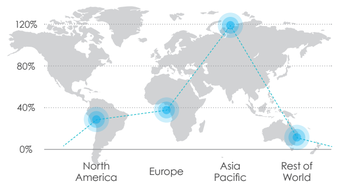
Global Battery Market Forecast (2019 - 2027)

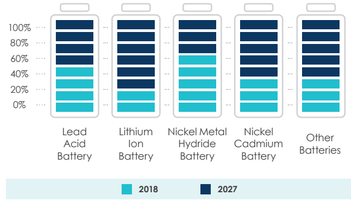
* Source : Inkwood Research

Market By Region



Market By Application

Market By Battery Type



Major References

SAMSUNG DISPLAY · SAMSUNG ELECTRONICS · SAMSUNG ELECTRO-MECHANICS · SAMSUNG SDI · LG Electronics · LG Innotek

LG Energy Solution · SK hynix · SK innovation · SK nexilis · SKC · SKC solmics

KOREAN AIR · KAI · HYUNDAI MOBIS · Q CELLS · Hanwha Defense · Hanwha Techwin

AMOREPACIFIC · CJ CHEILJEDANG · CJ LOGISTICS · LOTTE FINE CHEMICAL · DONGWOO FINE-CHEM · Dong Sung FINETEC

HYOSUNG TNS · EcoPro BM · DAEDUCK · WISOL · Amkor Technology · SFA SEMICON

KUMHO TIRES · SEJONG INDUSTRIAL CO.,LTD. · CTR · YG · LIG Nex1 · Hansol Paper

About THiRA-UTECH

Smart Factory & Logistics
DX Solution Provider

Founded in 2006, THiRA-UTECH is a public company dedicated to providing top-notch solutions for smart manufacturing and smart logistics. We offer professional consulting and advanced solutions such as Manufacturing Execution System (MES), Supply Chain Management (SCM), Production Planning System (APS), Quality Management System (QMS), Warehouse Management System (WMS), big data analytics, cloud services, and Autonomous Mobile Robot (AMR). THiRA-UTECH cares about our customers' success, and we have a successful track record with many conglomerate companies across various industry sectors including semiconductor, electronics, automotive, display, secondary battery, chemical, airline and etc. In October 2019, THiRA-UTECH became the first company in the smart factory industry to become KOSDAQ-listed.

THiRA-UTECH

www.thirautech.com

CK Building 1~7F, 7, Hakdong-ro 5-gil, Gangnam-gu, Seoul, South Korea (06044)

TEL | +82-2-3461-6531 / **FAX** | +82-2-3461-6532

E-mail | info@thirautech.com

THiRA ROBOTICS

www.thirarobotics.com

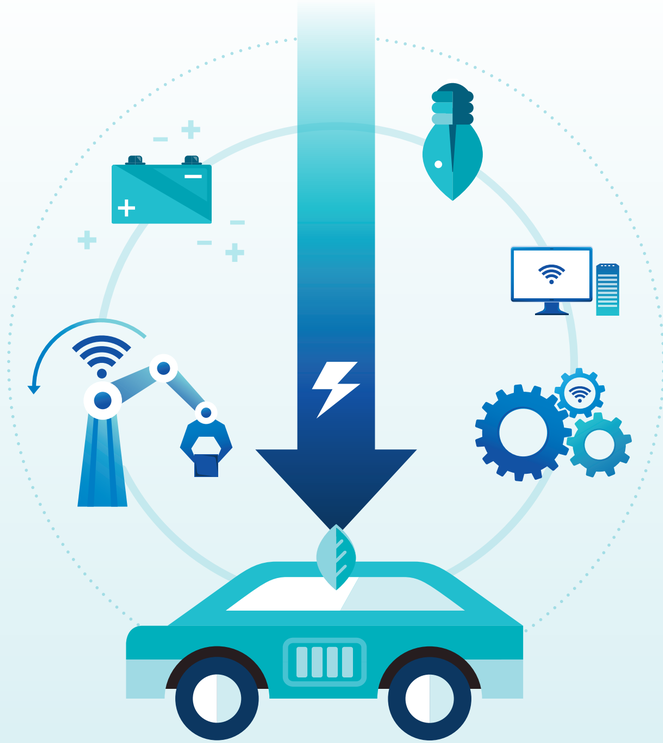
Unit 304, 388, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do, South Korea (13403)

TEL | +82-31-732-6531 / **FAX** | +82-31-732-6532

E-mail | sales@thirarobotics.com

Secondary Battery · Electric Vehicle (EV)

Smart Factory Solution



THiRA-UTECH

THiRA-UTECH

Our Secondary Battery / EV Smart Factory Solution is a Combination of

Information Technology (IT) + Operation Technology (OT).

Integrated Control S/W Standard-Based Failure Control Solution

Standardizing the integrated manufacturing equipment control software for unmanned automated production / automated logistics facilities achieves error-free production with **integrated control OT solutions** that can **detect, analyze, and correct errors** in the automation system

Quality Data Control Solution

An integrated OT solution for a seamless quality control process, including the material and component manufacturing stages, to address any issues that arise from accidents involving autonomous mobility.

ESG (Environment / Safety) Management Solution

Secure a sustainable business environment with a solution that addresses ESG (Environment / Safety)

- **AI, Big Data, AR/VR -** Detect / Analyze / Action
- **Digital SOP -** 24/7 Emergency Response Process

OT Solution

*OT : Operation Technology

Quality Control Solution to Address Autonomous Mobility for OT

- Strengthening the Quality Control Process
- Production Security History for OT

Step 2 A Solution Capable of Automation System Error Detection / Analysis / Corrective Action

- Equipment Control Software Performance Management
- System Error Management
- Equipment Error Management / Diagnosis SPEC

ESG Disaster Response Integrated Control Solution

- Real-Time Visibility
- Environment and Image Data
- Disaster Response SOP

IT Solution

Production Manufacturing Core

SCM — MES

* Example : Secondary Battery from Company "S"

Step 1 Standardization of Integrated Equipment Control Software

EIS — Manufacturing Equipment CIM — Inspection/Measurement Equipment CIM

MCS — ACS — SCS — CCS/LCS

THiRAbot (AMR) — THiRA Stocker

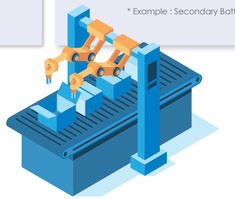
* Example : Secondary Battery from Company "S"

Facility (Manufacturing Plant)

Power — HVAC — Pure Water

GAS — Chemical — Wastewater

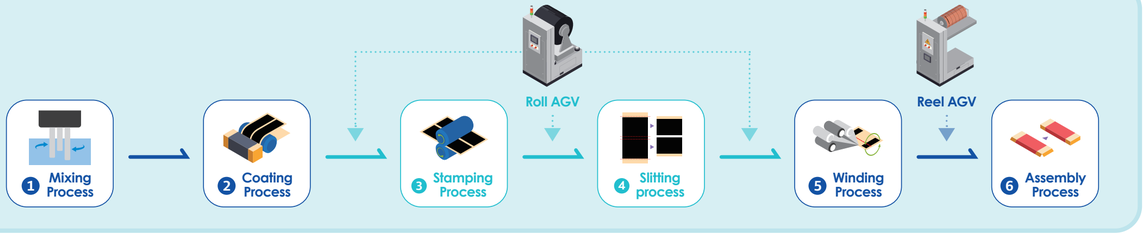
* Example : Secondary Battery from Company "L" (Integrated Production Control)



Logistics Automation for Secondary Battery Production

Automated Return of AGV/AMR, Taking into Account Production Line Limitations

- Optimal Operation and Layout Changes Based on Simulations



THiRA ROBOTICS

Autonomous Mobile Robot (AMR)

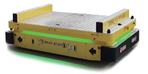
All Robots are **100% Designed and Manufactured in-House.**

roboL

THiRAbot series

THiRAbot 200

THiRAbot 200 Conveyor Type



THiRAbot 1000

THiRAbot 600 Storage Type

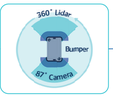
Model	roboL	THiRAbot Series			
		THiRAbot 1000	THiRAbot 600	THiRAbot 300	THiRAbot 200
Dimensions (W x L x H, mm)	600 X 1,100 X 1,200	1,400 X 2,000 X 650	720 X 900 X 320	500 X 700 X 340	500 X 700 X 340
Maximum Load (Kg)	200	1,000	600	300	200
Stop Precision (mm)	±10	±100	±5	±5	±5
Maximum Speed (m/s)	1.0	0.94	1.00	1.10	1.10
Battery [V][A]	Li-ion 24[V]40[Ah]	LiFePO4 51.2[V]113[Ah]	Li-ion 48[V]40[Ah]	Li-ion 24[V]40[Ah]	Li-ion 24[V]40[Ah]
Application Areas	Stores, Hospitals, Warehouses	Construction Site, Cargo Transport	Factory Automation, (Transfer of Raw Materials and Products)	Factory Automation, Logistics Warehouse Automation	Factory Automation, Logistics Warehouse Automation
Features / Navigation	AI Human Tracking, Autonomous Driving AMR	Stereo Camera + LiDAR, AI Human Tracking, Autonomous Driving AMR	Hybrid SLAM, Autonomous Driving AMR	Hybrid SLAM, Autonomous Driving AMR	Hybrid SLAM, Autonomous Driving AMR

10° Incline Climbing

Uneven Surface Driving

Overcoming Steps

Autonomous Driving & Tracking



Triple Safety System

Robot OS