

Dry Electrode Manufacturing 2026

Process Comparison & Equipment Checklist — NEGUP MACHINE technical brief

1. Why dry electrode matters in 2026

In early 2026 Tesla confirmed that both the anode and cathode of its 4680 cell are now made by a dry process at Giga Texas. After six years of effort, solvent-free electrode manufacturing left the lab. The shift removes the energy-intensive NMP coating and drying steps and rewrites the equipment a battery line needs. This brief summarises the verified process numbers and the 2026 equipment milestone map for cell, module and pack builders.

2. Dry vs wet process

Parameter	Wet coating (conventional)	Dry process (4680, Giga Texas)
Solvent	NMP (toxic, needs recovery)	None
Drying ovens	~100 m tunnels, up to 50% of plant energy	Eliminated
Electrode production cost	Baseline	~50% lower at full scale
Line capital expenditure	Baseline	~41% lower
Factory energy use	Baseline	>30% lower
Floor space	Baseline	~50% reclaimed
Line speed	Baseline	7-10x faster
Active-material fraction	Lower (binder + solvent load)	97-98%

Table 1. Dry vs wet electrode process, as reported from Tesla's 4680 production engineering (Q4 2025 call, Jan 2026) and supplier disclosures.

3. 2026 equipment milestone map

Player	2025-2026 milestone	Equipment implication
Tesla (Maxwell IP, 2019)	>1M dry 4680 cells/week, ~40 GWh; \$3.6B Nevada	First 100 GWh trial-scale proof
Naknor	Jan 2026 dry calender batch delivery, +/-0.002 mm roll-to-roll	Roll-to-roll battery-grade accuracy
Tsingyan	China's first 0.1 GWh sulfide SSB dry line, 85% yield	Dry process improves GEM-state
CATL/LG/Samsung/Panasonic	Still wet coating in volume	Dry remains Tesla's moat

Table 2. Selected 2025-2026 dry-electrode equipment milestones. Sources: Tesla Q4 2025 earnings disclosure; Naknor and Tsingyan supplier announcements; industry reporting.

4. Line-build checklist for cell, module & pack builders

- Calender precision: target +/-0.1 MPa pressure control and sub-micron thickness accuracy — the dry line is made by pressure, not heat.
- Upstream mixing: high-shear dry blending with uniform PTFE fibrillation; powder handling becomes the contamination frontier.
- First-pass yield: mature wet lines run >98%; dry lines are stable >90% — specify for commercial speed, not just throughput.
- Inspection load: inline thickness, density and bond-strength checks carry more of the quality burden; keep per-batch test records audit-ready.

NEGUP MACHINE builds module-pack assembly and end-of-line testing systems sized for the tighter tolerances and richer test data a dry-electrode upstream now demands. WhatsApp +86 153 0769 0902 .

