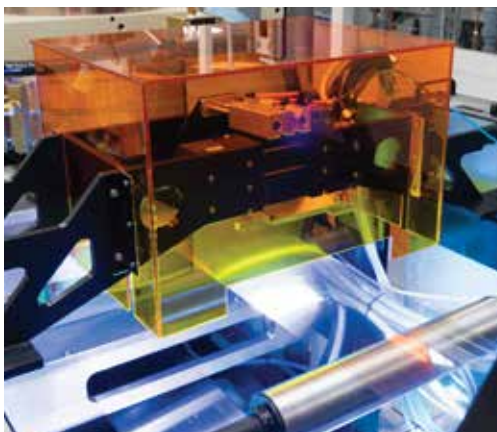
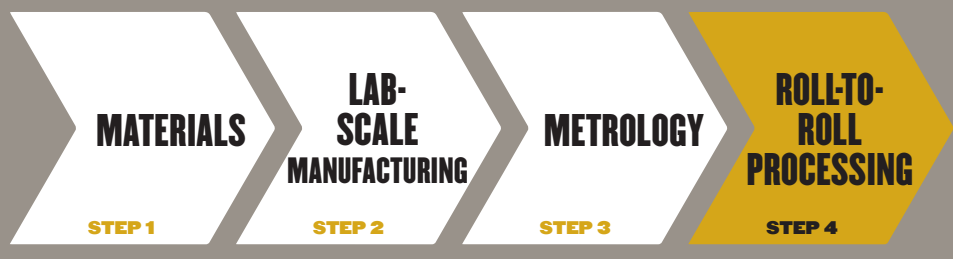


## FILM CASTING PROCESSES IN ROLL-TO-ROLL LABORATORIES



## BIRCK NANOTECHNOLOGY CENTER ROLL-TO-ROLL PROCESS



### OVERVIEW

Film casting processes at Birck Nanotechnology Center Roll-to-Roll laboratories are used to create polymeric and composite films and coatings. Coatings are cast from solution by doctor blade, gravure, and slot die processes. Films are melt cast via extrusion, and nanofibrous mats are produced by an electrospinning process. For cast materials that contain particles, particle alignment is possible via the application of magnetic or electric fields. All of these methods are continuous roll-to-roll processes. Applications include substrates for flexible electronics, electrically insulating layers, and functional films that respond to various stimuli.

### MIRWEC MINILABO COATING LINE

- Roll-to-roll coatings via gravure, slot-die, or doctor blade.
- Up to 6" flexible substrate width.
- Line speed 0.1 to 2 m/min; typical coating fluid viscosity 1 to 500 cP.
- 1 m long exhausted convection oven for 25-160°C hot air drying.
- Machine includes metering pump for slot-die coatings and full 6" width slot die.
- 6" wide gravure rolls are available with different texture depths for thickness tuning.
- Custom slot dies w/ syringe pump or a custom doctor blade chamber can achieve strip coatings of various widths.





## MAXWELL: A CONTINUOUS LARGE-SCALE ROLL-TO-ROLL (R2R) PRODUCTION LINE

### Material Deposition on Flexible Substrates

- Solution casting via doctor blade
- Electrospun fiber mats
- Melt casting via extrusion

### Out-of-Plane Particulate Alignment

- Z-direction orientation of particles via Electric Field (up to 5 kV/mm) or Magnetic Field (up to 2.7 Tesla)

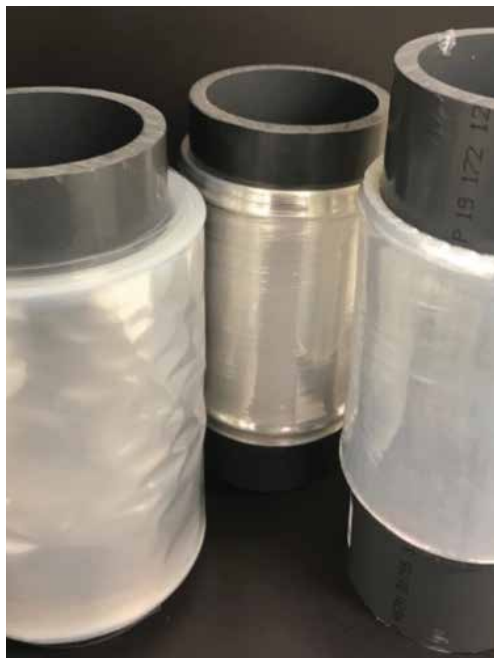
### Local Temperature Control and Curing

- Sequential flat plate heaters (up to 300C) and chill plates to maintain melt, cure, or solidify material as needed within particle alignment zones.
- 100W Laser for rasterizing (heat/cure) or cutting
- UV lamp (up to 200 W/cm<sup>2</sup>)
- PulseForge 1200 flash annealing lamp (high intensity UV/vis/near IR up to 4.9 kW/cm<sup>2</sup> pulses)



## MILAB TECH EXTRUSION FILM CASTING LINE

- Chill roll film and sheet casting line floor model.
- 25 mm extruder, 30:1 L/D.  
250 mm flat die width.
- Thermal components operate up to 400°C.
- Dies have adjustable lips for sheet thickness from 0.3 to 1.5 mm or film thickness down to 0.01 mm.
- Up to 250 mm width untrimmed film.
- Chill Rolls are hard chromed, mirror polished and cored for water cooling and heating. Polishing roll is pneumatically operated.
- Suitable for producing film and sheet with materials such as PE, PP, PS, ABS, PVC, PET, PC, etc. as well as filled materials.



## CONTACT INFORMATION

### FILM CASTING PROCESSES IN ROLL-TO-ROLL LABORATORIES

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