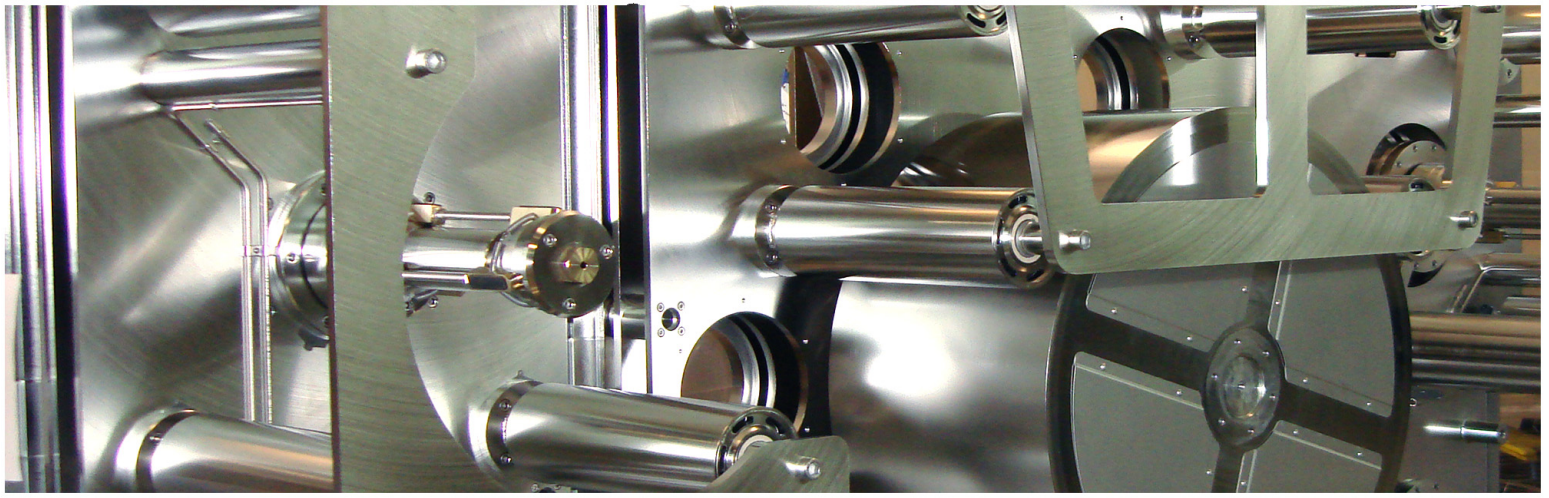




# ORION SERIES

40cm - 200cm Roll-to-Roll  
Vacuum Deposition System



Mustang's revolutionary roll-to-roll vacuum deposition systems deposit uniform thin-film coatings onto a rolling substrate as it passes through the vacuum chamber. The thin films and other coatings (Front Contact-TCO e.g. ZnO, Window Layer - CdS, Absorber - CIGS, Back Contact - Molybdenum) are deposited by sputtering (physical vapor deposition - PVD), evaporation or chemical vapor deposition (CVD) or plasma enhanced chemical vapor deposition (PECVD).

Our technologies are designed to optimize the solar cell manufacturing process with excellent uniformity. With the ability to be produced in less time, with minimum waste of materials along the way, Mustang helps today's solar cell producers to maximize profits, while playing an important role in preserving our global environment.

Mustang's modular production lines are upgradeable in both throughput and process technology, delivering greater efficiency and productivity.

## EXPERIENCE

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Mustang brings 25 years of thin film deposition experience, both lab and production, to the solar industry. Mustang builds true production tools that have been designed specifically for PV and are optimized for the deposition of PV materials - this sets us apart from others in the industry. Engineered to reduce device cost and maximize productivity, the ORION series is a fully automated end-to-end solution delivering high yield, high uptime, and low maintenance.

## EFFICIENCY

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### *Installation to Production in Days*

The ORION Series is designed for high-volume production with unmatched out of the box performance; typical installations are running production within 10 days.

### *Maximum Uptime*

Mustang thin film production systems are designed for maximum uptime, reduced operating costs and maximum yield, featuring:

- Fast pump-down (< 4 hrs)
- Easy access to components for cleaning and maintenance
- Quick & easy target and roll changes
- Long-wear targets

## VERSATILITY

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### *Mustang's Modular Architecture provides for:*

- Horizontal or vertical configurations
- No touch: deposition path
- Multi-chamber load lock
- Closed loop carrier return system
- Real-time remote monitoring
- Clean room compatibility
- Multiple pre-treatment options
- Several deposition options







## PRODUCTION LEVEL PHOTOVOLTAICS

### *Optimization*

Mustang knows that high utilization of materials is critical to our customers' success, and have designed our machines with that principle in mind. Mustang Solar works with each customer to ensure our modular tool is ideally configured for your specific process requirements.

### *Low Maintenance & Unparalleled Support*

Single tool platform allows for lower personnel costs through cross-training of operators, repeatability, standardized spares and maintenance procedures. Should you need assistance, Mustang offers global support, 24 hours a day, 7 days a week..

## SYSTEM SPECIFICATIONS

*Deposition Zones:* Front and back side, up to 14 deposition positions

*Differential Pumping:* Fully isolated deposition modules

*Deposition Sources:* Planar/Rotatable Magnetrons, Evaporation, PECVD and CVD

*Power Supplies:* AC / DC, Pulsed DC, RF or HIPIMS disciplines

*Material Handling:* Deposition in both directions

- Interleave protection, before and after deposition
- Tracking systems, laser scribing, barcode scanning

*Characterization:* In-situ measurement options

*Maintenance:* Optimized design provides Low cost of ownership user friendly interface and maintenance.

*Quality Control & Production Management:* Data collection and remote process monitoring

*Pumping Options:* Turbomolecular, cryopump or hybrid combinations

*Base Pressure:*  $<5 \times 10^{-7}$  Torr

*Maximum Working Temperature:* 450°C (842°F)

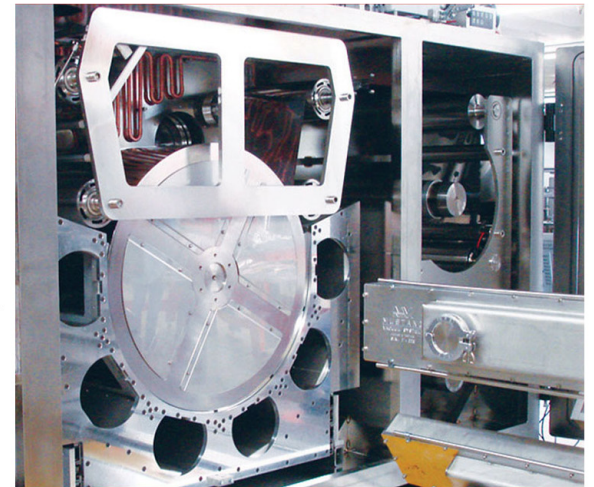
*Material Capacity:* 150- 1500 mm wide. Other sizes are available upon request

*Line Speed:* .1 to 10 meter/min.

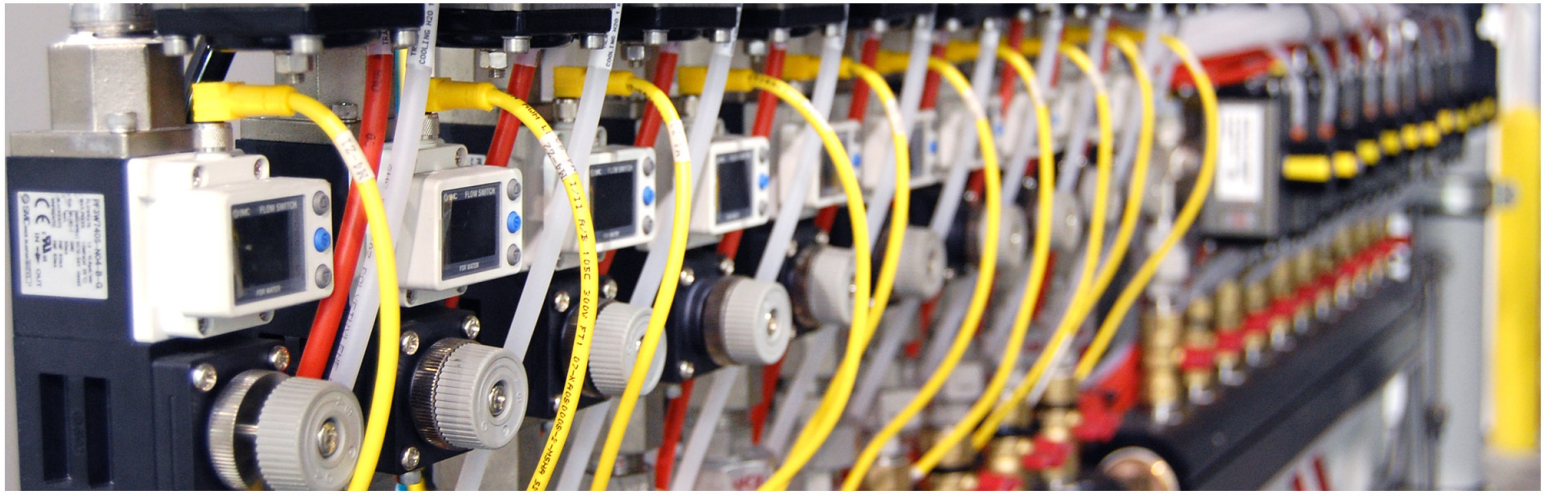
*Maximum Material Weight:* 3500 lbs. dependent roll mechanism configuration

*Power Requirements:* 480V/3P/60Hz @ 800 amps (Final Requirements based on options selected)

*Water & Air:* 400 GPM (1500 l/m @ 15-26°C), 80 psi (5.5 bar) (Final Requirements based on options selected)







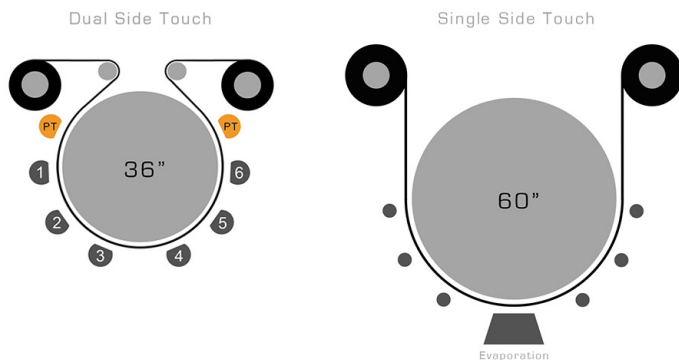
## REACHING GRID PARITY

Choose Mustang, the team that will drive solar to grid parity.

Mustang offers:

- Return On Investment - Mustang equipment provides the Lowest Cost of Ownership
- Low Initial Cost - Reducing upfront costs with smarter tool designs
- Low Operational Costs - Consumables and maintenance schedules optimized to production runs
- High Throughput - Up to 10 meter/minute deposition rates for PV processes
- Scalability - Proven deposition designs up to 1.5m wide films
- High Efficiency - Proven designs to enable your success

## ORION SERIES CONFIGURATIONS



Dual Side touch and single side touch systems are available and are dependent on the layer property specifications. Mustang's expertise in vacuum pumping allows us to maintain 100 to 1 pressure differential between chambers, along the drum. This allows our customers to run completely different process conditions within each deposition zone.

## ABOUT MUSTANG SOLAR

Mustang Solar is a wholly owned subsidiary of Mustang Vacuum Systems. As a global leader in Thin Film Technology, the company provides globally proven thin film coating solutions to a wide range of production customers in the automotive, optical, packaging and solar industries. Utilizing our extensive experience in the manufacture of production thin film equipment, Mustang Solar's ORION series offers field proven equipment and end-to-end manufacturing lines for the mass production of Thin Film CIGS Solar Modules. Engineered to reduce device cost and maximize productivity, Mustang Solar's solutions are fully automated, high yield, high uptime, and low maintenance.

