

HYDROGEN FUEL CELL

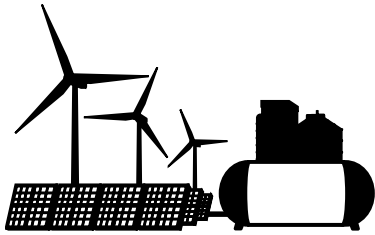
C O U R S E

For Engineers, Innovators and Enthusiasts

SPECTRONIK



WHY HYDROGEN FUEL CELL



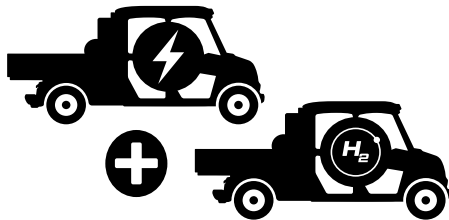
Sustainable production,
storage and transportation
of green Hydrogen



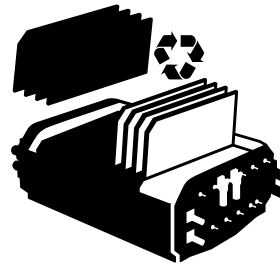
3X longer range and
runtime vs. battery



5min Hydrogen refueling
vs. several hours
battery charging



Increased competitive advantage
vs. other EV makers who do not
have Hydrogen solutions



Local high quality green jobs
for fuel cell production,
servicing and recycling



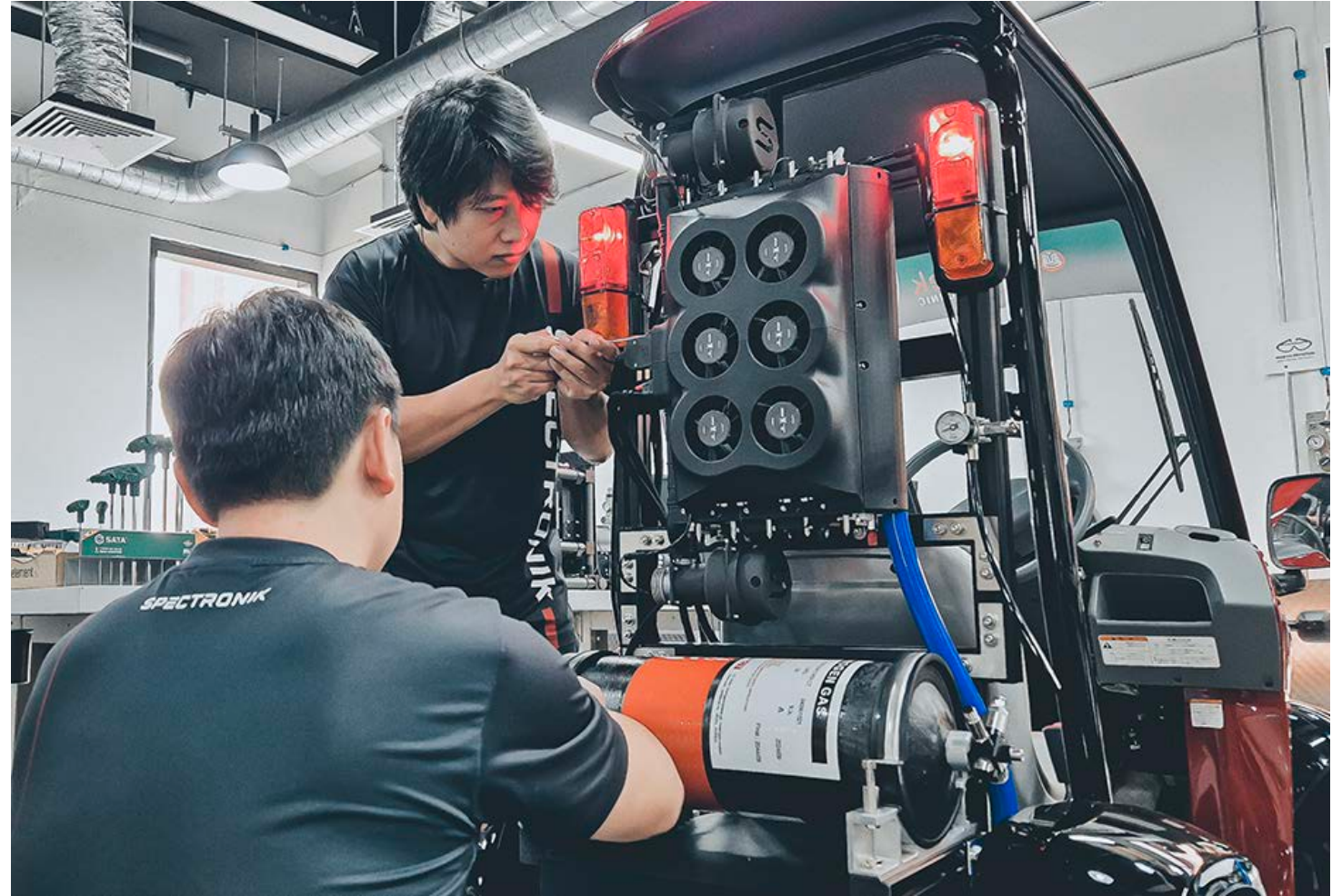
Training/upskilling to be
familiarized with Hydrogen
fuel cell technology

HYDROGEN FUEL CELL WILL PLAY A PROMINENT ROLE IN FUTURE MOBILITY APPLICATIONS

COURSE OBJECTIVE

By the end of this course, participants will be able to:

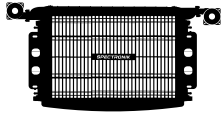
- Calculate the optimal fuel cell power size and Hydrogen cylinder volume for their vehicles.
- Install and operate a fuel cell power system.
- Safely refill a Hydrogen gas cylinder.



CONVERT ANY ELECTRIC VEHICLE PLATFORM INTO A HYDROGEN FUEL CELL POWERED ONE

TOPICS COVERED

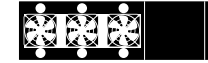
1



Hydrogen
Fuel Cell System

- Voltage-Current characteristic.
- Fuel consumption rate.
- Determining fuel cell efficiency.

2



DC-DC
Converter

- Buck/boost working principle.
- Setting Voltage & Current limits.
- Setting Current slew/ramp rate.

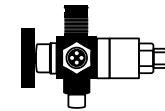
3



Carbon Fiber
Cylinder

- Differences between Type 1-4 cylinders.
- Filling and compressing Hydrogen gas.
- Calculating Hydrogen energy content.

4



Miniature Gas
Pressure
Regulator

- 2-step pressure regulation.
- Pressure transducer data capturing.
- Safety mechanisms.

TARGET AUDIENCE

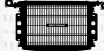


This course is specially tailored for:

- Engineers (Mechanical/ Electrical/ Electronics/ Electrochemistry).
- Mobile Robot manufacturers (drone, AGV/AMR, autonomous lawnmower etc).
- Urban Mobility OEMs (2-3 wheeler, light commercial pick-up, buggy, compact EV etc).
- Corporate R&D managers and system integrators evaluating Hydrogen fuel cell technology for their specific use-cases.
- Power Systems Engineers designing and optimizing multiple power sources in hybrid configuration (PV, battery, fuel cell).
- Professionals/ students/ enthusiasts interested in green technology, robotics, electric vehicles and Hydrogen fuel cells.
- Members of Hydrogen and fuel cell associations.

ESSENTIAL COURSE FOR ANYONE INTERESTED IN HYDROGEN FUEL CELL TECHNOLOGY

SAMPLE COURSE TIMETABLE

Time	Day 1	Day 2
09:00-12:00	- Introduction to Hydrogen Fuel Cell Conversion Kit Topic 1: Fuel Cell System  - Setting up a 1kW/3kW fuel cell - Powering a DC electronic load - Plotting a fuel cell Voltage-Current (VI) curve - Recording Hydrogen gas consumption at different loads - Determining the fuel cell efficiency	Topic 3: Carbon Fiber Cylinder  - Understanding the different types of Hydrogen storage cylinders - Filling and compressing Hydrogen gas using a gas booster pump - Calculating the energy content inside a gas cylinder Topic 4: Miniature Gas Pressure Regulator  - Stepping down the Hydrogen gas pressure for fuel cell inlet - Connecting the gas pressure transducer - Understanding the in-built safety mechanisms
12:00-13:00	Lunch Break	
13:00-15:00	Topic 2: DC-DC Converter  - Setting the Voltage output and Current limit via PC app - Understanding the Current slew/ramp function - Calculating the DC-DC converter efficiency - Connecting to fuel cell system	Converting an EV platform into Hydrogen fuel cell powered  - Installation of Hydrogen Fuel Cell Conversion Kit into an EV platform - Logging the load power profile of a typical driving cycle - Identifying the acceleration, cruise and regenerative braking modes - Test-drive of Hydrogen fuel cell compact EV (Driver's License required)
15:00-15:30	Afternoon Tea	
15:30-17:30	- Tour of Spectronik fuel cell production facility - Summary of Day 1 learnings	- Final quiz and Q&A - Certificate award ceremony
18:00	End of Day 1	Course completion

2 DAYS OF FUN AND IMMERSIVE COURSE SPANNING THEORY LEARNING AND HANDS-ON PRACTICAL WORKS

COURSE FEE

What's Included

- All course material, equipment and consumables
- Interactive theory learning and hands-on practical sessions
- Q&A and fun quizzes
- On-site lab assistants
- Test drive of Hydrogen fuel cell vehicle
- Tour of Spectronik fuel cell R&D lab and production facility
- Spectronik T-shirt and souvenir
- Lunch (bento box/buffet), snacks and light refreshments
- 10% discount coupon for Spectronik products
- Certificate of Completion issued by Spectronik



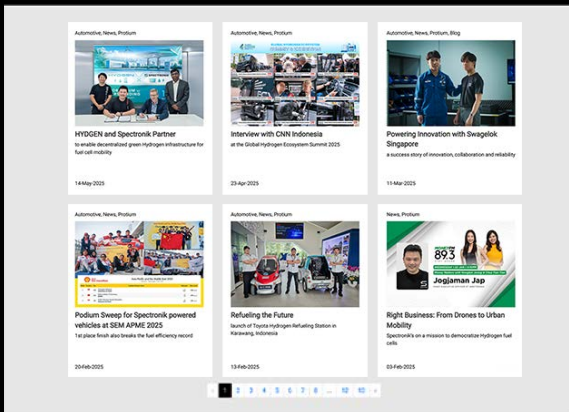
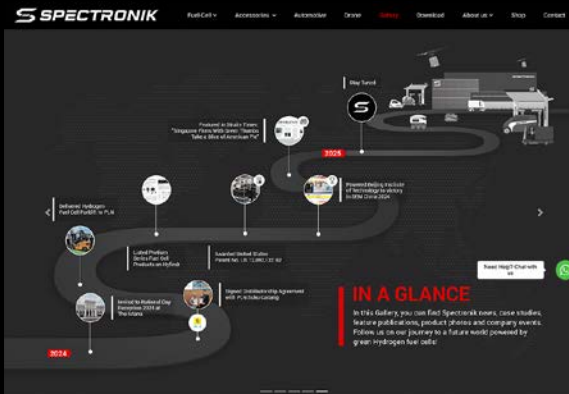
Corporate/Individual
SGD \$1,999/pax;
15% discount for a group of 10;



University/Research Institution
SGD \$1,499/pax;
15% discount for a group of 10;



THE BEST HYDROGEN FUEL CELL COURSE ON THE PLANET!



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The Story Thus Far

Visit our Gallery where you can find Spectronik news, user case studies, feature publications, product launch videos, technical blog posts and company events



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