albatts

Alliance for Batteries Technology, Training and Skills

2019-2023

Battery Thermal System Engineer

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Battery Thermal System Engineer

A battery thermal system engineer is responsible for designing, developing, and testing thermal management systems for batteries. They work with a team of engineers and scientists to create efficient and safe thermal management solutions for electric vehicles, consumer electronics and other applications. They are responsible for ensuring the safe and optimal temperature range for the battery cells to function properly and preventing thermal runaway.

They need to have a strong understanding of thermal science, thermodynamics, and heat transfer, as well as experience with thermal management systems, safety protocols and regulations. They also need to be familiar with simulation and modeling tools to predict the thermal performance of the battery systems under different conditions. They need to be able to work closely with other engineers and stakeholders to ensure that the thermal management system meets the requirements of the application and is compatible with the rest of the system. They also need to be familiar with the regulations and standards related to battery thermal management and safety.

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

ID	NAME	Concept URI
2511.5	embedded system designer	http://data.europa.eu/esco/occupation/10469d70-78a3-4650-9e29-d04de13c62c1
2149.2.4	design engineer	http://data.europa.eu/esco/occupation/6fc8f605-98b9-4218-b5e2-91c4c9c55c4d

Context

Minimum EQF	5/6/7/8
Value Chain	Cells and Components Manufacturing Modules and Packs Battery Integration
Departments	Quality RnD IT/Digitalisation

Specialisations	Other job roles that are more specialised but based on this
	Battery Algorithms Engineer
	Thermal Hybdrid Battery Simulation Masterand
	Design Engineer - Thermal Management System
	Thermal Design Engineer
	Thermal System Engineer
	Principal Thermal Architect
	Thermal Simulation Engineer

Cross-sectoral Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Models/ Modelling/ Diagrams/ Schematics	S	- Set up the battery model (physical and electrochemical) to analyse the internal status of battery, calculate the exclusive charging profiles of battery based on the specific aging degree of battery to prolong the life of battery. - Create physics-based modelling of cell and pack elements. - Develop models of battery state of charge and health - Thermal model development and analysis for control, diagnostics, and optimisation	Expert	develop models
Analyse Test Data	S	- Set up test environment, support to test and validate the developed battery algorithms	Expert	analyse test data
(Automated) Product Testing	S	Perform simulations and prepare testing needed to verify and validate the system design	Expert	perform product testing
General Programming Languages	K	- Python scripting - Working with MATLAB	Practitioner	Computer programming
Machine Learning	S	- Experience with machine learning	Practitioner	Utilise machine learning
Data Analysis/ Science	K	- Use a variety of cell and battery pack models, fleet data, and laboratory test data to create state-of-the-art feedback control and estimation algorithms for high voltage battery packs. - Understand the principles of data science	Practitioner	gather data; inspect data; process data
Simulation Methods	S	- Selection of a suitable simulation method depending on the potential cause - It is meritorious if you have experience within measurements methods and heat transfer simulations. - Design support for battery thermal management through simulation	Practitioner	Run simulations
Validation/	S	- Virtually verify components / systems	Practitioner	apply validation

Verification		- Knowledge of testing and validation of components and systems		engineering
Thermal Management / Systems	S	- write technical report and provide results of CFD & Thermal Analysis for input in Technical requirement - Device a thermal runaway detection strategy for early warning - different thermal runaway detection mechanism (voltage, current, temperature, pressure, gas, swelling, derivatives, combination etc.) - responsible for the thermal management systems - Deep knowledge of heat transfer and thermodynamics, thermal management, system verifications. - Experience of cooling systems development for battery electric vehicles. - Perform thermal system design - Design detection method for thermal system faults (physics modelling or data-based modelling) - Experience in thermal design, analysis, and relevant hardware	Expert	Design thermal equipment

Sector Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Cell Design	K	- experience within Lithium Ion-Batteries, Energy Storage System - Use a variety of cell and battery pack models - Work on projects from cell capacity, impedance, energy, and degradation estimation to diagnostics of sensors, cells and battery pack components. - Create physics-based modeling of cell and pack elements.	Practitioner	Industrial design
(Battery SoC, SoH) Algorithms	K	- Create and integrate models, define algorithms, write testing code, and evaluate the performance of algorithms throughout the life of the product. -	Practitioner	algorithms

Soft Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Teamwork	K	- Interact with cross-functional teams to understand and work around package requirements and limitations, ergonomics, manufacturability - Ability to work as part of a team of experts	Practitioner	teamwork principles
Communication	K	- Good and assertive communication skills - Ability to work as part of a global team of experts	Practitioner	communication
Problem Solving/Trouble shooting	S	- Analytical and decisive, problem-solving mindset	Expert	problem solving & troubleshoot

General Transversal Competence

Name	Type (S/K)	Description/Context	Level	ESCO
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Academic Competence (can be taken from University programme)

Name	Type (S/K)	Description/Context	Level	ESCO
Mechanical Engineering	K	- A degree in Mechanical Engineering	Expert	mechanical engineering
Computer Science / IT Management	K	- Computer Science on master level	Expert	Computer science
Physics	K	- Physics on master level	Expert	Physics

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