albatts

Alliance for Batteries Technology, Training and Skills

2019-2023

Battery Cell Module Engineer

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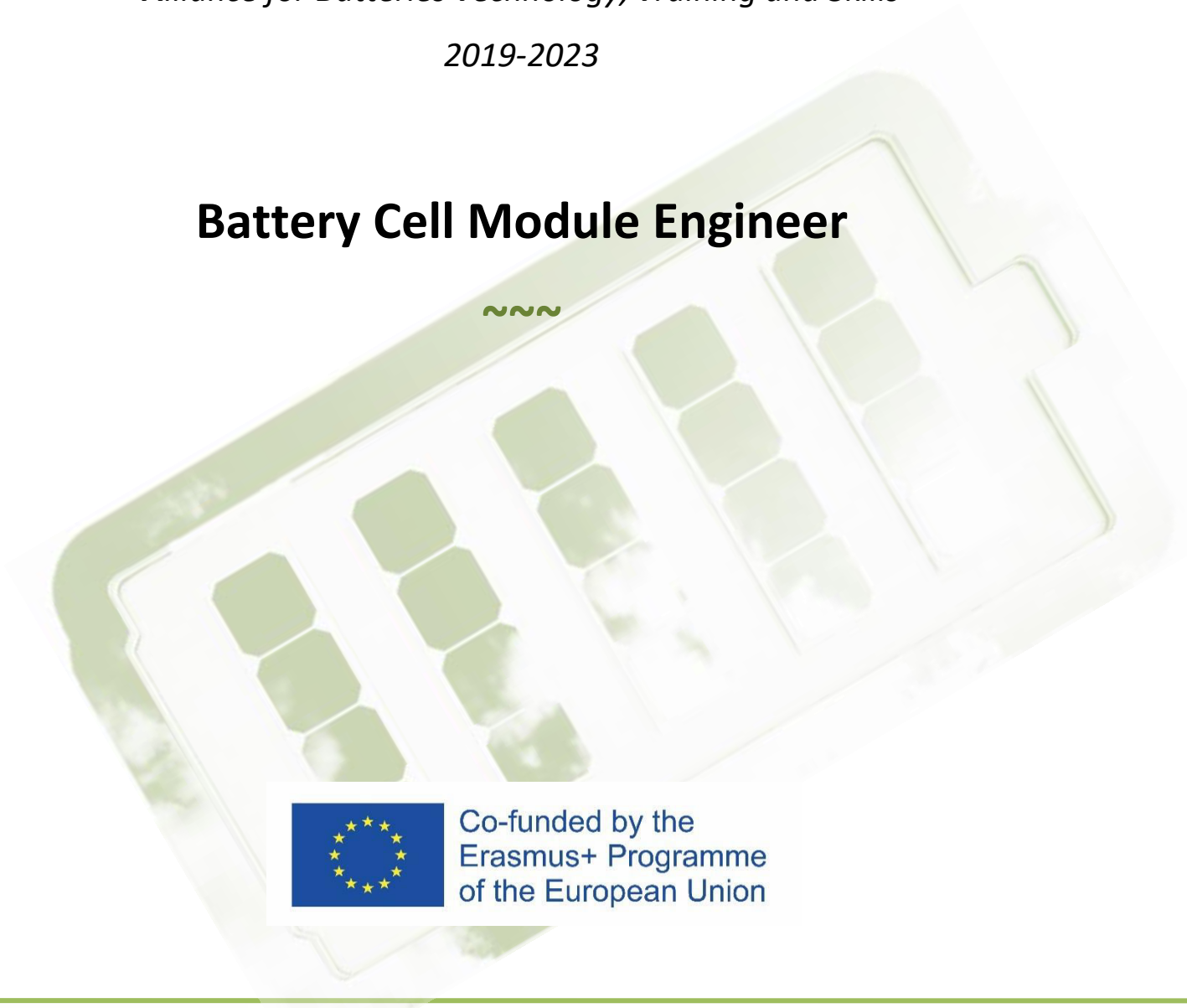

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Battery Module/Cells Engineer

A battery cell module engineer is responsible for designing, developing, and testing battery cell modules for various applications. They work with a team of engineers and scientists to create efficient and cost-effective energy storage solutions for electric vehicles, consumer electronics, and other applications. They may also be involved in the selection of materials and components for the battery cell modules and in the optimization of the manufacturing process. They should have a strong understanding of electrical engineering, materials science, and manufacturing processes, as well as experience with battery management systems and safety protocols.

ESCO Occupations - ESCO - Occupations - European Commission (europa.eu)

ID	NAME	Concept URI
2151.1	electrical engineer	http://data.europa.eu/esco/occupation/86ca306c-ab99-420a-9e2a-aa73c5c4de22
2144.1	mechanical engineer	http://data.europa.eu/esco/occupation/579254cf-6d69-4889-9000-9c79dc568644

Context

Minimum EQF	6/7/8
Value Chain	Cells and Components Manufacturing Modules and Packs Battery Integration
Departments	Production and Maintenance Logistics Quality RnD
Specialisations	Other job roles that are more specialised but based on this Cell designers Battery Cell Developer - Energy Functions Battery Cell Conditioning Process Development Expert Senior/Staff Battery Engineer Mechanical Cell Design Engineer Senior Battery Engineer

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	Cell Test Engineer Cell Simulation Engineer Cell Mechanical Engineer Cell Material Engineer Cell Design Engineer Senior Cell Design Engineer Battery Engineer Cell Module Electrical Engineer Cell Module Mechanical Engineer Cell Module Simulation Engineer Cell Engineer Lithium-ion Cell Battery System Engineer Battery Cell Simulation Engineer Development Engineer - Battery Cell Chemistry and Energy Storage Battery Cell Simulation Engineer Battery Module Performance Engineer Senior Battery Cell Engineer

Cross-sectoral Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Inspect Quality of Product / Sampling	S	- Work towards optimizing product quality and resolving quality issues - Select, characterize, and validate materials and components - Create and update technical documentation, test plans, and test results	Expert	inspect quality of product
Process Improvement	S	- Good understanding of production processes - Support root cause investigations and failure mode analysis - Drive design and process changes to improve cell technology - Find ways to improve the process and safety	Expert	identify process improvement
Develop/Ensure Conformity to Specifications	S	- Select, characterize, and validate materials and components - Interface with RnD to evaluate new materials, modelling to define requirements, and validation to test new designs - Conduct feasibility studies for requested features before	Expert	ensure conformity to specifications

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		confirming functional requirements - Facilitate communication and clarification of technical requirements between customers and internal stakeholders		
Analyse Test Data	S	- Analyse test results and provide conclusive reports - Create and update technical documentation, test plans, and test results - Knowledge and use of appropriate analysis methods	Expert	analyse test data
(Automated) Product Testing	S	- Plan, organize, direct and follow up on project related testing activities - Work with testing / validation - Acquire and interpret analytical and cell test data	Expert	perform product testing
Product Design	S	- Cell product and process development engineering - Ability to pilot scale sample process development to collaborate with R&D projects - Develop and optimize battery models including electrochemical, thermal, and data-driven models - pilot scale sample process development to collaborate with R&D projects	Expert	develop product design
Product Development	S	- Battery cell development and energy functions throughout all phases of development - Organize and carry out physical characterization and battery failure analysis work to support battery development - Develop and review mechanical drawings and models - Understanding of cell characteristics and electrochemistry and its consequence on complete battery systems - Design, develop and execute test methods to evaluate various lithium-ion battery cell chemistries and drive the decision for cell selection based on test results	Expert	develop new products
Safety Procedures	K	- Identify the safety mechanism and create plan and execute to improve safety based on knowledge and understanding mechanism - Plan and execute root cause analysis of failures - Work closely with cell suppliers to ensure high levels of quality, performance, and safety	Expert	safety engineering
Models/Modelling/Diagrams	S	- Develop electrochemical models to simulate capacity degradation (SOH) - Develop and optimize models for lithium-based batteries including electrochemical, thermal, and data-driven	Expert	develop models

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		models - Design experiments to extract parameters required for modelling and to validate models - Create and validate cell models - Develop battery models for integration into firmware - Cell models parametrization - Cell/battery/BMS simulation models creation - Models performance evaluation		
Data Analysis/Science	K	- Test and simulation data analysis - Create data analysis programs, graphics packages - Work with scientists to interpret results - Perform simulations, analysis, and DFMEA to ensure that the system meets the needs and the product fulfils the systems requirements	Expert	gather data; inspect data; process data
Analysis Methods	K	- Implement, refine, and customize diagnostic and analytical methods - Knowledge and experience of applied electrochemical and chemical analysis methods - Good knowledge in analysis and design of battery components - Test and simulation data analysis - Carry out post-mortem cell and battery material analysis (cell teardown) - Perform root cause analysis and defect identification - Organize and carry out physical characterization and battery failure analysis - Create data analysis programs - Conduct DFMEA and Failure analysis	Expert	analysis methods
Simulation Methods	S	- Evaluate automotive modules, mechanical and thermal simulation - Perform simulations, analysis, and DFMEA to ensure that the system meets the batteries needs and the battery fulfils the systems requirements - Contribute to building up ESS & Cell simulation area - Secure transfer of cell characteristics to product development through development of models and simulation	Practitioner	run simulations

Sector Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO

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Cell Design	K	- Design, validate, and analyse battery product - Develop and optimize models - Cell material development	Expert	industrial design
Lithium-ion Chemistry	K	- Experience with Li-Ion battery chemistries, cell design, cell performance characterizations, pack integration, pack durability, and pack weatherproofing - Development of lithium anode battery designs including the cell chemistry and mechanical design - Develop electrochemical models - Acquire and interpret analytical and cell test data using materials characterization and electrochemical techniques - Develop electrochemical models to simulate capacity degradation (SOH) of Li-ion battery	Expert	battery chemistry
Battery Design	K	- Design, validate, and analyse battery product - Understanding and ability to work with cell design, analysis and material development - Development of battery designs including the cell chemistry and mechanical design - Define the cell bill of materials (BOM) as well as all critical chemical and mechanical design parameters - Lead analytical and test method development, design experiments, and analyze data - Develop and review mechanical drawings and models	Expert	industrial design
Characterization Techniques	S	- Acquire and interpret analytical and cell test data using materials characterization and electrochemical techniques - Organize and carry out physical characterization and battery failure analysis work to support battery development	Expert	
Battery System	K	- Understanding of battery systems and systemic view of the cells and modules integration into the system		

Soft Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Communication	K	- Facilitate communication between stakeholders - Communicate and collaborate with product teams and internal departments as well as suppliers - Good written and verbal communications skills required	Practitioner	communication
Teamwork	K	Work in cooperation with internal and external actors to produce the optimal solutions	Practitioner	teamwork principles

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General Transversal Competence

Name	Type (S/K)	Description/Context	Level	ESCO
English	K	- Working in a multicultural and international environment - Good written and spoken English	Practitioner	English
Reporting	K	- Develop and create comprehensive technical specifications and report - Acquire and interpret analytical and cell test data using materials characterization and electrochemical techniques - Perform tear downs and prepare reports - Analyze test results and provide conclusive reports	Expert	follow reporting procedures
Customers/Stakeholders	S	- Facilitate communication and clarification of technical requirements between customers and internal stakeholders - Collaboration and communication with customer and supplier to discuss technical information and performance - Communication and interaction with inside and outside stakeholder on diverse issues	Expert	communicate with customers

Academic Competence (can be taken from University programme)

Name	Type (S/K)	Description/Context	Level	ESCO
Electrochemistry	K	- Acquire and interpret analytical and cell test data using materials characterization and electrochemical techniques - Develop electrochemical models	Expert	electrochemistry
Mechanical Engineering	K	- Mechanical engineering to design, develop and test new systems and features - Develop mechanical designs for battery cell - Specify and review Hardware requirements needed to meet system level requirements - Ability to review and guide during the design of hardware components, software protocols, system schematics, requirements documents, test plans and schedules	Expert	mechanical engineering
Electrical	K	- Electrical Engineering university degree	Expert	electrical engineering

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Engineering				
Material Science	K	- Select, characterize, and validate materials and components - Develop and execute materials evaluation in support of product qualification	Expert	materials science
Chemistry	K	- Development of battery designs including the cell chemistry and mechanical design - Defining the cell bill of materials (BOM) as well as critical chemical and mechanical design parameters	Expert	chemistry
RnD	S	- Technical support for R&D team, with technical cell level analysis - Possess pilot scale sample process development to collaborate with R&D projects - Research and benchmark competitive technologies - Interface with R&D to evaluate new materials, modelling to define requirements, and Validation to test new designs	Expert	manage research and development projects
Engineering	K	- Engineering university degree	Expert	engineering principles
Physics	K	- Knowledge of applied electrochemical and chemical analysis methods relevant to lithium-ion batteries	Practitioner	physics

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