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Alliance for Batteries Technology, Training and Skills

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Simulation Engineer



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Simulation Engineer

A battery simulation engineer is responsible for using mathematical models and simulation tools to predict the performance of batteries and battery systems under different conditions. They work with a team of engineers and scientists to create accurate and reliable simulations of the battery systems, which can be used to analyze and optimize the design, performance and safety of the batteries. They are responsible for developing and maintaining the simulation models, performing simulations and analyzing the results, and providing recommendations for design changes and improvements.

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

ID	NAME	Concept URI
2149.2.1	Calculation	http://data.europa.eu/esco/occupation/fbceeac6-798b-4307-a825-626707a753ad
	engineer	

Context

Minimum EQF	6/7/8
Value Chain	Cell and Components Manufacturing
	Modules and Packs
	Battery Integration
Departments	Production Maintenance
	Quality
	RnD
Specialisations	Other job roles that are more specialised but based on this
	Cell Simulation Engineer
	Cell Module Simulation Engineer
	Thermal Hybdrid Battery Simulation Masterand
	Machine Learning Engineer in Simulation within Autonomous Systems
	Battery Cell Simulation Engineer
	Battery Charging Simulation Expert
	Thermal Simulation Engineer
	Performance Simulation Engineer - Powertrain
	Controls Simulation Engineer



Cross-sectoral Specific Competence

Name	Туре	Description/Context	Level	ESCO
	(S/K)			
Models/Modelling/	S	- Use a variety of cell and battery pack models, fleet	Expert	develop models
Diagrams/Schemati		data, and laboratory test data to create feedback		
cs		control and estimation algorithms		
		- Create physics-based modelling of cell and pack		
		elements		
		- Create, optimise and integrate models		
		- Develop models of battery state of charge and health		
		- 3D-modelling		
		- Support testing, prototype build, and launch		
		activities		
		- Experience working with SW such as Star-CCM,		
		Ansys, etc.		
(Automated)	S	- Design experiments to extract parameters required	Expert	perform
Product Testing		for modelling and to validate models		product testing
		- Support testing, prototype build, and launch		
		activities		
		- Use cell and battery pack models, fleet data, and		
		laboratory test data to create feedback control and		
		estimation algorithms		
		- Create and integrate models, define algorithms,		
		write testing code, and evaluate the performance of		
		algorithms throughout the life of the product		
(Battery SoC, SoH)	К	- SOC/SOH/SOE/SOP algorithms development	Expert	algorithms
Algorithms		- Understand and apply new methods regarding		
		calculation models, algorithms, simulation, and		
		calculation software		
General	К	- Good programming skills C, C++, Simulink, Stateflow	Expert	computer
Programming		- Matlab and Python for process automation and		programming
Languages		optimization		
		- Capable of developing scripts in Matlab or Python to		
		automate common tasks		
Python	К	- Matlab and Python for process automation and	Expert	Python (computer
		optimization		programming)
		- Capable of developing scripts in Matlab or Python to		
		automate common tasks		
Data	К	- Implement, refine, and customize diagnostic and	Expert	gather data;
Analysis/Science		analytical methods for characterization of cells,		process data
		batteries		

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		-	Ability to implement and understand test and		
			simulation data analysis		
		-	Gather and analyse test data as well as perform final		
			validation		
Simulation Methods	S	-	Contribute to building up ESS & Cell simulation area	Expert	run simulations
		-	knowledge from leading studies or projects related to		
			Battery Cell/Battery Simulations and design		
		-	Ability to use data science, machine learning, deep		
			learning and reinforcement learning methods to		
			extract scenarios from data, generate scenarios on		
			maps, search edge cases, cluster scenario groups,		
			data validation and perception performance		
			validation, etc		
		-	Experience with physical modelling and/or simulation		
			of electrical, mechanical, and hydraulic systems		
Validation /	S	-	Knowledge of testing and validation of components	Expert	apply validation
Verification			and systems		engineering
		-	Use data science, machine learning, deep learning		
			and reinforcement learning methods to extract		
			scenarios from data, generate scenarios on maps,		
			search edge cases, cluster scenario groups, data		
			validation and perception performance validation,		
			etc		
Diagnostics	К	-	Experience with embedded diagnostics	Practitioner	performance
(Performance		-	Use data science, machine learning, deep learning		ulagnosis
Prediction/Validatio			and reinforcement learning methods to extract		
n)			scenarios from data, generate scenarios on maps,		
			search edge cases, cluster scenario groups, data		
			validation and perception performance validation,		
			etc		

Sector Specific Competence

Name	Туре	Description/Context	Level	ESCO
	(S/K)			
(Battery	К	- SOC/SOH/SOE/SOP algorithms development	Expert	algorithms
SoC, SoH)		- Understand and apply new methods regarding calculation		
Algorithms		models, algorithms, simulation, and calculation software		
		- Experience in battery degradation estimation		



Soft Competence

Name	Туре (S/K)	Description/Context	Level	ESCO
Problem Solving/Trouble shooting	S	 Analytical and problem-solving skills 	Practitioner	problem solving & troublesho ot
Teamwork	К	 Interaction with cross-functional teams to understand and work around package requirements and limitations, ergonomics, manufacturability etc. Ability to work in teams 	Practitioner	teamwork principles
Communication	К	 Good communication skills and ability to work independently & contribute as a good team player 	Practitioner	communica tion

General Transversal Competence

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

Academic Competence (can be taken from University programme)

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



