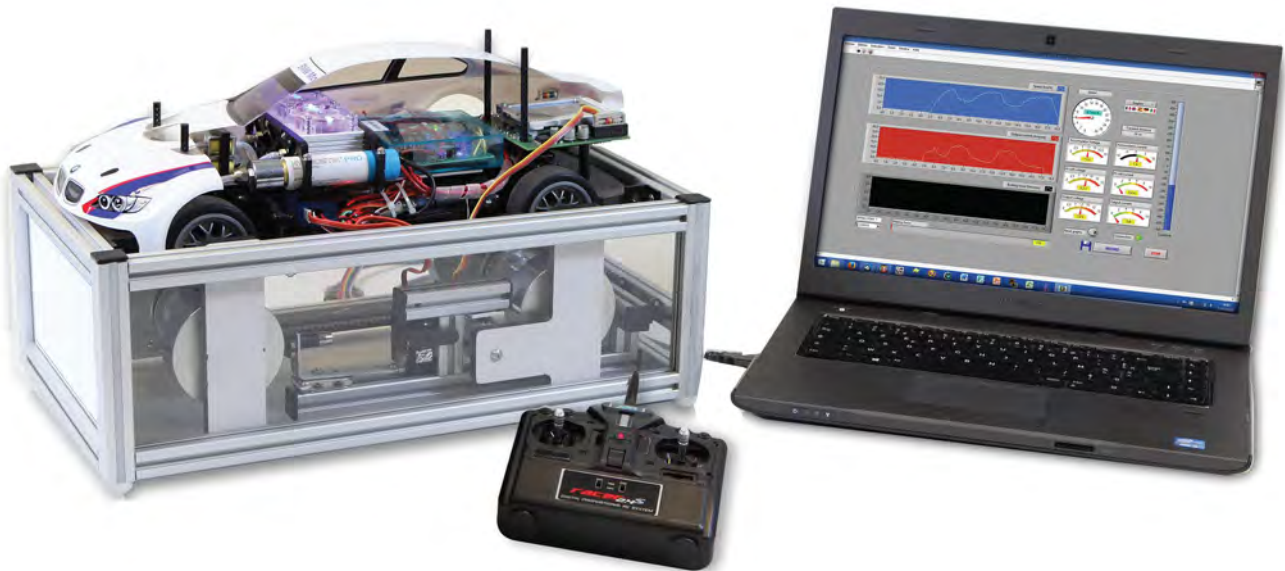# H2Hybrid - Fuel Cell Automotive Trainer

FCAT-30

○ ADVANCED FUEL CELL EDUCATION
○ HYDROGEN HYBRID TECHNOLOGY
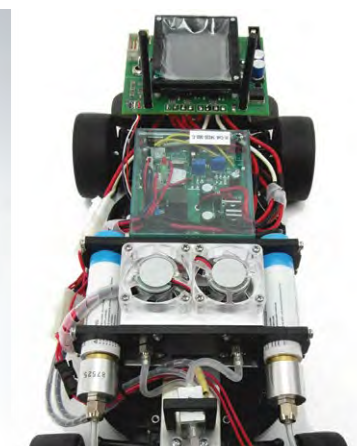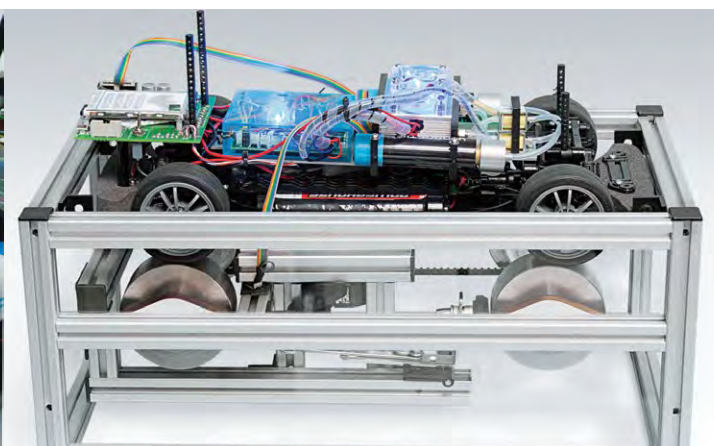○ ADVANCED CURRICULUM WITH COMPUTER MODELING

Understand hybrid vehicles like never before

The H2Hybrid Fuel Cell Automotive Trainer is the ultimate tool for exploring science and engineering concepts through hands-on activities with a working fuel cell car. An impressive array of hardware, software, and digital curricular materials allow for hours of activities for students from high school vocational-technical up through college-level engineering.
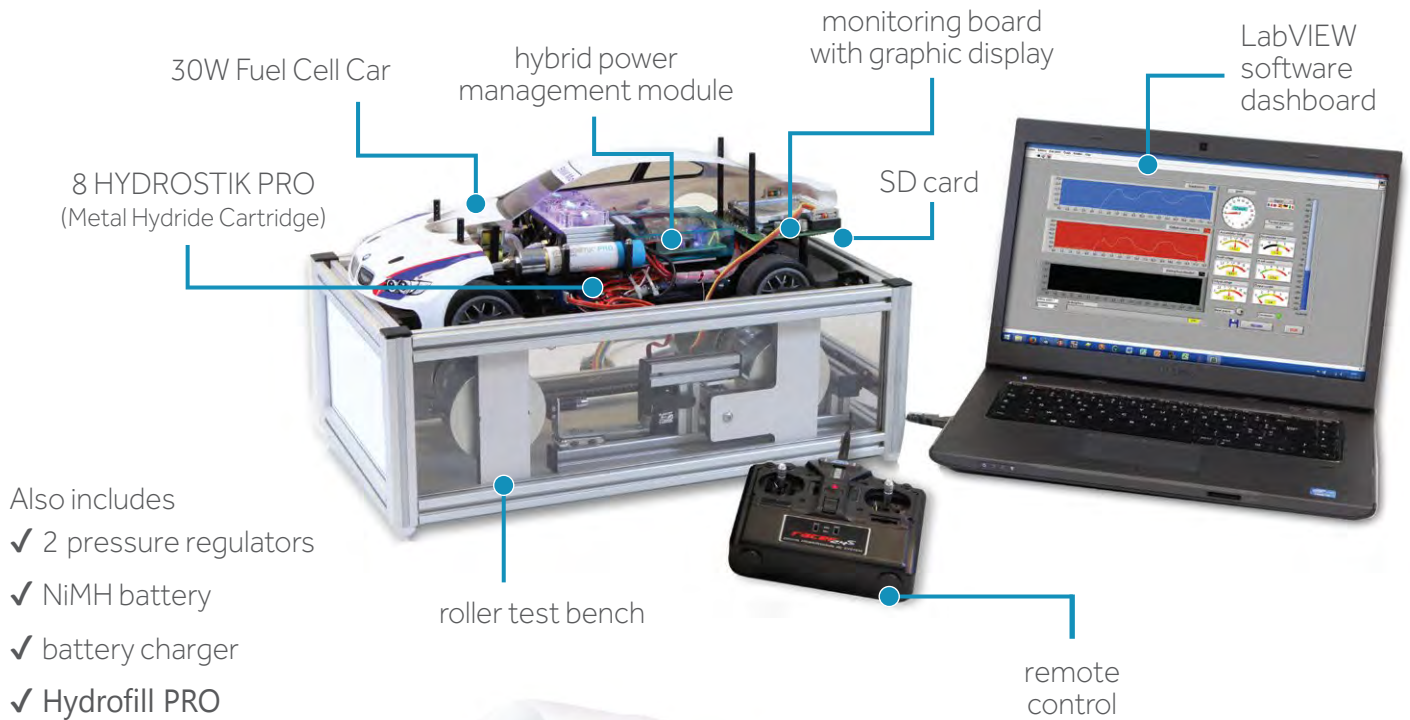

AREAS OF STUDY

✔ Engineer new solutions for optimization of car's performance

✔ Examine the three fields of energy management

✔ Comprehend hybrid propulsion technology and work to minimize environmental impacts

✔ Learn about data acquisition and discover how to manipulate, analyze and interpret graphs and data gathered from the car on the road and on the bench

✔ Understand the expected performance of a fuel cell system and how to get to optimum operation

✔ Explore the difference between expected performance and experimental results

Complete resources for advanced experiments

INCLUDED COMPONENTS

30W Fuel Cell Car

hybrid power management module

monitoring board with graphic display

LabVIEW software dashboard

8 HYDROSTIK PRO (Metal Hydride Cartridge)

SD card

Also includes
- ✓ 2 pressure regulators
- ✓ NiMH battery
- ✓ battery charger
- ✓ Hydrofill PRO

roller test bench

remote control

HYDROFILL PRO
FCH-020

FEATURES

- Produces hydrogen safely
- Input is just water and electricity
- Indispensable for HYDROSTIK based engineering projects

ADDITIONAL OPTIONS

- ✓ Accelerometer

Features

## MONITORING BOARD

✓ Touch screen LCD display for choosing data recorded and displaying real time graphs

✓ Measure voltage and current from the motor, fuel cell and battery, as well as distance travelled

✓ Included SD card stores the data as a .csv file

✓ Data can also be transferred in real time to PC for analysis

ROLLER TEST BENCH

✓ Measure the braking force under different conditions, with servo

✓ Real-time measurement from monitoring board

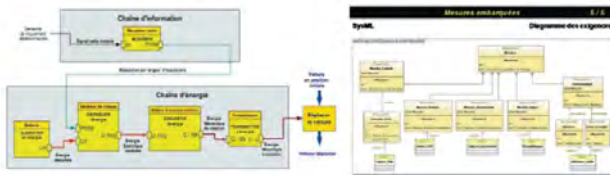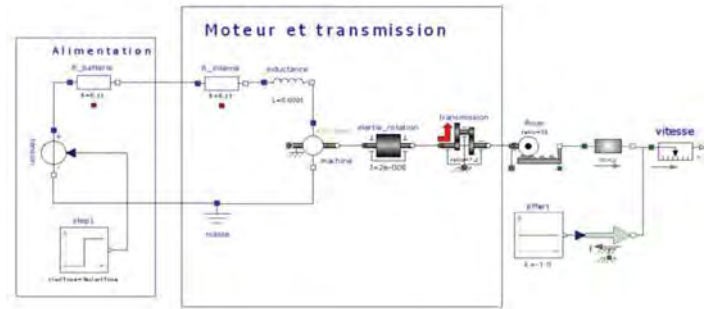✓ Car acceleration and brake rollers controlled by the remote control

rollers   brake   servo   force sensor   lever   anodised aluminium frame
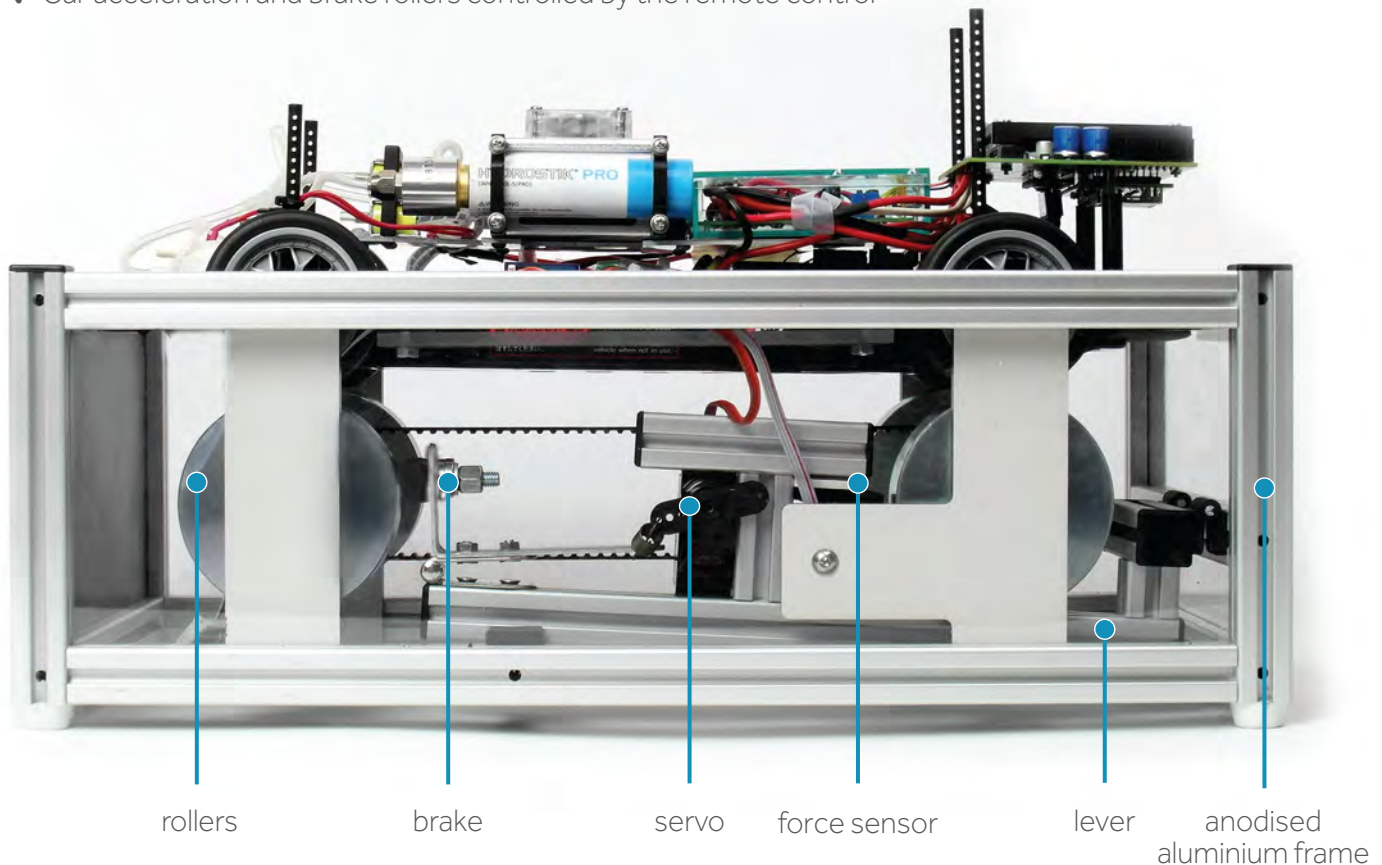
Features

SOFTWARE AND COMPUTER MODELS

✔ Modeling for SYSML, PSIM, OpenModelica, MATLAB, and Excel

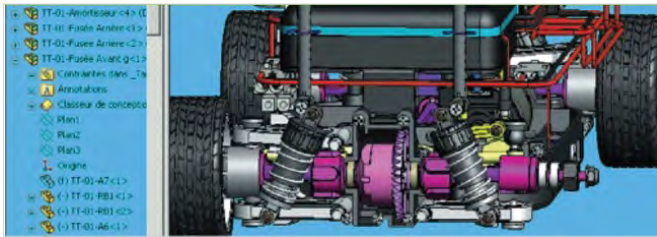✔ Diagram of a complete Hydrogen Hybrid Car
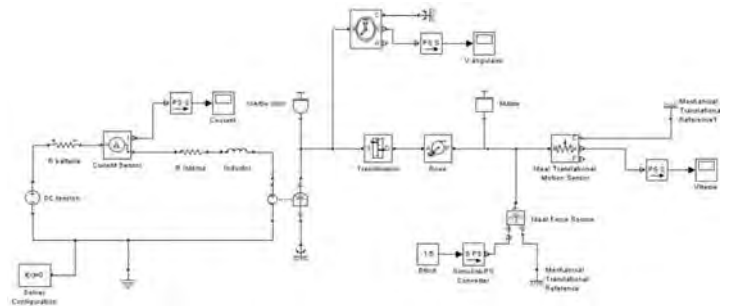
✔ Modeling of energy flow

Openmodelica

SYSML
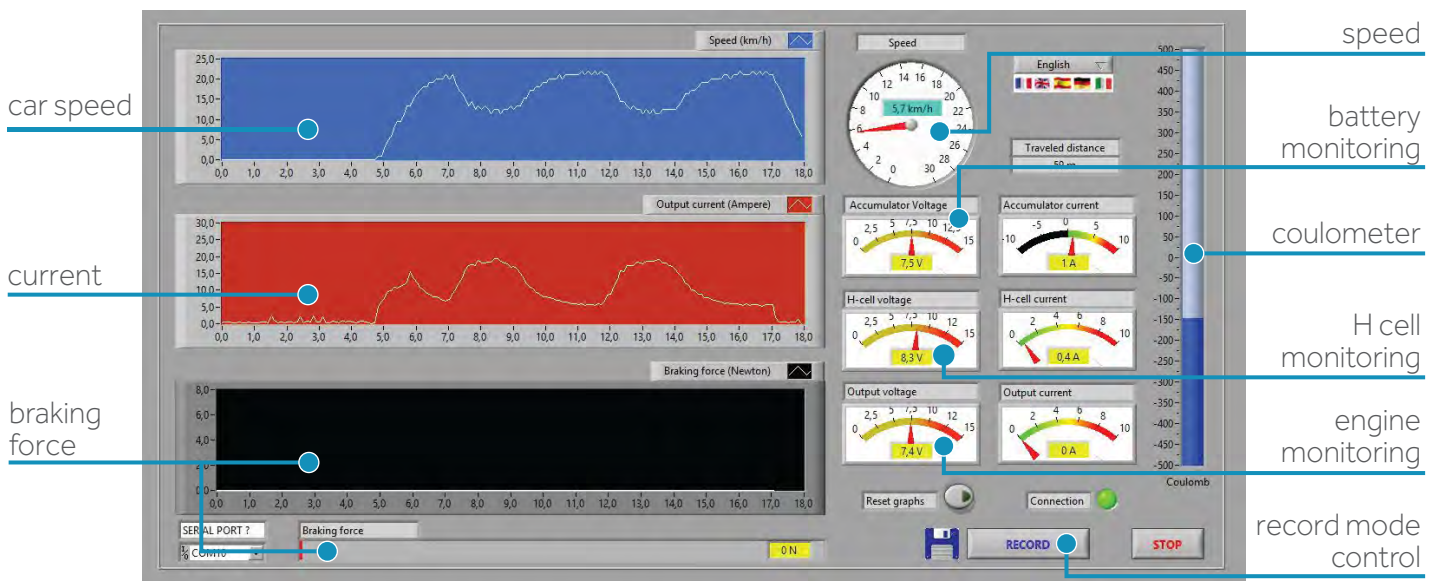

Solidworks

MATLAB

✔ LabVIEW dashboard with real-time graphs of speed, current, and braking force

✔ LAbVIEW data collected: speed, battery voltage, fuel cell voltage, current, motor voltage, battery charge

H2Hybrid – Fuel Cell Automotive Trainer

Horizon Educational

Cienytec
CIENCIA Y TECNICA
Tecnologías de la Educación

Lesson plans

✓ Students and teachers' material

✓ 6 months of curriculum in physics, chemistry and engineering

✓ Hands-on experiments and problem based learning

CAR SYSTEMS

Steering and Propulsion

Using Electrical Energy to Power the Vehicle

Transmitting Mechanical Energy

Speed and Consumption of Energy

Measuring Changes in Electrical Energy

THE ROLE OF HYDROGEN

Understanding the hydrogen fuel cell

Understanding modern batteries

Comparing sources of electricity

ENERGY NEEDS

Using models to describe the car's motion

MATLAB & OpenModelica:
Simulating the car's motion

Making measurements on the track

Making measurements on the charging bench

SYSTEM ADAPTABILITY

Providing power

H-Cell power

Influence of the arrangement of the components of the fuel cell

Effects of the arrangement of the Hydrostiks

MANUFACTURER'S DECISIONS

Making measurements on the track

Making measurements on the charging bench

Energy consumption

Sustainable development

CUSTOMIZING YOUR CAR

Changing how you drive

Changing the components
of the energy system of the car

Reducing various forms
of resistance to motion

Changing the mode of hydrogen consumption