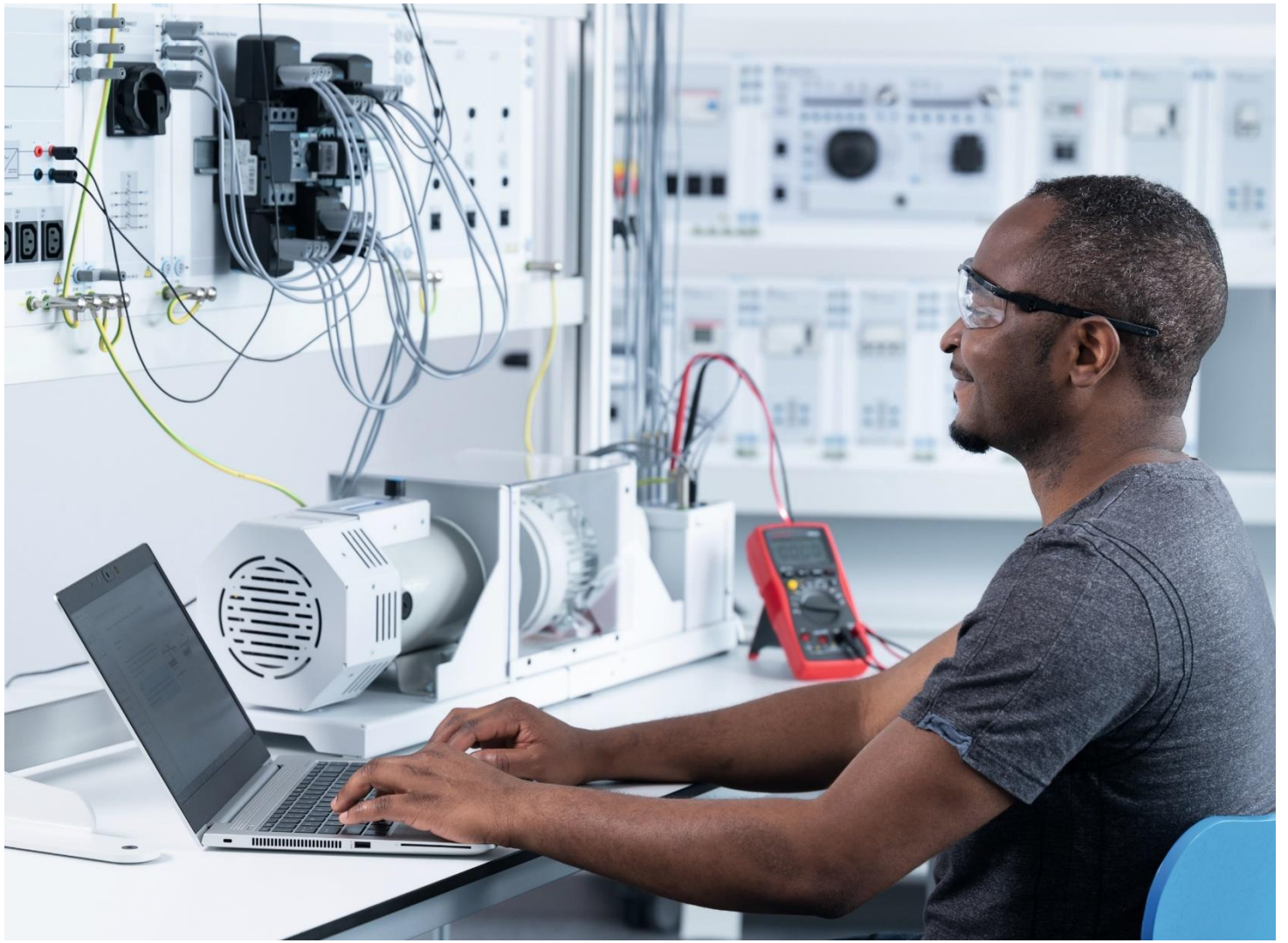
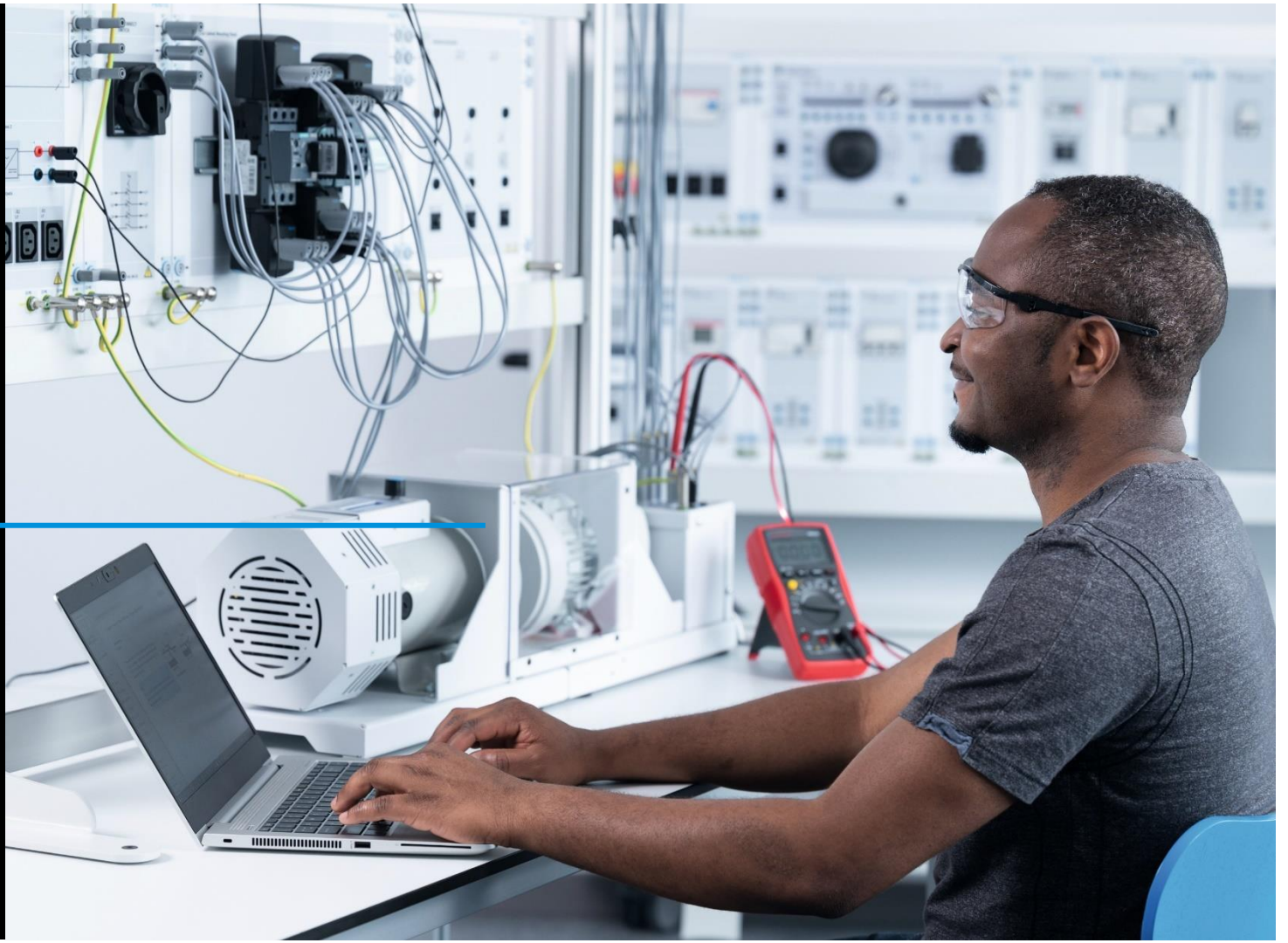
Technical education

Learning solutions for electric vehicle and battery manufacturing



The blue path
to green skills

Your way to sustainability training



Transportation electrification is key to decarbonization and energy transition.

Electromobility: the use of electric vehicles (EVs) powered by electricity from batteries or fuel cells

- reduced greenhouse gas emissions
- reduced air pollution
- higher energy efficiency
- reduced dependence on fossil fuels

To achieve transportation electrification, we need electric vehicles and batteries.

Automakers and battery manufacturers are under growing pressure to increase production.

One of the biggest challenges: recruit and retain a skilled production workforce.

Key characteristics of the work environment:

- Large-volume production facilities
- High level of industrial automation (factory + process)
- Integration of advanced manufacturing technologies

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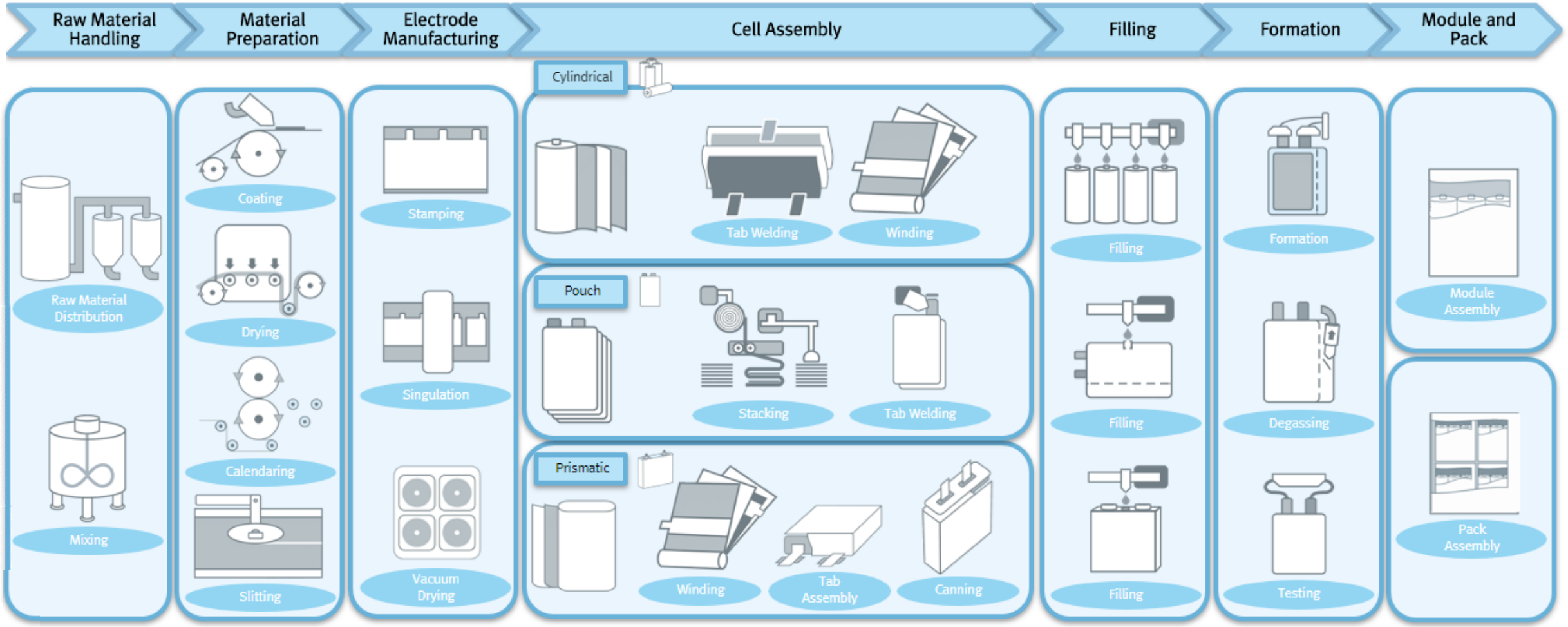
Battery processes: Main process groups for cylindrical, pouch, and prismatic cells



Prepare workers for advanced manufacturing environments.

We can help you build a qualified pipeline of skilled production workers, especially:

- Operators
- Maintenance technicians

Learning solutions are flexible and can fit various levels of qualification.

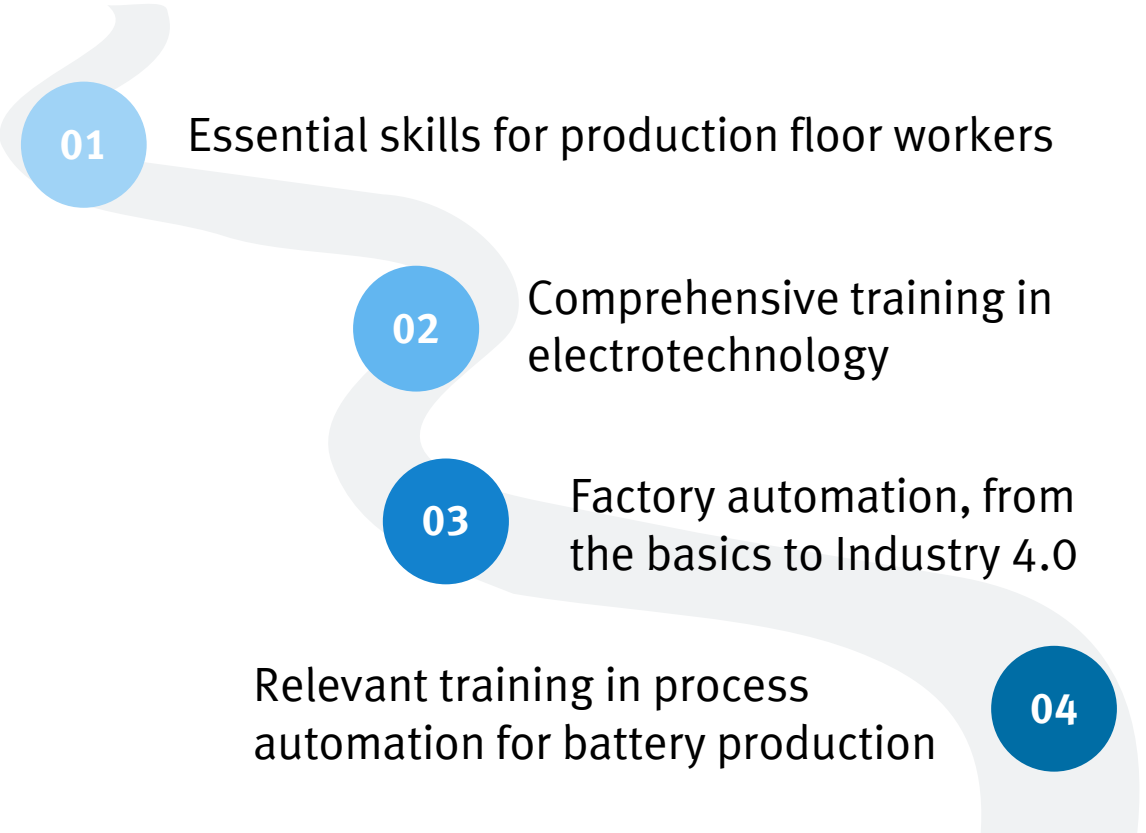


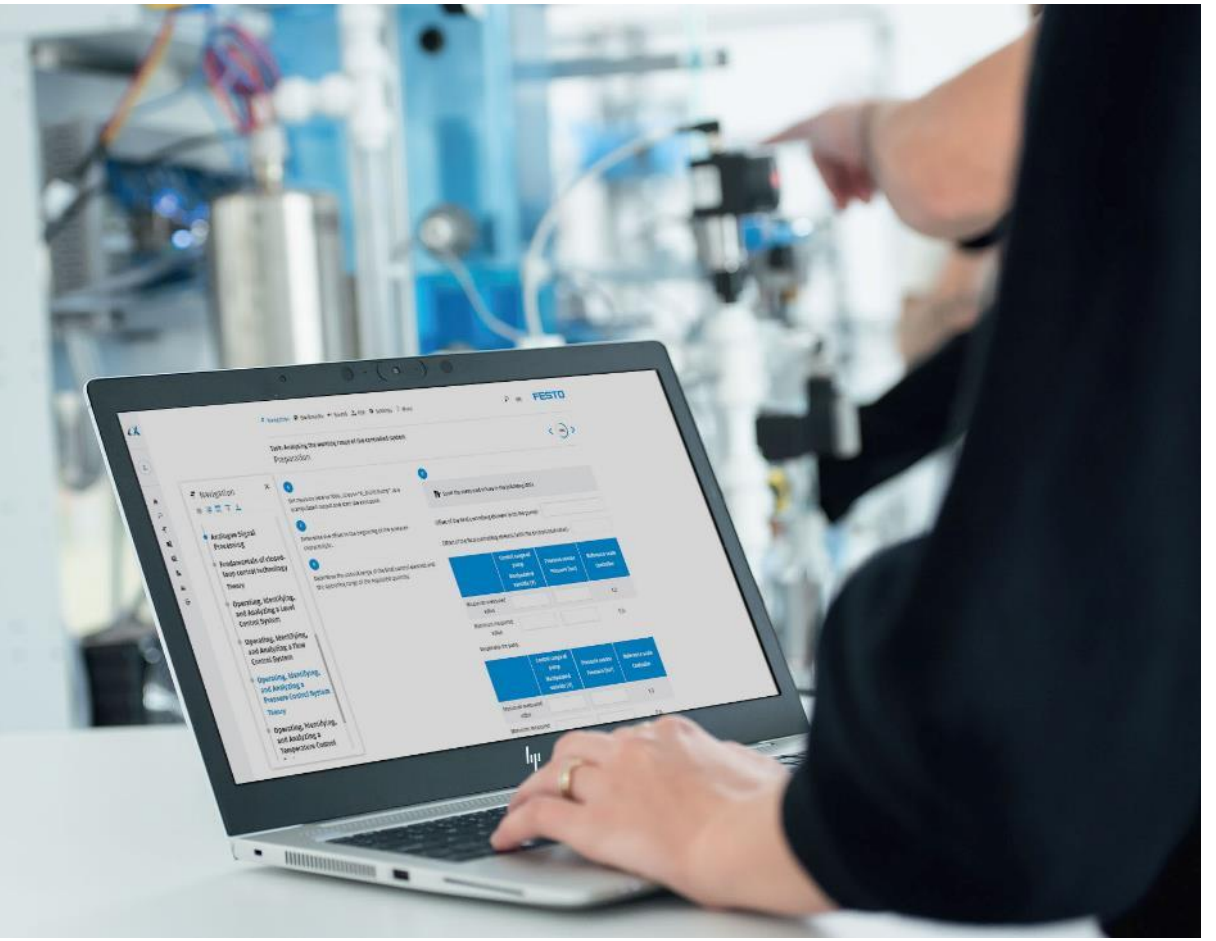
Chart customized learning paths.

Our digital learning portal, Festo LX, is the backbone for skills development.

A comprehensive collection of varied learning content enables learners to study precisely what they need, at their own pace, creating a stimulating learning experience adapted to the latest educational trends.

Browse the collection on **lx.festo.com**

Create your account



A sample of relevant courses

Electric Vehicle Charging Stations
eLab course by Festo Didactic
Show More

Hydrogen Fuel Cell
eLab course by Festo Didactic
Show More

Lead-Acid Batteries
eLab course by Festo Didactic
Show More

Ni-MH Batteries
eLab course by Festo Didactic
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Electric Drives 1
eLearning course by Festo Didactic
Show More

Dimensional Metrology – Precision Measurement (Course
eLab course by Festo Didactic
Show More

DC Power Electronics
eLab course by Festo Didactic
Show More

Temperature Process and Heat Exchanger
eLab course by Festo Didactic
Show More

TPM – Total Productive Maintenance
eLearning course by Festo Didactic
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Introduction to Additive Manufacturing
eTheory course by Festo Didactic
Show More

Plant Control and Commissioning with MES
eLab course by Festo Didactic
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Introduction to Automation and Robotics
eLab course by Festo Didactic
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Introduction to Industry 4.0
eLearning course by Festo Didactic
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Introduction to Robotics
eTheory course by Festo Didactic
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Safety Technology
eLearning course by Festo Didactic
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Industrial Safety in the Workplace
eTheory course by Festo Didactic
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Basics of PLC Programming
eLab course by Festo Didactic
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Process Control – Pressure, Flow, and Level
eLab course by Festo Didactic
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01 Convey essential skills for the production floor.

Safety

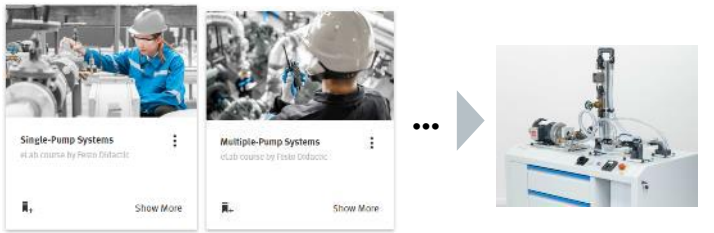
Power supply systems
and protective measures

Pneumatics

Various training packages in pneumatics & electropneumatics basic and advanced level, digitalization in pneumatics, etc.

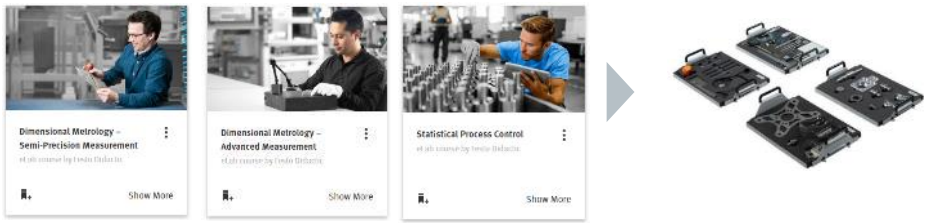
Industrial pumps

Pump installation, operation, maintenance, troubleshooting, fluid mechanics...



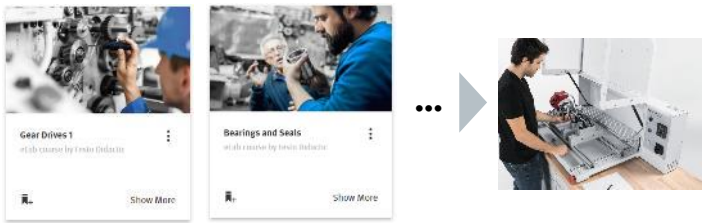
Metrology and quality

Dimensional metrology, geometrical dimensioning and tolerancing or global product specifications, statistical process control



Mechanical drives

Belt, chain & gear drives, couplings, shaft alignment, bearings, seals, gearboxes, clutch-brake...



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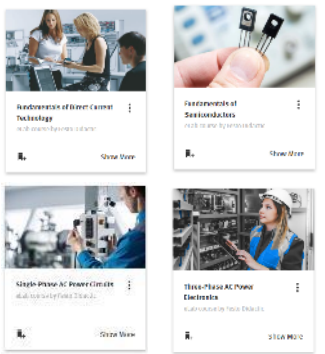
01

Convey essential skills for the production floor.

Industrial wiring

Enclosures and conduits, electrical panel, schematics, ...

Electricity basics



AC/DC (TP 8012 or EMS*, suitcase *), Electricity fundamentals (TP 1011)

Motors and drives

... Basic motor control (TP 1221), servo brake and drive system (TP 1410), variable-frequency drives*, dissectible machines*...

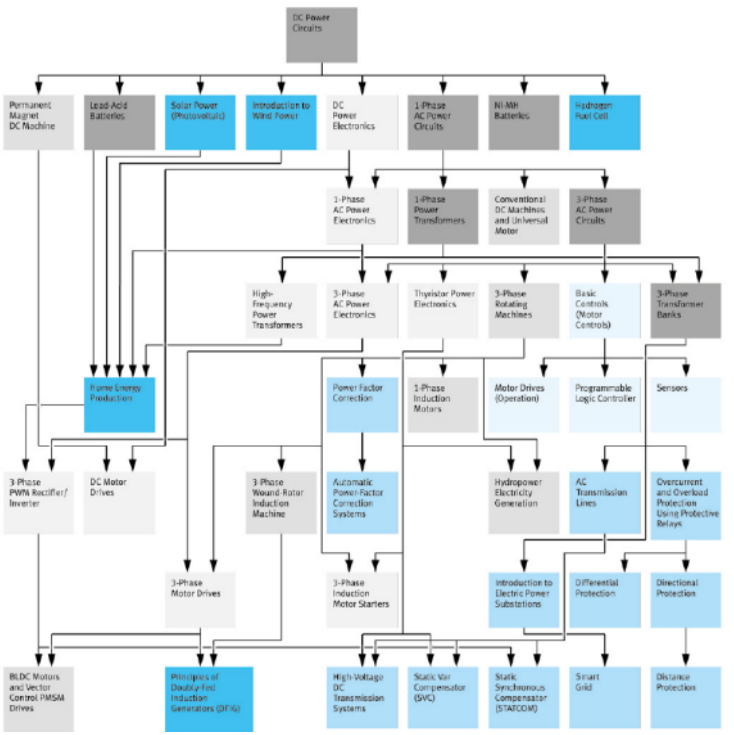
* Cannot be delivered to CE countries

02

Comprehensive training in electrotechnology

The EMS: A unique training program based on a benchmark platform

- Extensive training program covering the basics of electric power, power electronics, rotating machines, industrial controls, smart grid and renewable energy
- Practical experimentation on electric power systems created using modules
- Pre-set, but customizable packages
- Digitalized hardware for data acquisition and control
- Courses on Festo LX



* Cannot be delivered to CE countries

02

Comprehensive training in electrotechnology

Training packages TP 8012

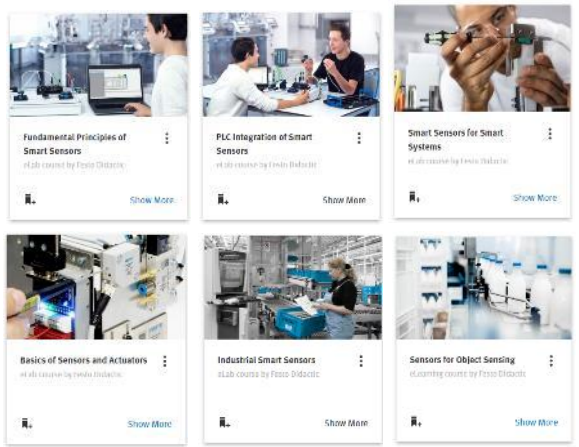
A collection of unique courses in electrical engineering focused on practical experimentation on electric power systems replicated using modular training packages.

- Pre-set, but customizable packages
- Digitalized hardware for data acquisition and control
- Courses on Festo LX

Topics covered: AC/DC power circuits and transformers,
power electronics (upcoming), solar and wind power, and more to come.

03 Factory automation, from the basics to Industry 4.0

Sensors



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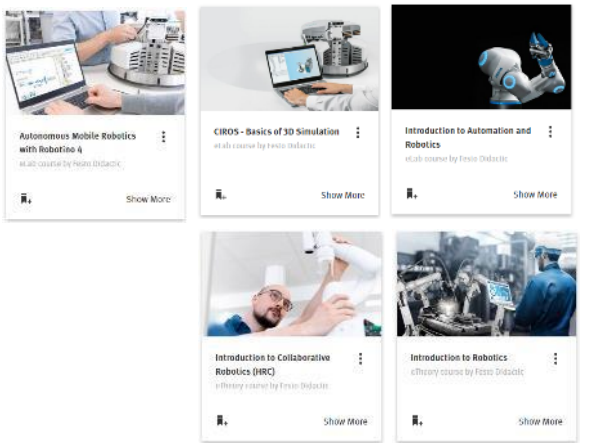
Smart sensors TP 1312, Sensors for object detection TP 1311, MPS stations...

PLC

...

Programming and troubleshooting with the EduTrainer PLCs or the Advanced PLC training*...

Robotics



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Industrial and collaborative robotics with MPS stations articulated-arm robots

Simulation and programming software CIROS

Mobile robotics with Robotino for education and research

* Cannot be delivered to CE countries

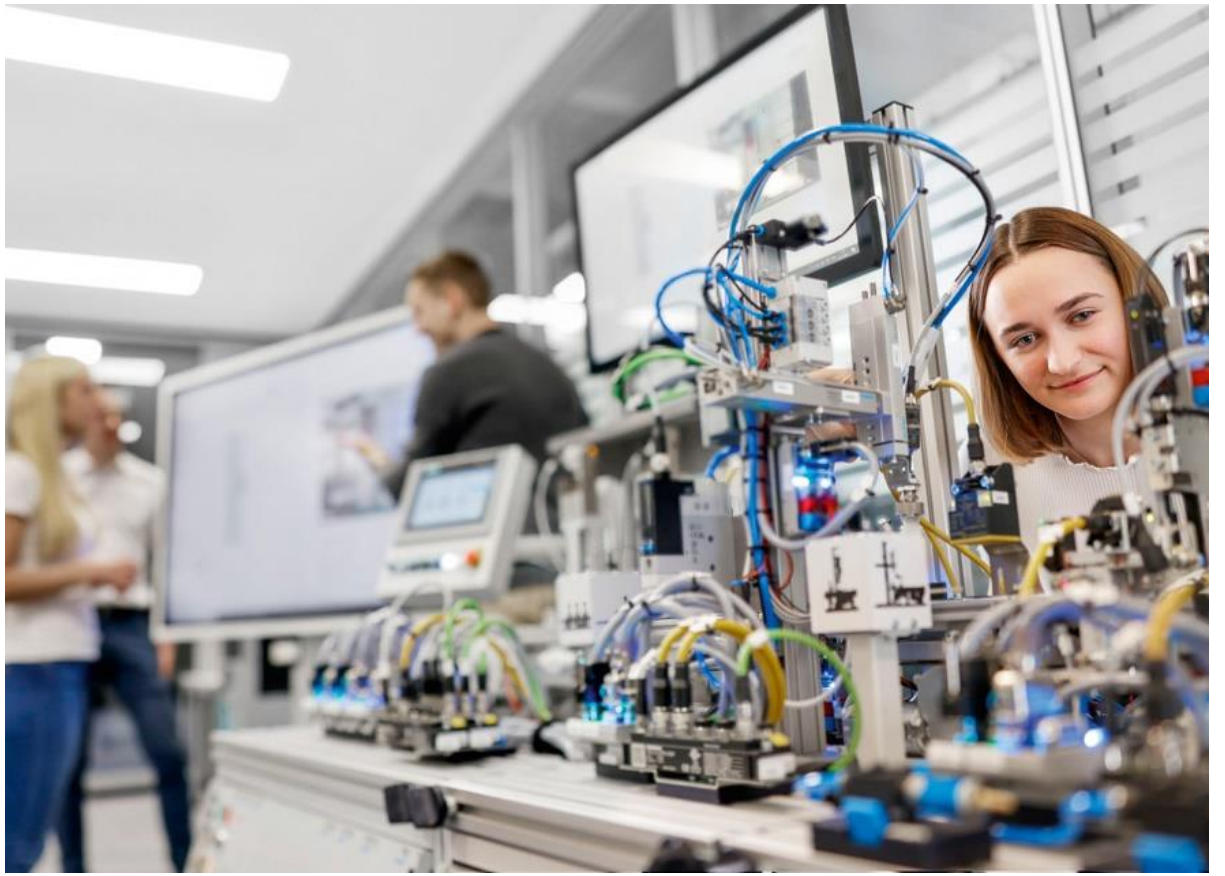
03

Factory automation, from the basics to Industry 4.0

MPS 400

All-round training factories based on an individual workpiece flow. They cover a wide range of material on the latest Industry 4.0 topics and the basics of mechanics, mechatronics and automation.

Manufacturing Execution Systems (MES), online shop, machine learning and artificial intelligence, IIOT retrofitting, industrial networking with PROFINET, radio frequency identification (RFID), human-machine interface (HMI), PLC programming, industrial communication with OPC UA, smart sensors with IO-Link, mobile robotics, machine, safety, energy monitoring, IT security...



03 Factory automation, from the basics to Industry 4.0

Cyber-physical learning factories

CP Lab is our professional and compact Industry 4.0 learning system which includes all the technologies and components needed for communicating an in-depth knowledge of Industry 4.0 or the Industrial Internet of Things.

CP Factory, our universal cyber-physical learning and research platform for I4.0/IIoT, models the technologies of networked production and provides a modular smart factory system for teaching and research purposes.

04 Relevant training in process automation for battery production

Why?

Instrumentation and process control devices and techniques improve efficiency, quality and safety.

- **Battery manufacturing** (battery fluids)
- **Water management** (purification of water)

It’s also important for:

- Renewable energy production (e.g. green hydrogen)
- Energy efficiency and sustainable manufacturing

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04 Relevant training in process automation for battery production

PA fundamentals

MPS PA Compact workstation

Closed-loop control, level, flow, pressure, and temperature

MPS PA Stations/System

Filtration, mixing, reactor, and bottling processes

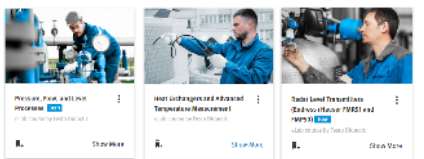
Instrumentation & process control*

Pressure, flow, level, temperature, heat exchanger, process dynamics, proportional & PID & cascade control...

Industrial PA

Process learning systems*

Industrial control systems for pressure, flow, level, temperature, pH, conductivity, air pressure/flow processes, fast heat exchanger, control strategies...



PlantPAx DCS demonstrator*

Distributed control systems, Industrial instrumentation, control strategies...

* Cannot be delivered to CE countries

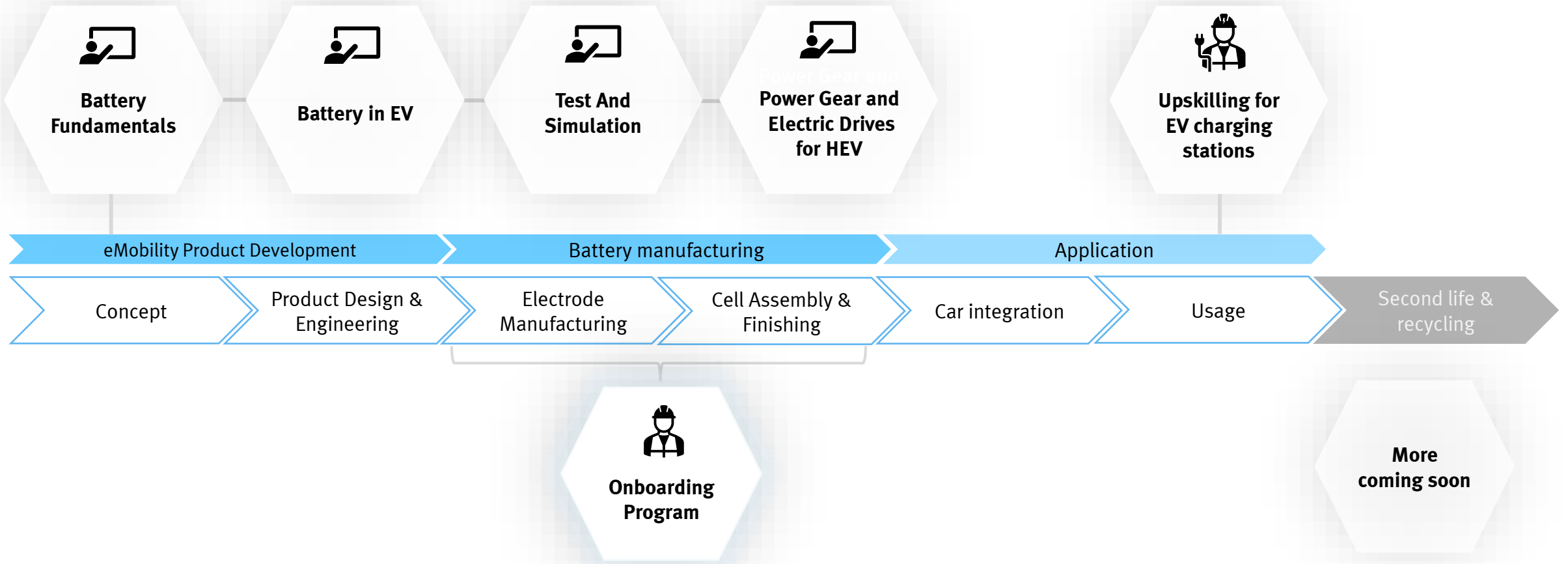
Workforce development: Specialized training for current workers

Leverage our training expertise to up- or reskill workers in a wide range of topics, like:

battery production (process, product, and safety) | pneumatics, hydraulics | sensors and data | instrumentation and control | machine safety | mechanical drives | electrical drive systems | maintenance for operators | ...

Contact your Festo local company to learn about the training offering in your country.

Sample of relevant training topics | eMobility value chain



Start planning your path.

Discuss your training requirements regarding green skills development.

Contact us: **didactic@festo.com**