

# New potentials in lithium-ion electrode manufacturing

Electrode coating solutions

Highest quality from  
R&D to mass production



# Value creation from a single source

## The smarter way to produce lithium-ion battery electrodes

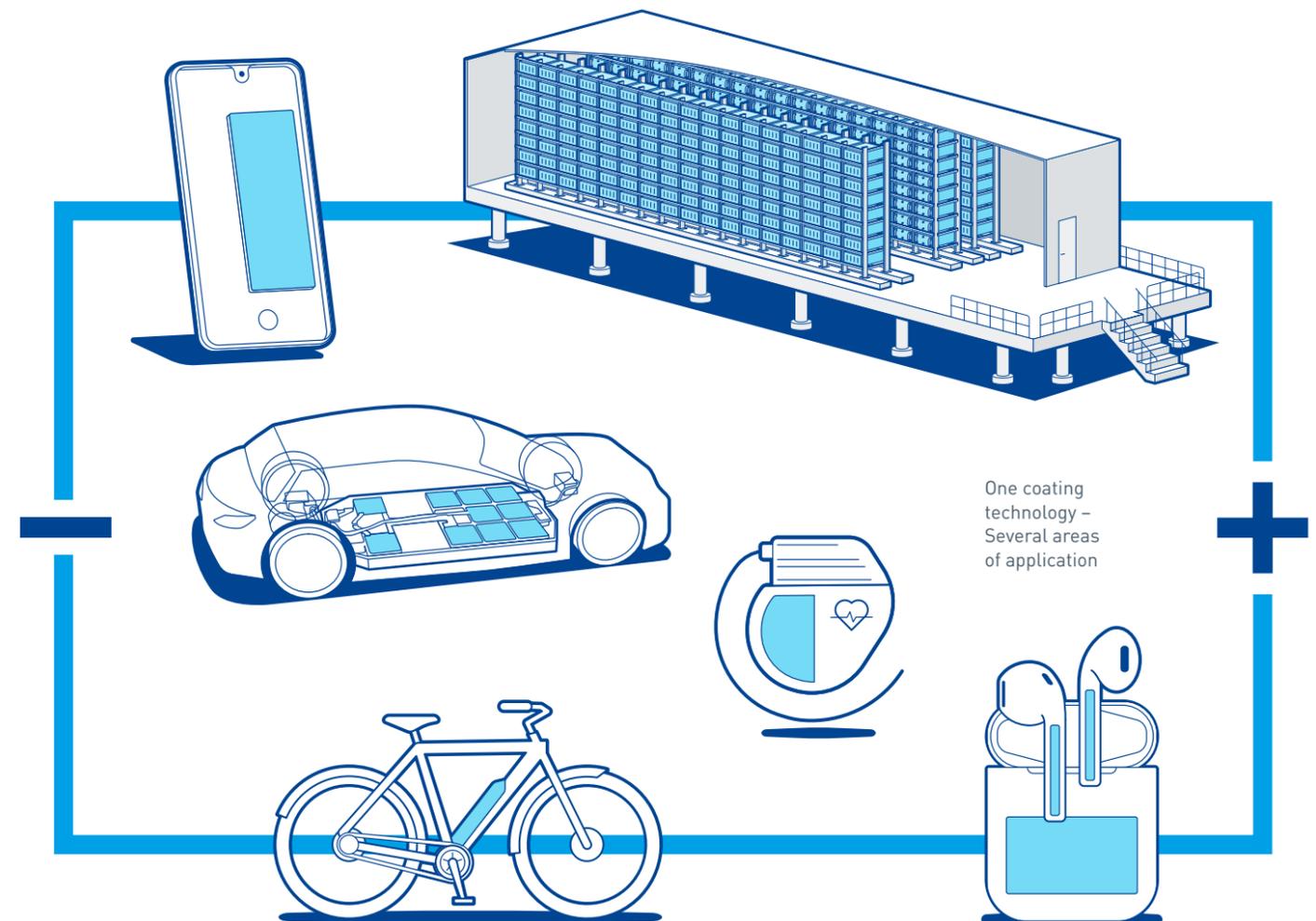
Dürr is a leading global supplier of comprehensive turnkey machinery approaches for producing battery electrode coated materials. We are a single-source machinery OEM that can meet the broadest range of electrode production requirements. Dürr is a brand of Dürr, an internationally operating

and leading supplier in the automotive and environmental industry. Our capabilities cover the entire electrode production line, with systems for raw material handling, slurry mixing, fluid delivery, web handling, coating and drying, calendering and slitting, solvent recovery and purification.

### Improved stability and longevity for power solutions

Coated electrodes are the starting material for many energy storage devices and keep our daily life going. As the lithium-ion battery industry matures, pressure to decrease

costs mounts. Battery manufacturers are seeking to lower material and processing costs. Dürr answers this challenge with ambition as it implements it with high-quality.



# Integral Electrode Manufacturing

## Coating, drying, solvent recovery and distillation

### SIMULTANEOUS 2-SIDED COATING

Dürr has developed a tensioned-web coating process using a slot-die mounted in a vertical orientation to simultaneously coat both sides of electrode foil traveling horizontally.

To optimize battery performance, every step in the coating process must be tightly controlled. Mixing conditions and the related equipment have a strong impact on the slurry, as does the coating and drying process. Simultaneous two-sided coating using the tensioned-web process enables battery

manufacturers to be more cost-effective, and therefore, more competitive – always taking into account our improved quality.

- Twice the throughput compared to single-side coaters
- Requires only one pass through the dryer, delivering equal drying of both coated sides
- Smaller overall manufacturing footprint
- Lower capital and operating costs
- Increased range of coat weights for lithium-ion slurries

### DRYING AND CURING

Dürr provides total drying and curing solutions for producing advanced web-based materials, such as lithium-ion battery cathode and anode electrodes. With more than 100 patents and thousands of dryer installations worldwide, we continue to pioneer the engineering and development of non-contact flotation dryers and ovens.

- Custom convection and hybrid dryer styles and designs
- Different types of heat sources, zone lengths, web widths and nozzle configurations
- Providing superior drying, curing, and web handling



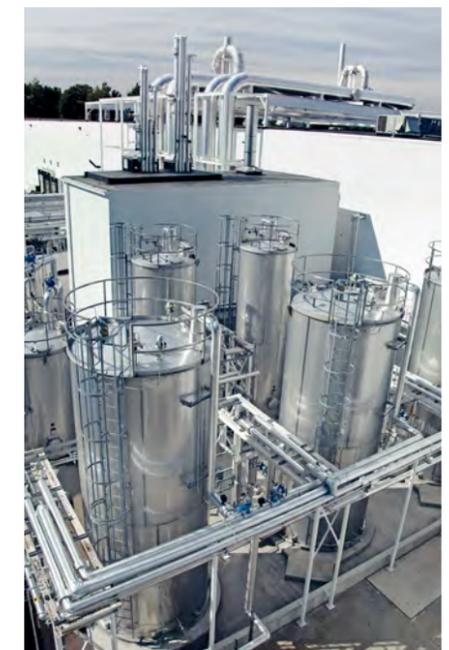
Access our film to learn more about the process and our technology.



Simultaneous two-sided coating



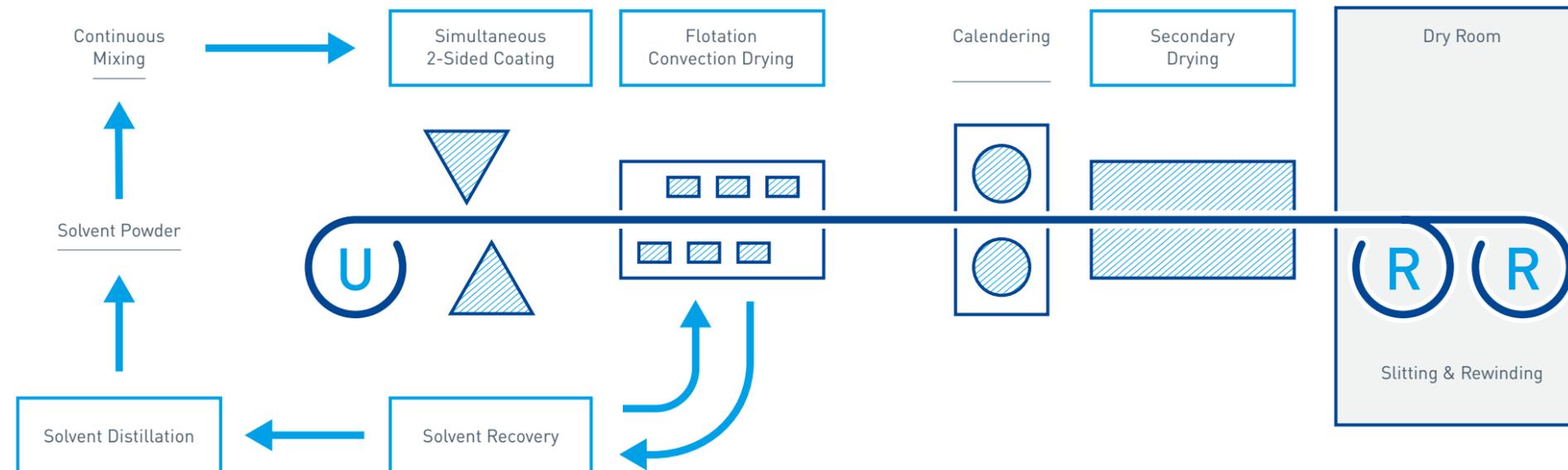
Contactless air flotation dryer



Solvent distillation column and tank farm

**>95%**  
reusable solvent  
after distillation

**99%**  
recovered  
NMP



### RECOVERY & REFINING SYSTEMS FOR ELECTRONIC-GRADE SOLVENTS

Dürr has developed proprietary systems for the high-efficiency removal, recovery, and purification of solvents from coating line exhaust air streams in the battery electrode manufacturing process.

These multistage systems offer the lowest CAPEX and operating costs for gigafactories:

- Produce electronic-grade solvents and allow immediate re-refining and re-use onsite
- Achieve savings of > \$2/kg

- Typical NMP recovery rate is > 99 %
- Supplied pre-assembled on skids for timely and easy installation

#### Multistage pollution control

- Stage 1: Condenser recovers most of the solvent by condensation
- Stage 2: Exhaust air cleaning by combination of concentrators and carbon filter  
Configured to meet strictest global and local emissions standards

# From R&D to mass production

We help our customers effectively go to market

From an R&D coater developing new chemistries to a coating line that meets the basic and competitive needs of a new player in the market to a fully integrated manufacturing plant for high-volume runs – our solutions improve quality, cost-effectiveness and speed-to-market.

## Pilot

### PilotCoater

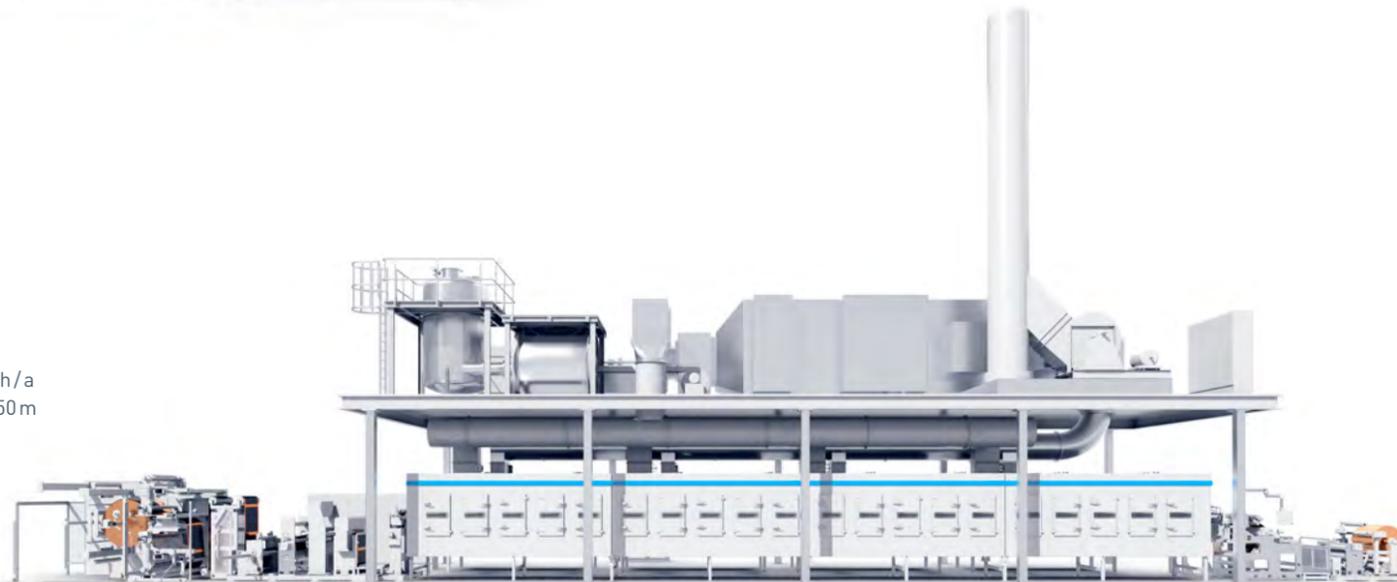
- Speed 10 m/min
- Foil Width 350 mm
- Capacity 50–100 MWh/a
- Dryer Flotation 3–9 m



## Pro

### ProCoater

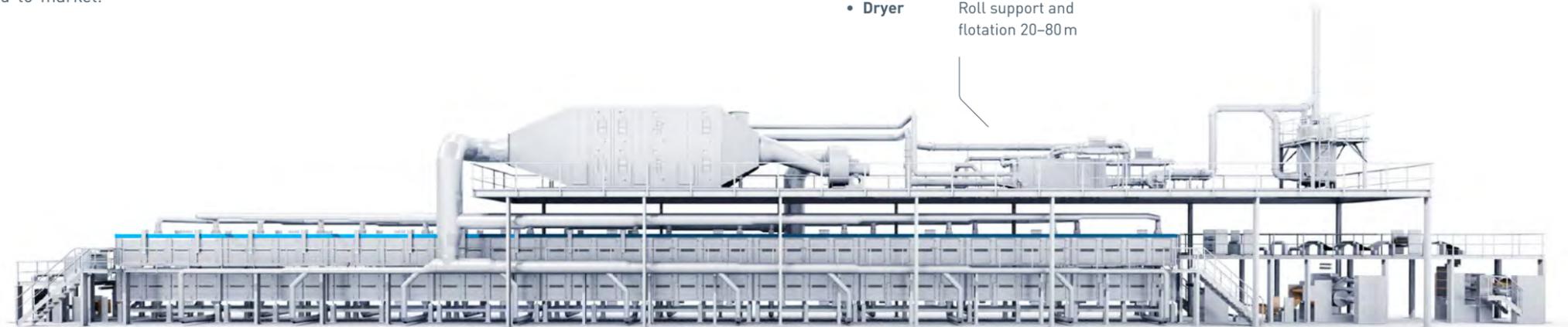
- Speed 20–80 m/min
- Foil Width 700 mm
- Capacity 500–1000 MWh/a
- Dryer Flotation 15–50 m



## Tandem

### TandemCoater

- Speed 20–80 m/min
- Foil Width 700–1400 mm
- Capacity 2–5,5 GWh/a
- Dryer Roll support and flotation 20–80 m



### PROCESS DEVELOPMENT & TEAM TRAINING

During the machine build period, Dürr provides customer-specific process development trials, making it possible to dramatically reduce time from commissioning to full production.

### QUALITY CONTROL

Dürr offers a fully integrated data capture and management tool that provides complete traceability from raw materials to finished cells. And, inline process control helps improve product quality and manufacturing confidence.

### SERVICE AND SUPPORT

Dürr offers global aftermarket services, upgrades, rebuilds, system integration services, and field services for the complete coating line and electrode plant.



#### Our service offerings include

[Existing equipment capability and process evaluation](#)

[Line speed upgrades and system expansion](#)

[Addition or upgrade of drying zones](#)

[Retrofitting complementary post treatment process equipment](#)

[Equipment relocation](#)

# LEADING IN PRODUCTION EFFICIENCY



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