Electric mobility

System Engineering for the battery industry
thyssenkrupp System Engineering is an operating business unit of the Automotive Technology segment of the thyssenkrupp AG, a system partner for all important components of the process chains car body and powertrain in automotive industry.

The product range also includes automation solutions for electrical storage and drive systems as well as solutions for innovative lightweight designs.

The company is a strong and reliable partner to its customers, optimizing their value added chain and strengthening their efficiency.
Low-emission electric propulsion systems will characterize and shape the mobility of the future. Currently, electric powertrains and renewable energies are expanding their market shares.

System Engineering is bringing its extensive experience from production lines of the automotive industry to the manufacturing process of modern energy storage and propulsion systems.

Our product range for the electric mobility:
- Li-ion cell assembly lines
- Cell formation and finishing
- Battery module and pack assembly lines
- Electric motor assembly lines
- End of Line test benches
- Service and support worldwide

Our comprehensive range of services includes the technical consulting for our customers in the development of design-to-assembly components, plant and factory planning. Our main scope of supply is the design, manufacturing and commissioning of turnkey assembly lines.
We design and build production lines for the manufacturing of large Li-ion cells and ultra-capacitors. While being a renowned system integrator in the automotive industry, we use our extensive know-how and proven industrial solutions, e.g. laser welding, automation and Integrated Quality Assurance (IQA) to the benefit of our customers. As a flexible partner, we offer tailor-made solutions. While following this competitive approach we strive to supply the best quality and cost efficiency to fulfill our customers’ needs and expectations.

System integrator for scope of supply
- Slurry mixing
- Coating
- Calendering
- Cutting
- Tab welding
- Electrode stacking/winding
- Insertion of electrodes into pouch/can
- Closing of pouch/can
- Electrolyte filling
- Formation and ageing
- Degassing
- Sealing and leak testing

Customer benefits
- Proprietary technical center
- Common R&D activities with renowned Organizations and Institutes
- Network of qualified and Best in Class suppliers worldwide
- Proprietary laser welding equipment and expertise
- Reliable integration into present systems
- Standard automation architecture
- Own solutions for Integrated Quality Assurance and In Process Verification

Battery cells - the basis for energy storage
We design and build assembly systems to process Li-Ion cells (either round, pouch or prismatic) further into battery modules and packs. For our customers we develop semi or fully automatic solutions, providing all the necessary safety features for man and machine. During the project realization, our customers benefit from our extensive experience in assembly line engineering, procurement and construction.

**Customer benefits**
- Custom made jigs and fixtures
- Diverse solutions for cell stacking, tab bending and welding
- Special solutions for inline testing process of welds
- Standard End of Line test, test benches for battery system

**Detailed overview of our scope of supply**
- Cell and component testing (incoming goods quality inspection)
- Cell and component preparation (plasma cleaning, gluing)
- Cell positioning and stacking
- Stack pressing
- Frame welding
- Connector/busbar laser welding
- Cell and module handling
- Integrated Quality Assurance (IQA)
- In Process Verification
We provide End of Line test solutions for battery cells, modules and packs.

Test stand set-up
- Manually or automatically loaded/unloaded
- Manual and automatic electrical connections up to 400 V/300 A
- Battery load test unit with uninterrupted change between charging and discharging
- Safety concept for your battery test
- Experienced test stand supplier for the automotive industry

Test features include
- Real time open CAN simulation
- HV-test/isolation resistance test
- High current charging and discharging test
- Check of internal safety features
- Monitoring of cell voltages and temperature sensors during entire test run
- Integrated leak test for cooling system and battery pack housing

“We are pleased that our globally already well-known and acclaimed test stands and test software have now been established in the new field of battery technology.”

Ingo Steinkrüger, thyssenkrupp System Engineering
Electric drive assembly -
electric vehicle & hybrid electric vehicle powertrain

We provide complete assembly systems for serial hybrid, parallel hybrid, range extender or pure electrical drive trains and its components.

Scope of supply and services
- Assembly of coils
- Impregnation
- Assembly of contact ring
- Assembly of magnets
- Stator assembly
- Rotor assembly
- Electrical test
- End of line test

Customer benefits:
- From coil winding up to test - everything from one source
- Flexible production adjustment - investment in several stages
- Attainment of highest product quality
We are developing assembly systems for e-drive trains based on 30 years of tried and tested combustion engine assembly processes.”

Dr. Christoph Kramer, thyssenkrupp System Engineering

We offer solutions by using tried-and-tested standard elements combined with custom modifications and enhancements. These range from manually-operated, ergonomic assembly tools to fully-automated stations.

Station set up
• Rotor assembly (fixing of magnets into laminations, lamination stack assembly, balancing, magnetizing)
• Stator assembly (heating of housing, pressing of stator core into housing, bearing insertion, cable handling)
• Final assembly (rotor into stator, closing of housing)
• Testing (leakage, isolation, performance)
• Assembly of drive unit (e-motor and to transmission)

Special quality gates
• Orientation and part presence check for laminations and magnets
• Camera system for application of glue
• Force-distance monitoring during press operation for shaft

Electric drive assembly - gearbox integrated motor
Test stand set up

- Set up for hybrid drive train includes engine, e-motor, inverter, transmission with clutches.
- Use of integrated DC-source instead of original car battery for drive and recuperation.
- Manually or automatically load/unload stations possible.
- References for manual and automatic electrical connections up to 400 V/300 A.
- Noise insulated cabin.
- Data evaluation with special testing software.
- Measuring PC system with database and server application.

Test features include

- Real time open CAN simulation.
- Integrated speed control for hybrid motor.
- Integrated Noise Vibration Harshness test (NVH).
- Integrated leak test for water cooling system.
- Clutch actuation test.
- Integrated test methods (all-in-one software concept).
Why choosing thyssenkrupp System Engineering

- High engineering competency for planning, designing and commissioning
- Long-term experience in plant construction
- Certified project management
- Focus placed on resource efficient and customized production solutions
- Extensive knowledge of OEM standards
- Worldwide presence