

# CLIANTECH SOLUTIONS

YOUR PATH TO TECHNOLOGY

## Turnkey Solutions for **Lithium Battery Assembly** Cell to BESS Manufacturing

*In Collaboration with*  **encore**  
SYSTEMS



[www.cliantechsolutions.com](http://www.cliantechsolutions.com)

KEEP YOUR ENERGY CENTERS OPERATING

# SYSTEM ENGINEERING CAPABILITIES



## Concept to Commissioning

Business feasibility  
Consultative Approach  
Market Forecast



## Project Management

End-to-end execution –  
from concept to  
market-ready solutions



## Technology Transfer Support

5kWh ~ 5MWh EV & ESS  
applications from Global  
OEMs



## Process & Plant Design

Layout Design in 2D  
Configuration Design  
Site Readiness -  
Utility & Facility



## Prototype Development

Prototype Development  
along with complete BOM  
details



## Manpower Selection & Training

Onsite & Offsite programs  
to upskill teams for  
smooth operations



## Installation & Ramp-up Support

Professional assistance  
from setup to full-scale  
production readiness



## Certification / Compliances Support

EV & ESS Applications  
India & Global



## Automation & MES Integration

MES Integration with ERP  
Smart automation systems



## Preventive Maintenance

Regular service schedules  
Lifetime Software Upgrades  
Hardware Enhancements



## Spare Parts Support

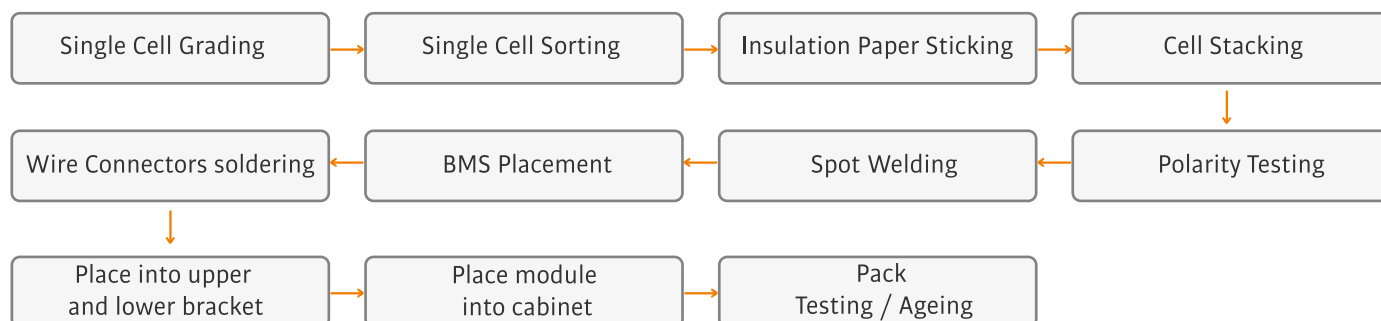
OEM-certified spares with  
warranty and quick  
in-house repairs



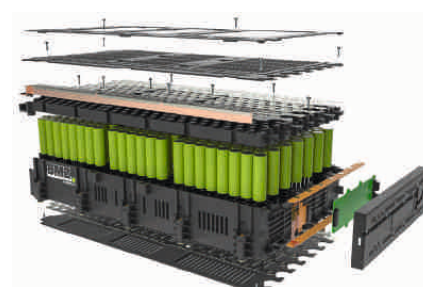
## 24 x 7 Service & AMC

Round-the-clock technical  
support and annual  
maintenance contracts

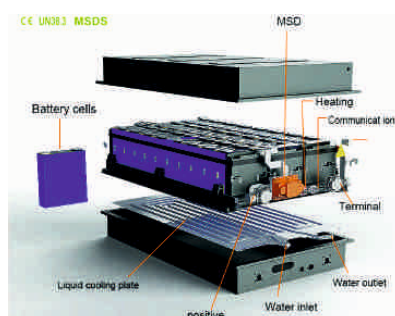
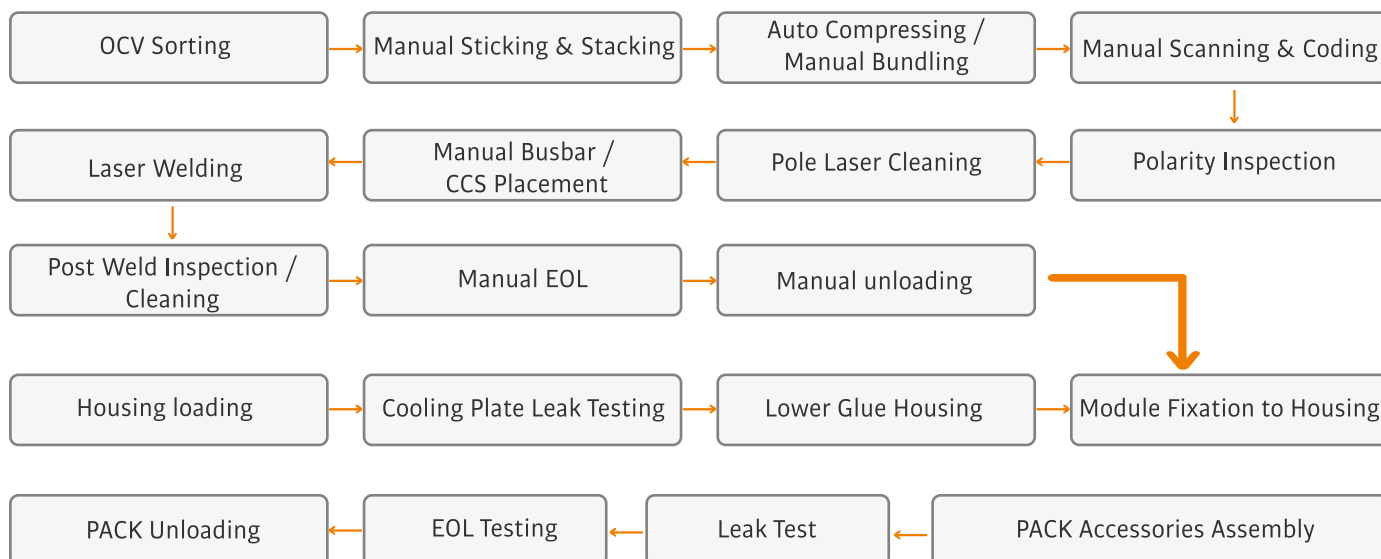
## Cylindrical Cell to Module Assembly Line Flow



*\*for reference purposes only, actual process may vary*



## Prismatic Cell to Module Assembly Line Flow



## CYLINDRICAL CELL GRADING / CYCLER / CAPACITY TESTING



5V 3A — 5V 6A  
512 channels  
(Cylindrical/Pouch)



5V 10A — 5V 20A  
256 channels  
512 channels



Jig Form

Fast Clamp Cylinder  
/Manual Pouch



Clamp Typ

Cross fixture/probe fixture/65  
Blue and white clasp/



Fixture  
Spacing

35MM/40MM  
/85MM/85MM



Supports Cells

Cylindrical:  
18650/21700/26650/32700/32  
135/33140/34189"/40140\*  
Pouch: Multiple sizes  
(customised)

Compatible for:



Main Test Functions:  
Current, Voltage, Time



Regenerative

## AUTOMATIC CELL SORTING



18650/21700/26650/32700  
10CH/6CH



32135/33140/34189/40140  
10CH/6CH

IR Tester\*:

HK 3561/HIOKI BT3561, BT3561A

Test Functions:

Internal Resistance, Open Circuit Voltage

Sorting efficiency: ≥ 70PPM

Interface: PLC + Touch Screen

Compatible For :



Keyence / Chinese

## AUTO INSULATION PAPER STICKING



18650/21700/26650/32700  
Any one size (can be customised)

Can be integrated with Automatic Cell sorting  
machine optional

Barley Paper Roll Width: ~100mm

Throughput: ≥ 70PPM (18650 size)

Interface: PLC + Touch Screen



## CCD / POLARITY INSPECTION (Before Welding)



Offline



Inline  
with I/O Conveyor



### Performance

PC Controlled  
Gigabit network card  
data transmission



### Camera specs

Ultra High Definition  
20M Pixel Camera



### Detection Range

400mm x 300mm  
(can be customised)



### Supports Cells

Cylindrical:  
18650/21700/26650/32700/  
32135\*/33140\*/34189\*/40140\*

## AUTOMATIC/MANUAL SPOT WELDING



5000A / 8000A / 10000A

### Manual

- ⇒ Max Cylindrical Stroke:  
20mm, 100 mm by default
- ⇒ Mode of welding:  
Double point balance welding
- ⇒ Welding Time:  
0 - 9.99ms, adjustable, prec. 0.01ms
- ⇒ Max welding thickness:  
0.25mm, 0.15mm & for above  
grooving or bumping is required.



8000A / 10000A

### Double Sided Automatic

- ⇒ Stroke Size:  
500mm x 380mm (customizable)
- ⇒ Welding Mode: Single Point/  
double point/three point option.
- ⇒ Japanese DK welding needle,  
diameter 2.5mm, continuous use.
- ⇒ **Welding Head Rotation Range:**  
**+/- 90 Deg.**

### Gantry Transistor Power Supply

Welding Pulse width is adjustable, solder spot  
does not change color.

Control mode constant current / constant  
voltage / current and voltage combination mode.

Real-time welding current monitoring, virtual  
welding, false welding alarm function.

Electric / Pneumatic Type

### Supports Cells

Cylindrical:  
18650/21700/26650/32700/  
32135\*/33140\*/34189\*/40140\*

## COMPREHENSIVE FINISH PACK / EOL TESTING



50V 60A ⇒ 100V 120A  
100V 200A

### Main test items:

- 1) Open circuit voltage
- 2) Load voltage
- 3) charging & discharging current
- 5) AC/DC internal resistance (ACR/DCR)
- 7) Charging overcurrent protection test
- 8) Discharge overcurrent protection test
- 9) Discharge voltage difference ( $\Delta V$ )
- 10) Short circuit protection function
- 11) Charging activation
- 12) Short circuit activation
- 13) Single-string static differential  
voltage (optional)
- 14) Multiple-string static differential  
voltage (optional)

	50V60A	100V120A	100V200A
Discharge Tests (customizable)			
Initial Voltage	0-50V	0-100V	0-100V
End Voltage	0-50V	0-100V	0-100V
Discharge Current	0.2-30A	0-60A	0.2-100A
Discharge Time	0.60S	0-60S	0-60S
Charge Tests (customizable)			
Initial Voltage	0-50V	0-100V	10-100V
End Voltage	0-50V	0-100V	10-100V
Charge Current	0.2-5A	0-60A	0.2-20A
Charge Time	0.60S	0-60S	0-60S

## PRISMATIC CELL GRADING / CYCLER / CAPACITY TESTING

with Auto Clamping System



5V 60A — 5V 100A  
16~64 channels



5V 30A — 5V 500A  
16~196 Channels

Test Functions:

Current, Voltage, Time, DCIR\*, Temperature, Pulse Test\*, Work Conditions Test\*



Jig Form

Electric upper pressure  
type square aluminum shell  
/ Manual OTT



Clamp Typ

Crocodile clamp/enhanced  
flat head clamp/OTT (optional  
add alligator clip)



Supports Cells

Prismatic: A length of 65-220 mm;  
40MM/81MM /162MM  
The thickness of 20-70mm;  
Height 90-220mm; Center  
distance of pollar ear: 45-160mm



Fixture  
Spacing

40MM/81MM  
/162MM

Compatible for:



Regenerative

## AUTOMATIC / MANUAL CELL SORTING



20V-1000V

HIOKI BT3561, BT3561A  
BT3562A, BT3563A  
BT3564A



6/10 channels

comes with  
HIOKI BT3562A &  
HIOKI Dm7275

Sorting Parameters:

Open circuit voltage, AC internal resistance, DC  
internal resistance

Supports Cells:

50\*160\*118,36\*130\*200,30\*130\*200mm

Sorting efficiency: ~600 cells per hour

Inbuilt Industrial Computer and HMI

Margin voltage deviation $\pm 0.1\text{mV}$ , Internal resistance  
deviation $\pm 0.05\text{m}\Omega$

Compatible For :



Keyence (Japan)

## AUTO/SEMI-AUTO LASER CLEANING & LASER WELDING



Laser Cleaning for Cell  
Terminals and Busbars



High speed galvanometer  
laser welding

Laser Type: Pure Fibre Laser (IPG/Raycus/Maxx)

Maximum output power (pulse mode)  
150W/300W/450W/600W

Maximum output power (continuous mode)  
150W/300W/450W/600W

Maximum peak power 1500W/3000W/4500W/6000W

Cooling mode:  
Water cooling

Laser wavelength:  
1070nm

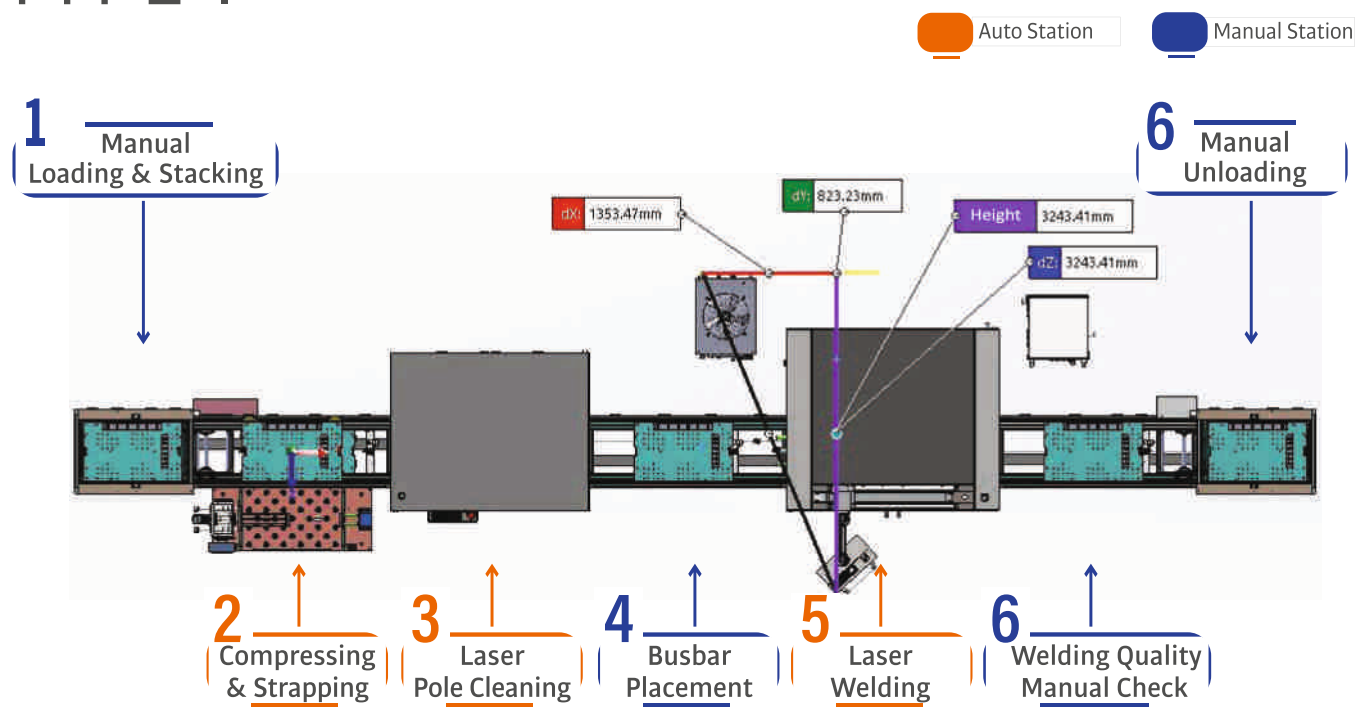
Working mode:  
pulse/continuous

XYZ axis control:  
manual/servo motor

Laser Source & Wattage: 100W Fibre  
Loading/Unloading: Manual/Auto  
Cleaning Width: can be customised  
Cooling: Air Cooled  
Life of Laser Source: >100000 Hours

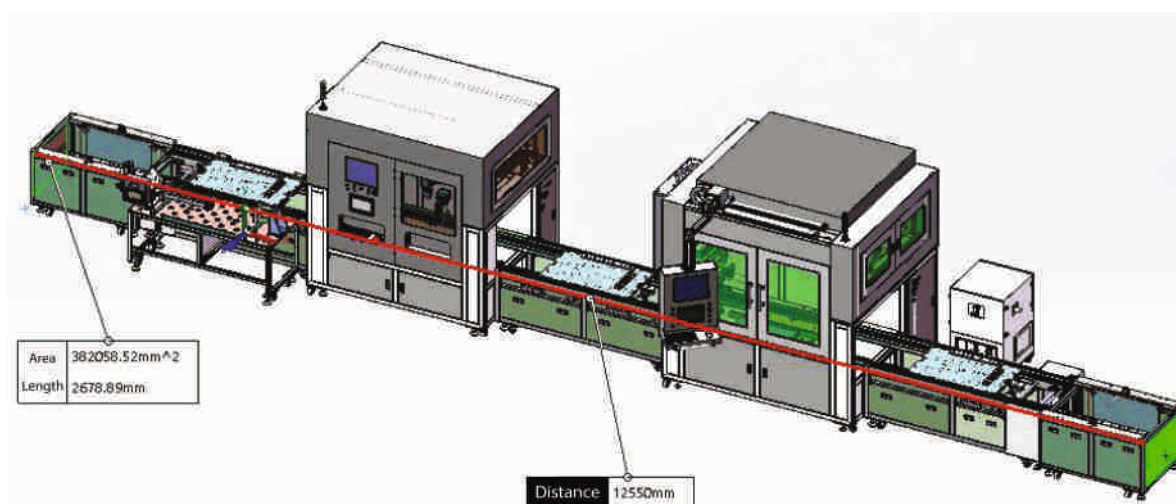
# SEMI-AUTO ASSEMBLY SOLUTION

## CELL TO MODULE TYPE I



### Inbuilt Features

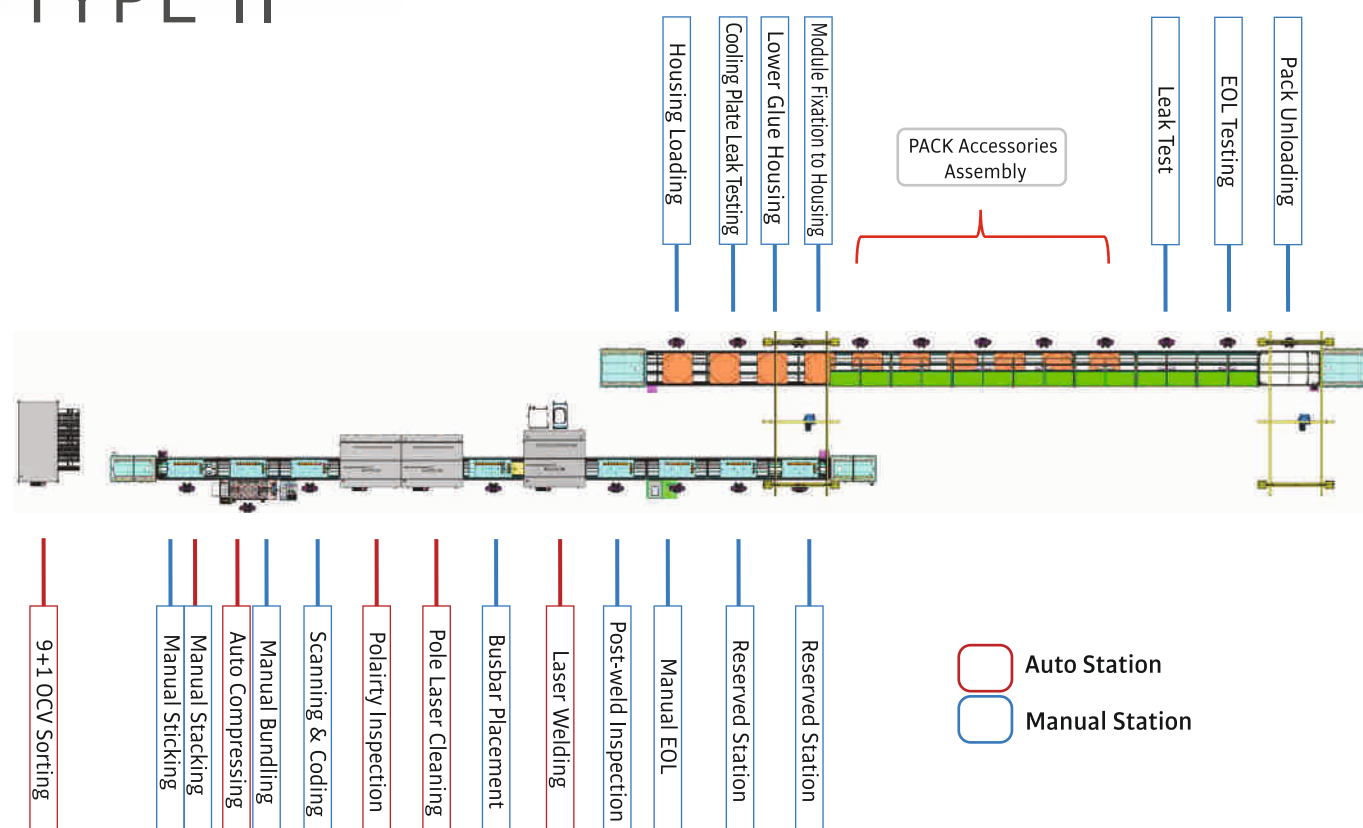
Inline Automatic Compression	*Traceability from Cell to Module	Laser Source Options RAYCUS / IPG with AMB mode optional
Polarity Detection & Laser Cleaning in single station	Compatible with 13 series Module Assembly Compatible with 100Ah ~ 314Ah Cells	
Laser Welding	Throughput upto 6 cpm (cells per minute)	*Optional
*MES Control	Area Required: 10,000 sqft (excluding testing set-up and Pack Line)	



Line dimension: L12550 \* W1900 \* H2500 (mm)

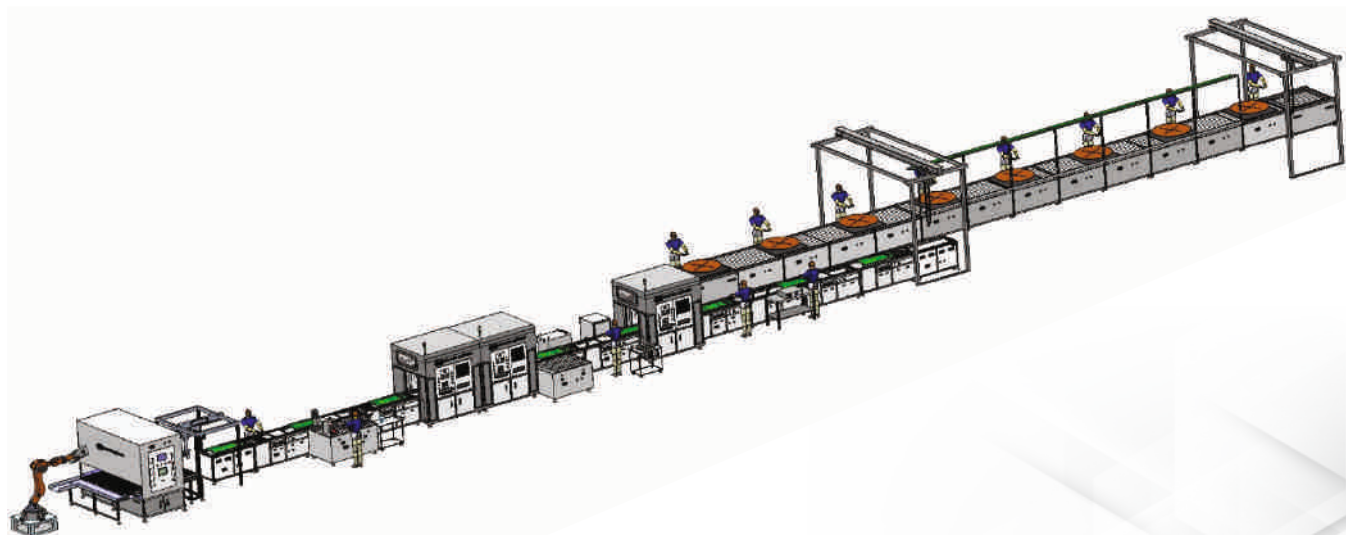
# SEMI-AUTO ASSEMBLY SOLUTION

## CELL TO MODULE TO PACK TYPE II



### Inbuilt Features

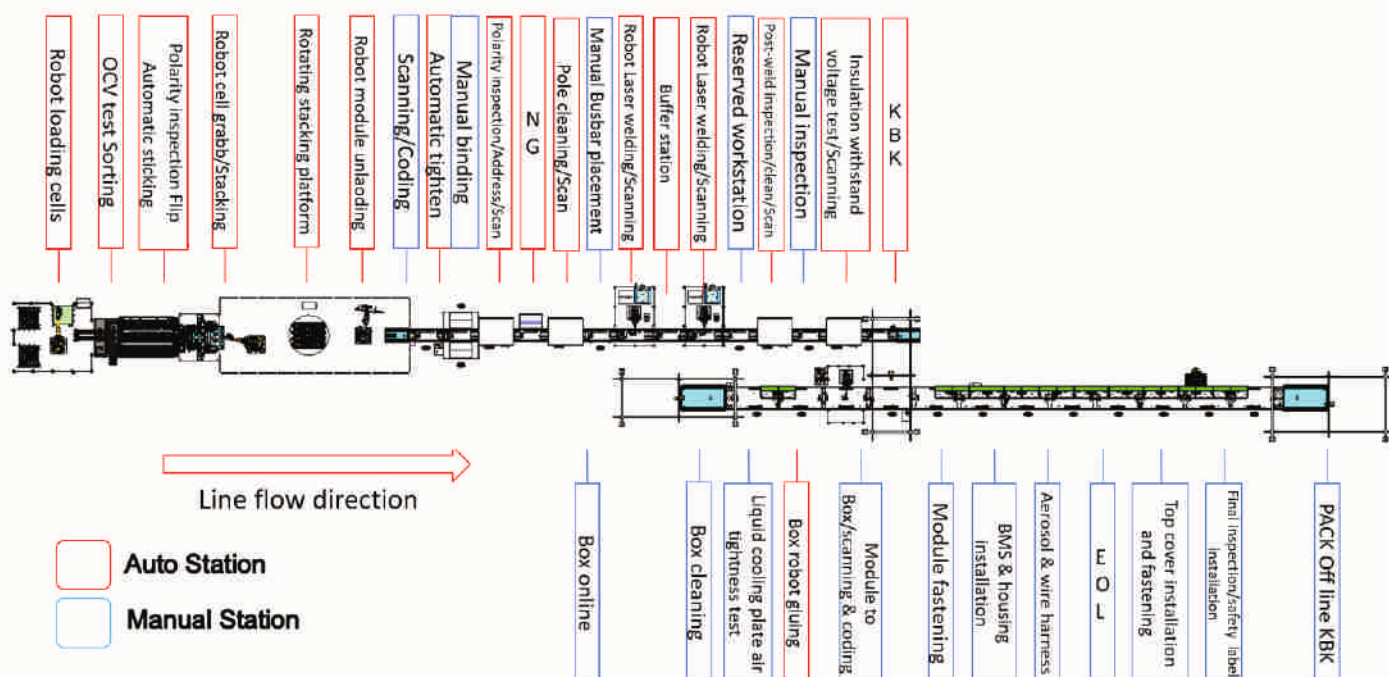
Inline Automatic Compression	Traceability from Cell to Module and Module to Pack	Laser Source Options RAYCUS / IPG with AMB mode optional
Polarity Detection	Air Cooling & Liquid Cooling Capability in Pack Line	
Laser Cleaning	Compatible with 52 series & 104 series Pack Assembly	
Laser Welding	Compatible with 100Ah ~ 625Ah Cells	Optional: Automatic Cell Loading Automatic Cell Stacking Inline EOL
Complete Line MES controlled	Throughput upto 8 ~ 15 cpm (cells per minute)	
Area Required: 20,000 sqft (excluding testing set-up)		





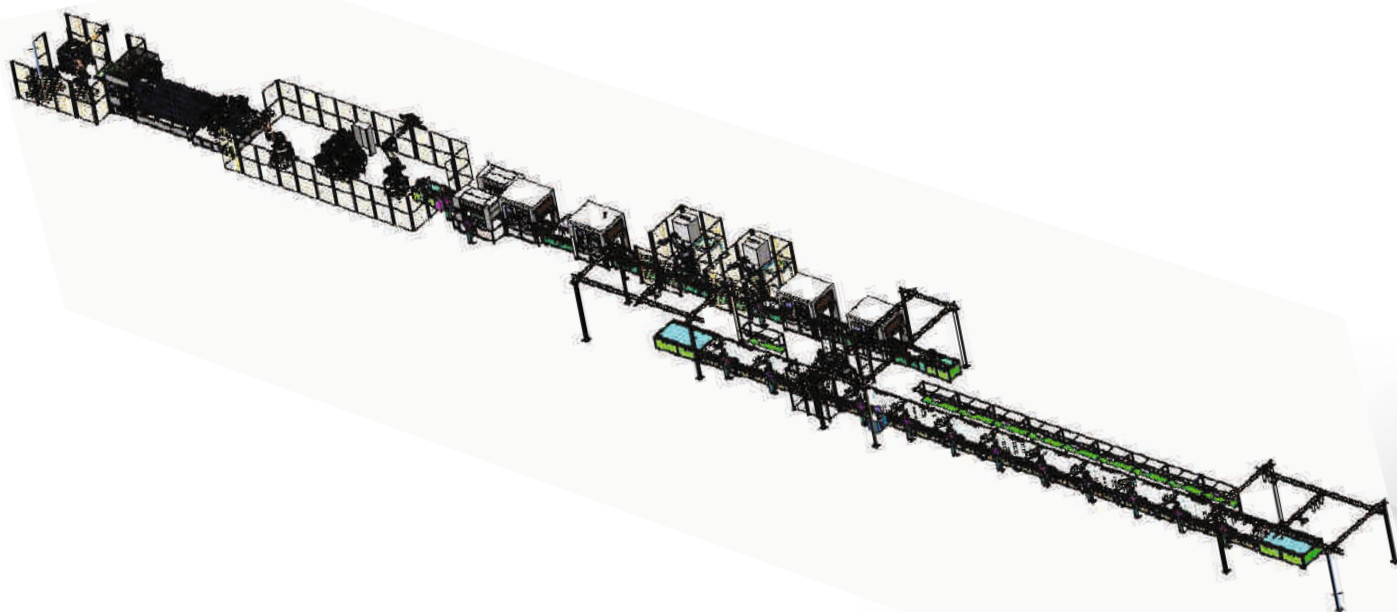
# FULLY-AUTO ASSEMBLY SOLUTION

## CELL TO MODULE TO PACK



### Inbuilt Features

Automatic Cell Loading	Automatic Gluing on bottom plate in Pack Line	Laser Source Options RAYCUS / IPG with AMB mode optional
Automatic Cell Surface Cleaning	Traceability from Cell to Module and Module to Pack	
Automatic Insulation Pasting	Air Cooling & Liquid Cooling Capability in Pack Line	Area Required: 25,000 sqft (excluding testing set-up)
Inline Automatic Compression	Compatible with 52 series & 104 series Pack Assembly	
Automatic Cell Stacking	Compatible with 100Ah ~ 625Ah Cells	
Polarity Detection	Throughput upto 8 ~ 15 cpm (cells per minute)	
Laser Cleaning (Cell Terminals)	Complete Line MES controlled	
Automatic Laser Welding		



## PCBA / BMS TESTING



○—CAN Hardware & Software (Smart) BMS

Testable for 4S ~ 48S for BMS (PCBA, modular design, support scalable and extensible)

With Short-Circuit Protection Test and Protect Time Test\*

Temperature Protection Test

Supports CAN 2.0A, CAN 2.0B, RS485 Communication, as per customer requirements

Support Automatic Start by Scanning Barcodes or Manual Start

Test BMS (PCBA) including LFP, NMC, LCO, LMnO, LTO, Etc

Supports + & - protection board

## BATTERY MODULE &amp; PACKAGEING / TESTER



Voltage Range: 60V ~ 1000V

Current Range: 60A ~ 500A



Regenerative

No. of channels customizable

It can be used in automotive battery, energy storage systems (ESS) and other high-power battery large variety of tests.

Each channel can be arbitrarily set as constant current charge and discharge mode, constant voltage charge and discharge mode, constant power and resistance discharge mode, the DCIR mode, rest mode etc.

Each channel can test batteries in different modes, also it can carry out completely independent work in different modes without interaction.

It has improved software and hardware multi-level protection, and emergency stop switch.

It is dual AC/DC designed to improve energy efficiency.

## END OF LINE TESTER



A comprehensive and intelligent testing platform developed to integrate automatic testing, data recording integration analysis, production efficiency, and other aspects of lithium battery offline, providing a complete static testing solution for power battery modules or PACK

Insulation Withstand Voltage Tester

- 1) AC Withstand Voltage (ACW): 5kV/100mA
- 2) DC Withstand Voltage (DCW): 6kV/20mA
- 3) Insulation Resistance (IR): 6kV/50GΩ
- 4) Ground Impedance: 40A/600mΩ

Multimeter

- 1) Resolution: 6½
- 2) Voltage Range: 2000VDC

AC Internal Resistance Tester

- 1) Voltage Range: 2100VDC
- 2) Resistance Range: 3600Ω

Programmable Resistor Unit

- 1) Insulation simulation switching
- 2) Switching Resistance: 5KΩ~10MΩ; Accuracy: ±3%
- 3) Resolution: 5KΩ

Voltage Range: upto 1500V

# ENERGY STORAGE TESTING

## BESS APPLICATION

### Cluster / Cabinet Testing Equipment



## 1600V/250A - 2

Capacity Range:	500kW
Voltage Range:	50~1600V
Current Range:	-250A~250A
Feedback Efficiency:	95%

High-frequency topology design; dual-channel per rack unit with multi-rack parallel operation capability

Voltage/current accuracy up to  $\pm 0.05\%$  FS

Current conversion time  $\leq 5\text{ms}$

High regenerative power quality with harmonic content  $\leq 3\%$  and power factor  $\geq 0.99$

Compact footprint and industry-leading power density

### Large Capacity Battery Container Testing Equipment

## 1600V/4.5MW



#### Advanced Design

High precision test results, high intergration. IP54 protection. **Indoor & Outdoor & Movable.** Supports modular installation, significantly saving space.

#### Super Cost-Saving

**Entire battery containers** and flexible multi-channel testing of **clusters/packs**. Saving millions in testing investment costs, facility construction, and electricity expenses

#### Super Flexible

**2.5MW** can be upgraded to **5MW/6MW** to meet higher demands. Don't need a full-power replacement and significantly reducing equipment cost.

#### Super Energy-Saving

Paired charge-discharge testing between two battery compartments (one charging and the other discharging) **effectively conserves energy** and enhances overall efficiency

CONNECTING EVERY STEP — FROM CELL TO ENERGY SYSTEMS

# PRODUCTION LINE MES

## Cell to BESS Manufacturing

ENcore Systems' customised MES management system is responsible for receiving data on all workstations' information and can also connect to the company's ERP system.

### Overview of the MES management system

<b>System Dashboard</b>	Count the production progress of each key position
<b>Production Management</b>	<ol style="list-style-type: none"> <li>1. Order Management: set up production work orders as per the production plan.</li> <li>2. Product Management: set-up, adding, modifying, deleting product information.</li> <li>3. Materials Management: manages material information used in the production process. Currently, the only materials we use are battery cells.</li> </ol>
<b>Production data query</b>	<ol style="list-style-type: none"> <li>1. Data query for each workstation - information uploaded by each inspection station</li> <li>2. Data traceability - through any information such as PACK code, module code, cell code, operator, etc. to obtain all the test data information of the PACK from the cell to the PACK;</li> </ol>
<b>Report Statistics</b>	include production achievement rate, hourly and daily production efficiency, product yield rate
<b>System Settings</b>	<ol style="list-style-type: none"> <li>1. Menu permission management</li> <li>2. Workstation detection software</li> </ol>

#### Cell segment detection

OCV detection	Module code generation
Module pole polarity detection	Module insulation withstand voltage test
Pole photography	Pole laser cleaning results

#### Welding section inspection

Laser welding	Post-weld inspection
Insulation withstand voltage test	

Local data disk configuration,  
supports lossless upload to MES

#### PACK segment detection

##### 1. Air-cooled PACK segment detection

Series installation torque collection	EOL Testing
Insulation withstand voltage test	

##### 2. Liquid Cooling PACK Segment Detection

Liquid cooling plate air tightness detection	PACK code generation
Module fixed torque data collection	EOL test
Series installation torque data collection	PACK air tightness test
BMU , module, PACK data binding	Generate label
External box cover installation torque data collection	

## Electronic Display Screen





END-TO-END ENERGY STORAGE MANUFACTURING, SIMPLIFIED

# BESS MANUFACTURING

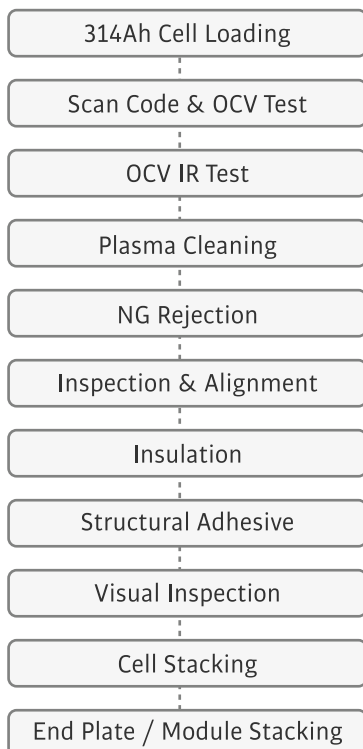
## PROCESS FLOW (CELL TO BESS)



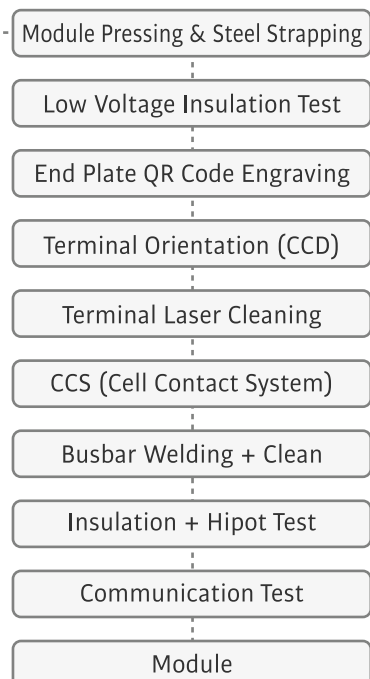
## BESS Manufacturing



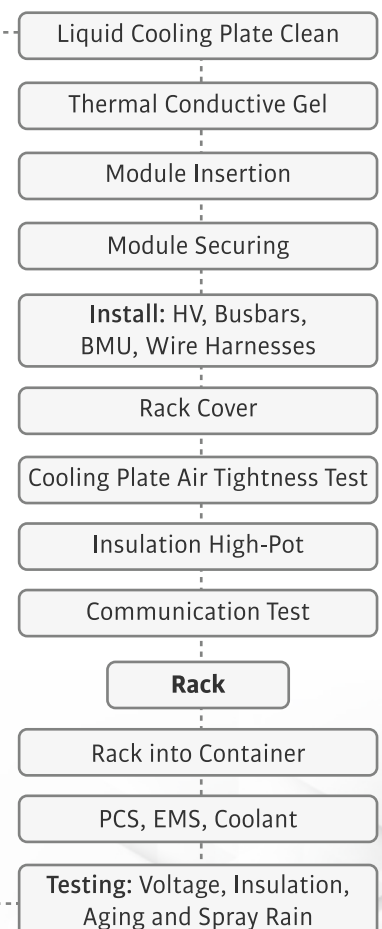
### Production Process Flow



### Module



### Rack - BESS

**BESS**

## MAJOR TECHNOLOGY PARTNERS



*Exclusive Partnership  
for India Market*

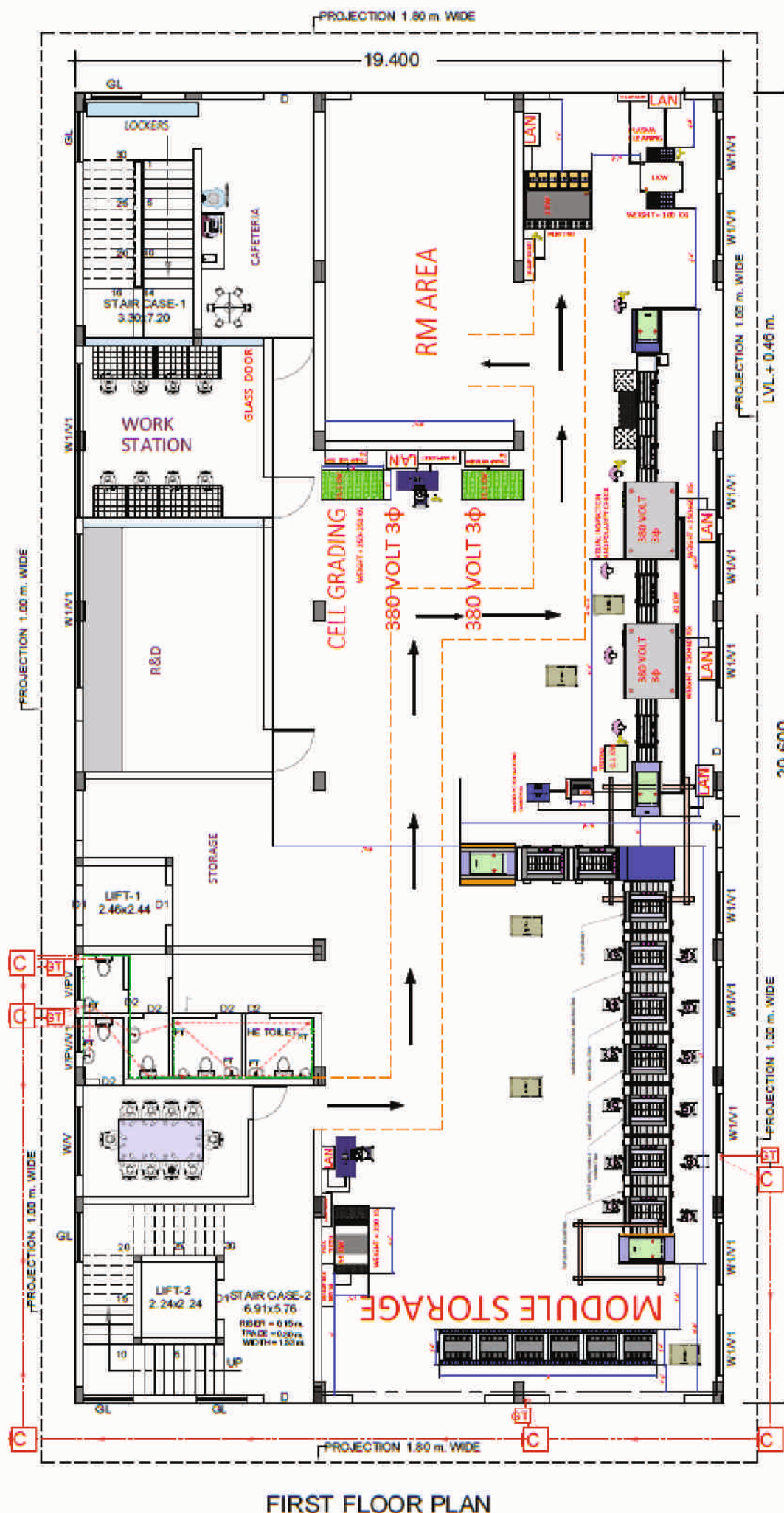
## OUR CUSTOMERS, OUR PRIDE (2024-25)

## Flagship Projects

Customer	Annual Capacity	Project Type	Location
RCRS Innovations Limited	1 Gwh	Automatic Cylindrical & Prismatic EV and ESS	Uttar Pradesh, India
Su-Kam Power Systems Ltd	3 Gwh	Automatic-Cylindrical & Prismatic EV and ESS	Himachal Pradesh, India
Fujiyama Power Systems Ltd	2 Gwh	Automatic-Prismatic ESS	Uttar Pradesh, India
Voltra Energy Pvt Ltd	2 Gwh	Automatic - Prismatic ESS	Haryana, India
Bessium Energy & Solutions	2 Gwh	Automatic - Prismatic ESS	Uttar Pradesh, India
Pastiche Energy Pvt Ltd	2 Gwh	Automatic-Prismatic ESS	Punjab, India
Lithina Energy Pvt Ltd	2 Gwh	Automatic-Prismatic ESS	Rajasthan, India
Microtek International Pvt Ltd	2 Gwh	Automatic Prismatic ESS	Himachal Pradesh, India

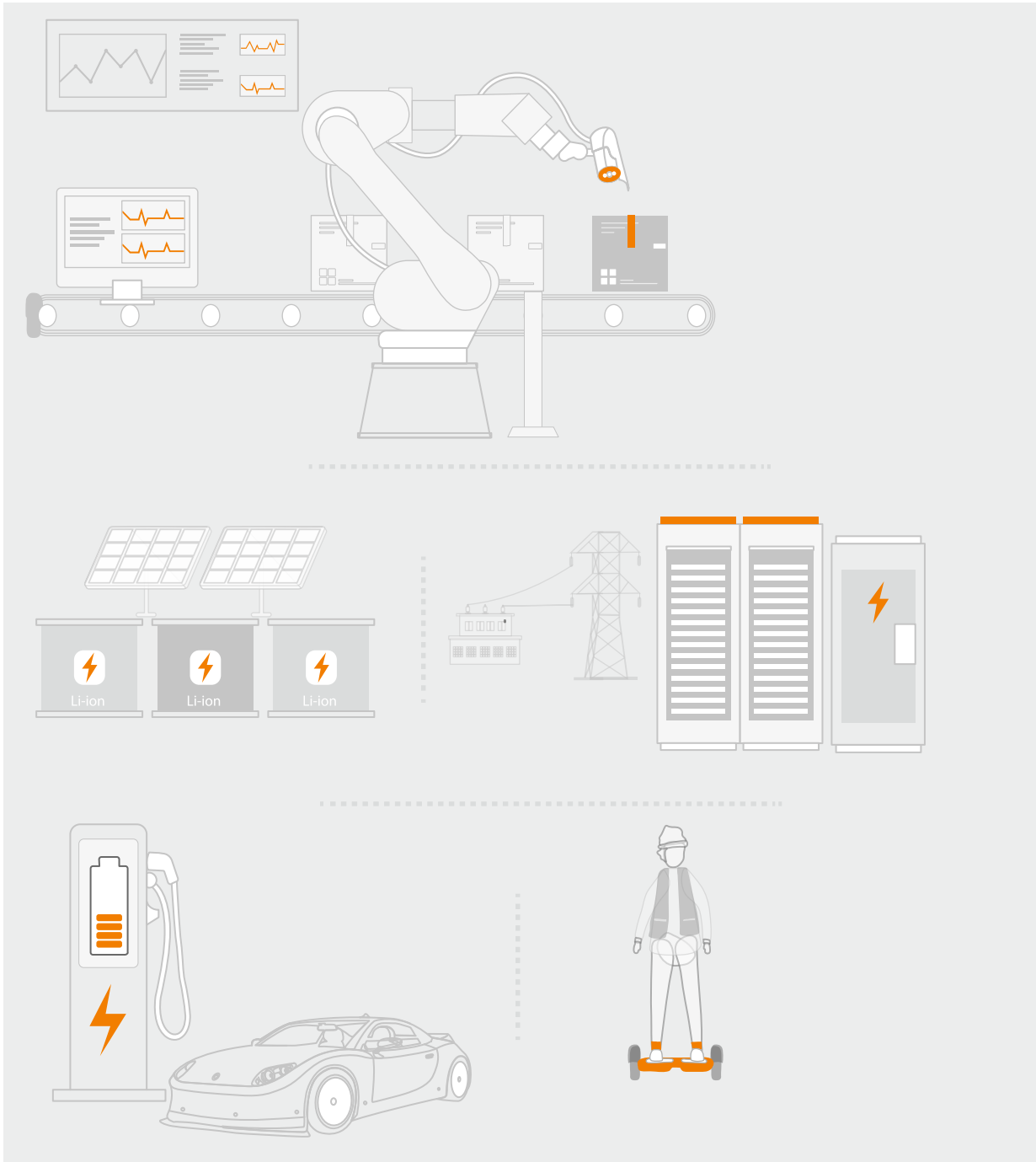
## Brands that believe in Us!





# DETAILED 2D FACTORY LAYOUTS

# CLIANTECH



All the solutions required for end-to-end Lithium Technology Ecosystem,  
**NICELY ARRANGED IN ONE PLACE**

Lithium Battery Pack Assembly Solutions

BESS: Engineering & Consulting

Technology Transfer

📍 Office No-1210, 12th Floor Gaur  
City mall, C-01/BGH-01, Sector-04  
Greater Noida (West) India  
Uttar Pradesh, India

☎ +91 90537 35333, +91 99100 05240

✉ info@cliantechsolutions.com

🌐 www.cliantechsolutions.com

