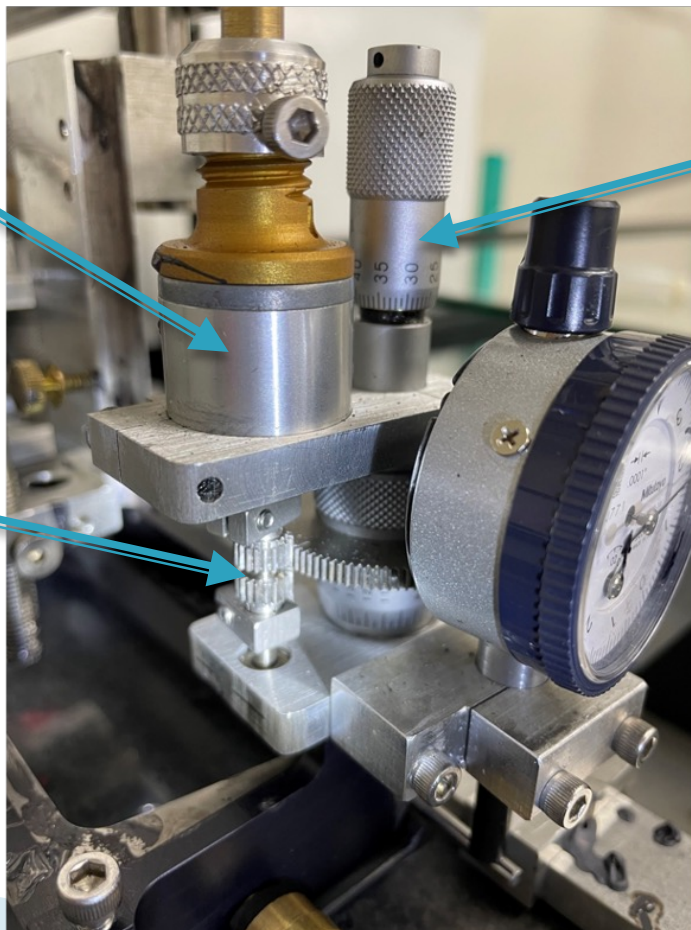
Model X4 Tape Casting System

Doctor Blade Adjustment Mechanism

54:1 Planetary Gearbox

5:1 Spur Gear

Compound Micrometer



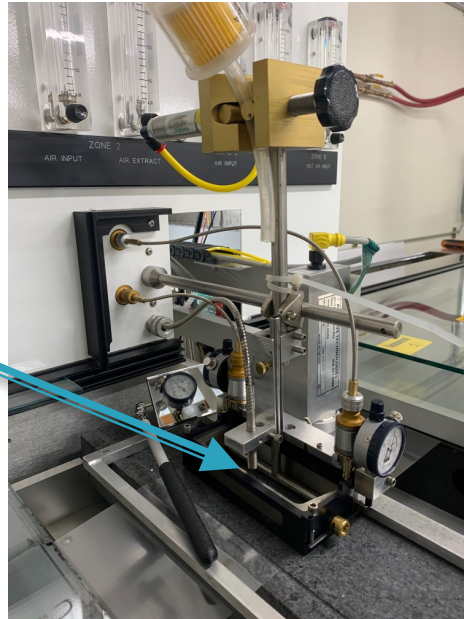


Ragan Technologies, Inc.

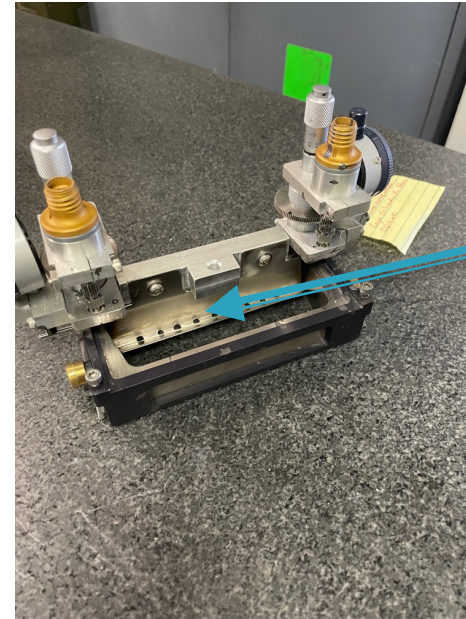
Model X4 Tape Casting System

Automatic Slurry Level Control

Optical sensor controls
Slurry level in casting head



Manifold distributes
Slurry evenly





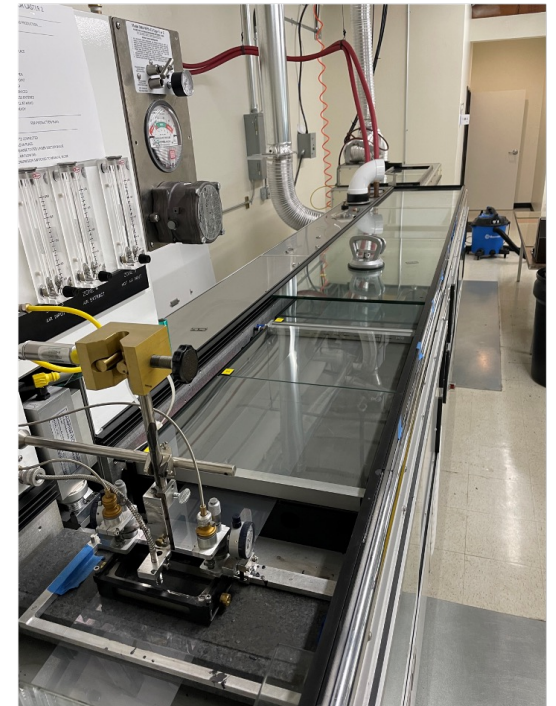
Ragan Technologies, Inc.

Model X4 Tape Casting System

Drying System

Arced bed drying path with
fluid heated platens

Three horizontal zones with
independent air and temperature
control

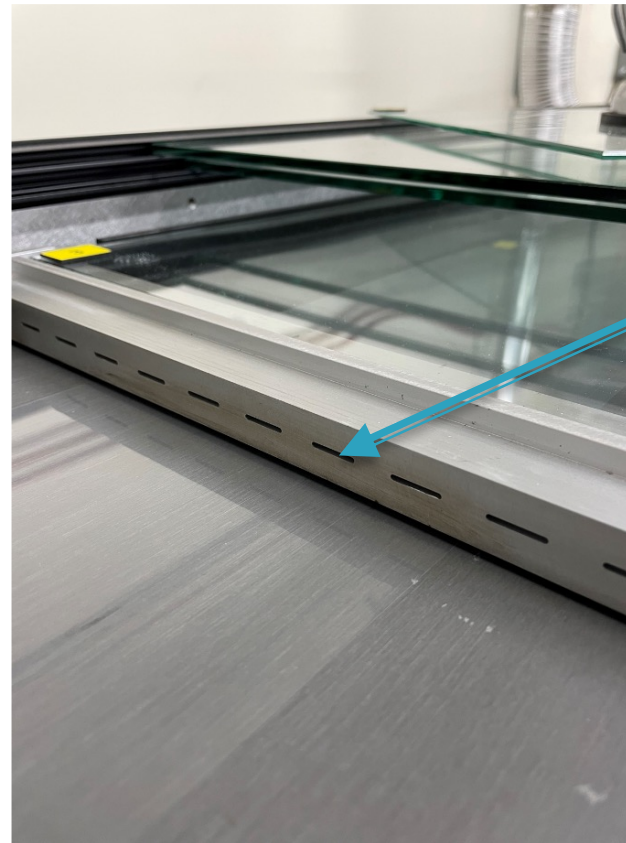




Ragan Technologies, Inc.

Model X4 Tape Casting System Drying System

Active air flow management
with air injection and
vacuum removal



Air-flow slots for
laminar flow



Ragan Technologies, Inc.

Model X4 Tape Casting System

Contamination Removal

Sticky Rollers

Blue silicone – contact web
white peel-off for cleaning blue

All rollers separate when not in use
to prevent bonding and damage

Rolls are preceded by static
eliminators to release the charges
that hold the particles to the film





Ragan Technologies, Inc.

Model X4 Tape Casting System

Drying Path Extension

Wheel reduces machine length
by 8 feet

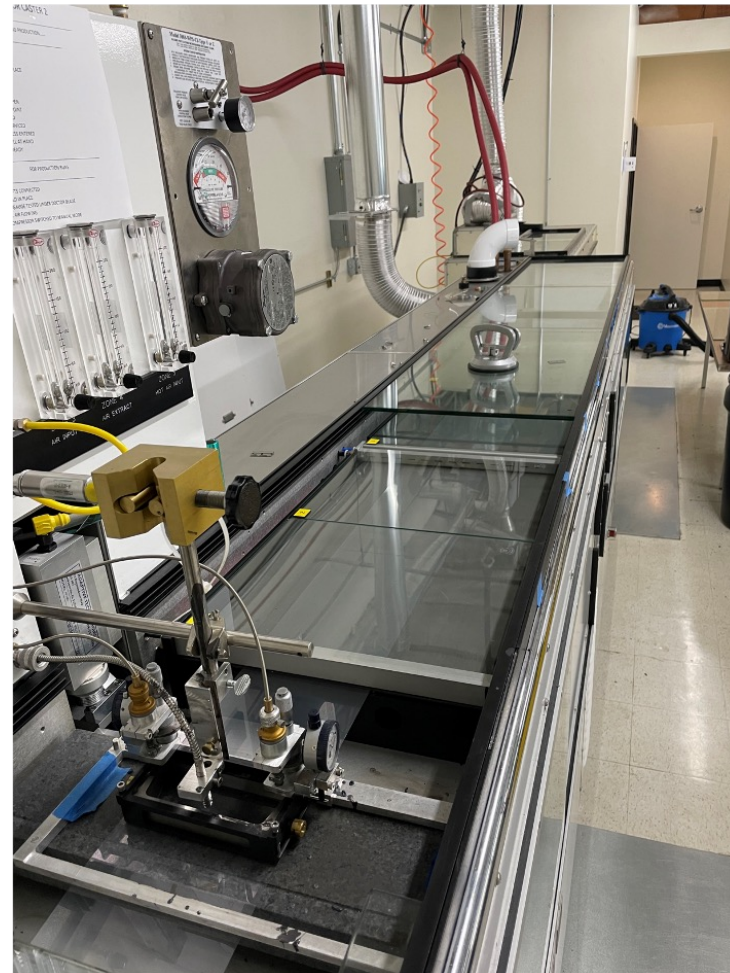
Heated circulating fluid

Path can be extended for aqueous binder

Counter-flow hot air sweep

Shroud easily removed for cleaning

Path can be shorter for lab model





Ragan Technologies, Inc.

Model X4 Tape Casting System

www.Ragantech.com

(978) 297-9805

