

Making Technology Visible

TECHNICAL TRAINING WITH VIRTUAL LEARNING



Practical and Virtual Training

Complete solutions for Vocational Schools, STEM
Colleges, Universities and Training Institutes

Industry 4.0 ready !



LABTECH – the International Technical Educational Company

LABTECH was formed over 30 years ago and is one of the largest Technical and Vocational educational systems designers and manufacturers in the world. Labtech's prime focus is to provide comprehensive 21st century skills infused technical and engineering learning solutions for Vocational Technical Schools, Polytechnics, Universities and Training Institutions. The development of LABTECH has been guided by professional educators from North America, Europe and Asia that have many years of experience in the field of international education.

Our Systems Approach design philosophy of "Making Technology Visible" is based on modular learning platforms and exposing key functional systems so as to clearly demonstrate the underlying technologies. We allow students to get close to technology by adopting a "hands-on" approach to training that combines theory as well as practical experiments. The result of this is that students have a clearer understanding of how technology works and its applications to industry and the work place. Many of our trainers have Fault Insertion systems that simulate common real-world faults with troubleshooting solutions facilitating real hands-on skills. Our Modular educational approach enables us to create systematic integrated solutions for varying syllabus levels, ranging from occupational skills standards and upwards to university degrees in engineering.

LABTECH has developed over 1.000 major training products which form a systematic educational program and we have exported these to over 90 countries worldwide. The technical training systems that LABTECH manufactures are made to International standards of quality and we are ISO 9001 certified in eight areas including educational research and development. LABTECH has a comprehensive R&D department and a sophisticated range of manufacturing equipment. LABTECH can assist training institution or projects by offering a complete service for equipping technology workshops or laboratories in our key technology areas including provision of training systems, educational aids, models, support tools and testing equipment.

Our training manuals are comprehensive teaching and learning guides which are student-centric and oriented for self-studies. The manuals include information on applied theory; related engineering information; set-up & operation; skills focused experiments; schematics & diagrams; along with troubleshooting solutions. We have active cooperative programs with leading educational and industrial institutions within our region who work together with us in our product research and development. Our trainers incorporate the latest technology so that education may keep pace with the changing economy.

Our manufacturing base is strategically located in a Free Trade Zone location on Batam Island nearby Singapore which allows us to easily ship all over the world. We also have marketing and distribution offices in Singapore, Malaysia, Jakarta, Australia, UK, and Jordan in order to facilitate communications, service support and financial transactions with our customer's world wide. We also have representatives in dozens of countries who act as our local partners on project implementation. Our unique international corporate structure allows us to globally market high quality products and services at reasonable costs.

Industry & Technology Partnerships and Memberships

Labtech has a network of industry and technology partners that enables us to widen our product offerings and better align our objectives with the end result of producing employable skills. Partnering with some of the most innovative technology companies in the world, including Microsoft and Intel. We are also members of ISTE (International Society of Technology in Education), CompTIA (Computing Technology Industry Association), IVETA (International Vocational Education & Training Association), Worlddidac. We also produce training systems for Toyota and for Schneider Electric This global network makes us uniquely aligned to meet the needs of educational institutions around the globe.



INTRODUCTION

LABTECH's VIRTUAL TVET© PROGRAM

21st Century TVET and the Future Impact on Education.

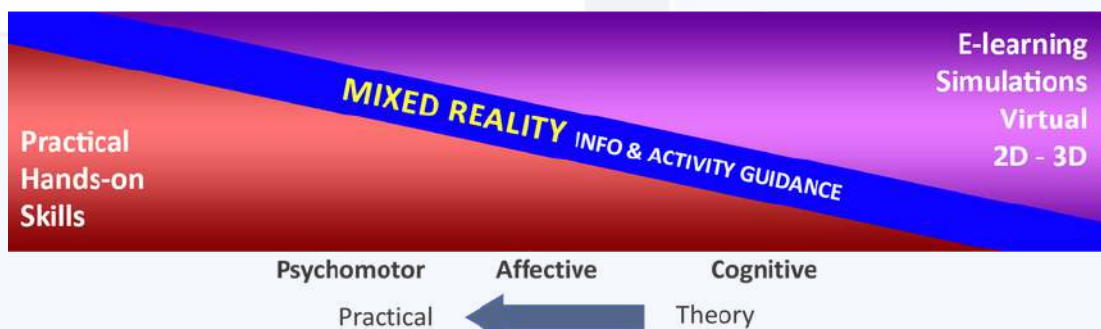


Labtech's Virtual Digital Content for Vocational and Technical Learning provides extensive and engaging course content in core TVET areas. Labtech's digital content is designed to meet the needs of learner in the 21st Century as well as Industry 4.0 (IR 4.0). It provides a platform for schools to expand learning beyond the class so that they may learn "Anytime-Anywhere". Younger people are learning differently today, and we need to update our TVET delivery systems to match with the student's new learning styles and preferences which is digital based. Industry's needs are also moving quickly and we need to be able to update, alter and adapt these programs to make the graduates ready to work. Our objective is to make learning relevant and fun through realistic 3D rendered models, animations and simulations. They feature comprehensive content with lots of references and exercises, differentiated learning via self-paced learning modules, realistic high-quality graphics that combines practical as well as theoretical exercises.

Virtual TVET and its Impact : The balance between virtual and practical learning in vocational education is becoming a cutting-edge topic in education today. Labtech is proud to be leading the way in this field by combining our own expertise built up over 30 years in vocational education together with the insights and research-based best practices for e-learning brought by our network of academic and industry partners. Our efforts have resulted in the most effective, innovative and comprehensive implementation of virtual learning in the field of vocational education. The power of Virtual learning is growing, and we are able to use it to speed up learning, make learning more in depth and make complex principles easier to understand. Costs can also be significantly lowered by replacing many physical training systems in the labs or workshops and increasing their student throughput. All of these factors can improve learning and importantly lower the cost of technical and vocational education. So with VIRTUAL TVET, Learning can be made more efficient, Deepen knowledge and skills, take less time and dramatically reduce lab infrastructure development and operational costs.

Why Labtech? Labtech is in a unique position of having 30 years' experience in developing the world's largest range of technical and vocational training systems (over 1,000 training systems in seven key technology Areas). As such we have gathered and created over the years' massive amounts training manuals, systems operational data, photos, videos, training models and a warehouse and factory full of technical parts and components. In order to do this right, we start with real industrial components and systems and then duplicate them down to the last screw in a Virtual 3D environment. Then we make the virtual models operational which are able to be operated, taken apart and reassembled in a Virtual Manner. Next we layer on our technical knowledge describing the system and its constituent parts, include videos, still photos or illustrations, glossaries and innovative new assessments (both formative and summative).

1. Automotive and Transportation Technologies
2. Electrical and Industrial Control Technologies
3. Electronics and Communication Technologies
4. Air-Conditioning and Refrigeration Technologies
5. Information and Communication Technologies
6. Renewable Energy and Green Technologies
7. Foundational Skills and Knowledge for TVET Studies
8. Bio-Medical or Med-Technician
9. Mechanical Studies
10. STEM for Engineering and Technology

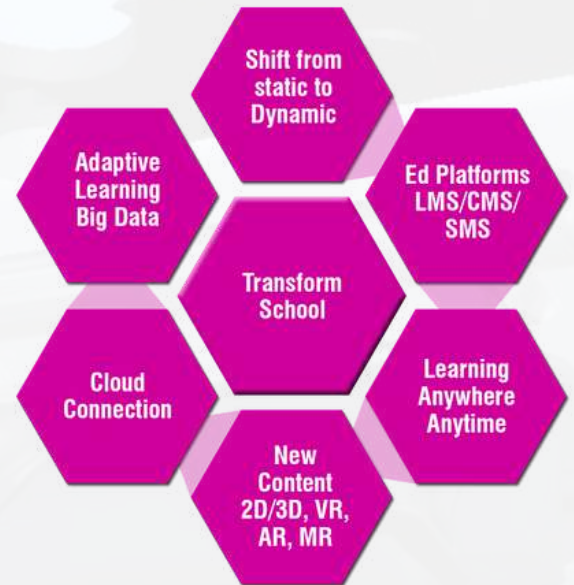


VIRTUAL TVET@ INDUSTRY 4.0 READY I

What is Virtual TVET?

- It is using **Technology for Teaching and Learning** by creating photo realistic interactive 3D models which can guide the learner in understanding complex technical subjects through visual learning.
- **Virtual TVET is Industry 4.0 ready** :The learner will study as they will work utilizing new technologies for learning and working.
- It uses **Interactive Realistic 3D Models** created with advanced game technology that can create informative animations and simulations that assist the learner in visualizing technical processes.
- **Detailed Models of Real Items** are created in full detail down to the last nut and bolt. We use original parts as our models and the resulting models are verified by industry experts.
- The program features **Blended (Braided) Learning** by balancing Virtual Learning with Practical hands-on learning to develop complete knowledge and skills of the subjects and topics.
- **Multiple Delivery Methods** : The 3D content can be delivered with standard 2D PCs and laptops or with Tablets (2D/3D). Parts of the content can be also viewed with VR (Virtual Reality), AR (Augmented Reality) and MR (Mixed Reality) platforms.
- The content can be delivered through our **TVET Learning Management System (LMS)** that provides learner performance info to the educational institutions at all levels of management.
- Content can be used **Off-Line at the educational institution** (through a local server system) or it can be **On-Line in the Cloud** which will enable learning both off and on campus to create a learning anywhere and anytime type system.
- **Cluster Educational Institutions** can be networked together to integrate with Centers of Excellence (COE) at the center for mentoring smaller schools which can act as feeder schools for the COE.

Converging Technologies will change Educational Capabilities



The educational aims of Virtual TVET :

- Targeting the areas that learners have difficulty understanding.
- Targeting activities that take time for the instructor to demonstrate.
- Improving learner comprehension of the foundational knowledge of technology and its applications.
- To develop and prepare learners in advance of practical training tasks in the lab.
- The above approach reduces workshop time thereby increasing potential learner throughput without expanding the lab.
- To assist the Teachers to have more time to mentor and develop learner hands on skills.

Who can use Virtual TVET?

- Secondary Schools that wish to implement STEM
- Secondary Vocational High Schools
- Polytechnics and Technical Institutes
- Engineering Universities.
- Industries wishing to update their training programs.

Tech

Jobs

Skills

Learning

INTRODUCTION

The Benefits of Virtual TVET :

1. Lower Costs of TVET by 50% or more

- New Labs and Workshops can be Redesigned for Digital learning that require less demonstration equipment so that they may include more skills-oriented equipment.
- Learners will need less time in the lab as they are better prepared when they arrive. This can double learner throughput through the labs.
- A Digital upgrade with Virtual TVET can improve the performance of existing older labs.

2. Scalability, Uniformity and Performance Monitoring

- Virtual TVET can be deployed quickly across an educational institution or a state or a nation and offer a fast way to do a major upgrade in learning capabilities for the institutions at an economical cost.
- Digital Deployment offers an effective way to uplift schools, improve teaching and learning content to achieve a higher standard and uniformity of learning.
- Educational Results can be monitored by class, institution, province or the nation. Learners can see their own progress as well.
- Ideal for coordinating programs between institutions and Centers of Excellence (cluster school approach).

3. Performance Oriented 21st Century Education : Competency Based and Adaptable Learning

- Data generated by the LMS can adapt learning to each individual to deliver differentiated learning (Adaptive Learning) featuring self-paced learning and multiple learning pathways.
- The Content is Competency based and features strong formative assessments (as well as summative assessments) to assist the learner to achieve as close to 100 percent as possible in knowledge and skills.
- This program can enable moving beyond time-based education to performance or competency-based learning. Learners can move through a course at their own pace and competency can be the determining factor rather than time in a class.

4. Teacher Benefits

- Can be used as an upgrade refresher course for teachers, particularly in the new technologies.
- The Virtual TVET is a new way of learning created with modern connected people in mind. This type of learning will increase the learner motivation and therefore make the teacher's job easier.
- Reduces amount of teacher time spent on lectures, remedial learning and grading so that they can concentrate on mentoring practical skills in the lab.
- Improves information available to the teacher so as to better monitor and guide his class.
- Teachers can handle more learners with less effort and increase the throughput in the labs.

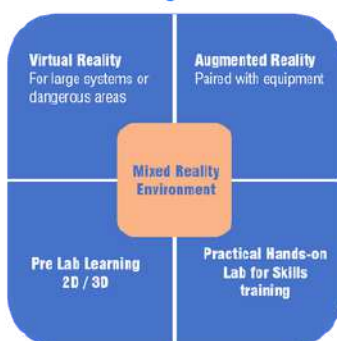
5. Facility Issues - Educational Institution Labs/Workshops

- The Virtual TVET program can help compensate for older labs by introducing learning on new and current technical content and skills. It is a quick and cost-effective way to give an old lab a new facelift.
- It can quickly upgrade learning and assessment materials and create a better uniformity of learning at a higher level which can be monitored for results.
- It can reduce the need for new equipment thereby lowering future development costs.

6. Keeping Curriculums Up-to-date with Technology

- Provides a platform to keep curriculum and content up to date Curriculum and Content revisions and updates can be quickly distributed throughout the participating institutions.
- Upgrading and adapting new courseware and materials to the latest technology and industry needs.
- Virtual TVET uses similar technology to industry 4.0 and moves education into the future.

21st Century TVET Eco-System New Learning Architecture



Training Programs

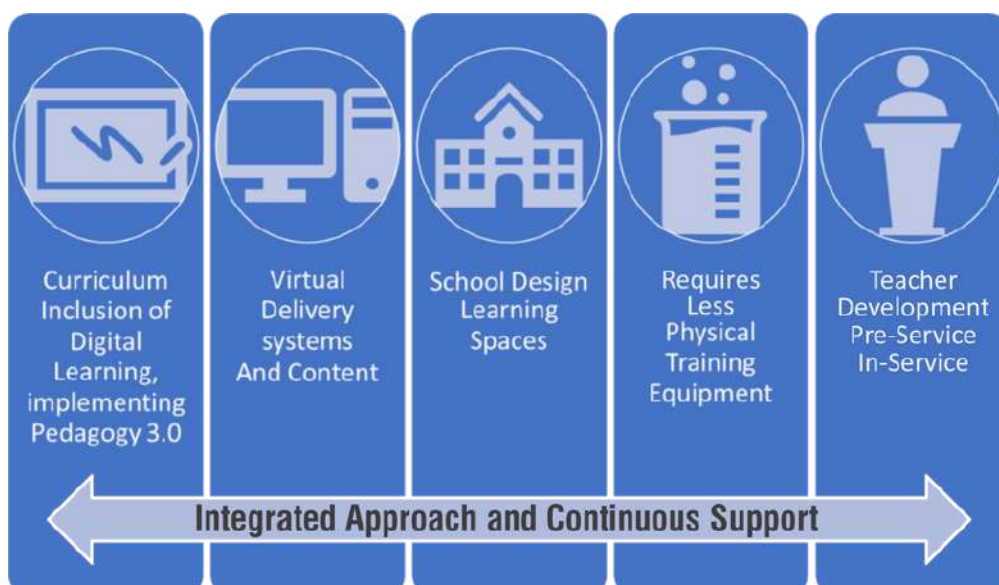
- **Using Virtual TVET :** Teacher training program to upgrade their skills in using digital content and assisting them to insert it into their lesson plans.
- **21st Century TVET Teacher Upgrade Course :** A special short course to upgrade TVET teachers to incorporate 21st Century learning into their programs and how to use technology for teaching and learning.



INTRODUCTION

Enhanced Learning Potentials

- **Competency based** : Improving competency through interactive learning and formative assessments. For employers, it is important that the learners are competent and have mastered their knowledge and skills.
- **Enhanced Quicker Learning** : Speeding up learning by individualized instruction and visualization of Complex Principles makes it easier to understand technology and its operation.
- **Differentiated Learning** : Allows the learners to take the time required to fully understand each topic without burdening the teacher. Allows for different learning pathways according to each learner's needs and preferences.
- **Deeper Learning** : Learners acquire deeper knowledge in the learning process and are able to go further in their understanding and exploration of the topics than they would otherwise be able to do.
- **Flexible Learning pathways** : The learner can take his time to learn at his own self pace and explore the learning elements in an order or sequence that suits him. He can repeat as many times as he likes until he is satisfied with his knowledge and skill development.
- **Strengthens Fundamental Concepts** : Through process and theory interactive animations and simulations learners can visualize and grasp the concepts more clearly and quickly as well as seeing the interrelationships.
- **Transitional Learning** : The interactive modules assist the learner to understand and apply concepts and fundamentals to real applications.
- **Skills Cluster Approach** : Learners can acquire additional skills or knowledge in areas related to their main area of study. This can help create multi-skilled interdisciplinary knowledgeable learners which are in high demand by Industry 4.0.
- **Formative Assessment tools** : Assist the learner to develop true mastery of knowledge and skills. Formative assessments are designed to get the learners as close to 100 percent retention of knowledge and skills as possible.
- **Learning on Demand : Anywhere and Anytime.** Allows the learner to work effectively off campus and to prepare for their lessons. Learning is continued outside of the classroom or lab.
- **Learning process similar to new work processes (INDUSTRY 4.0 READY).** Using technology for teaching and learning will be similar to how industry and business are currently transforming for Industry 4.0.
- **Triangulation of learning for guiding the individual to learn what he has not yet clearly understood.** This feature is built into our formative assessment program. It is where we approach learning in different ways from various tangents (points of view) to strengthen understanding where needed.



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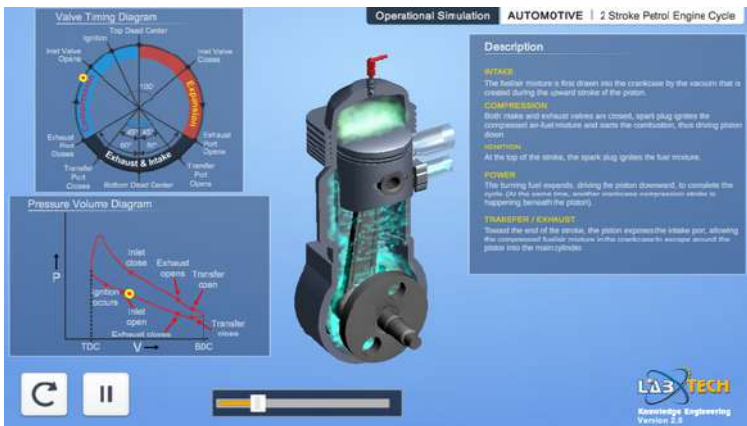
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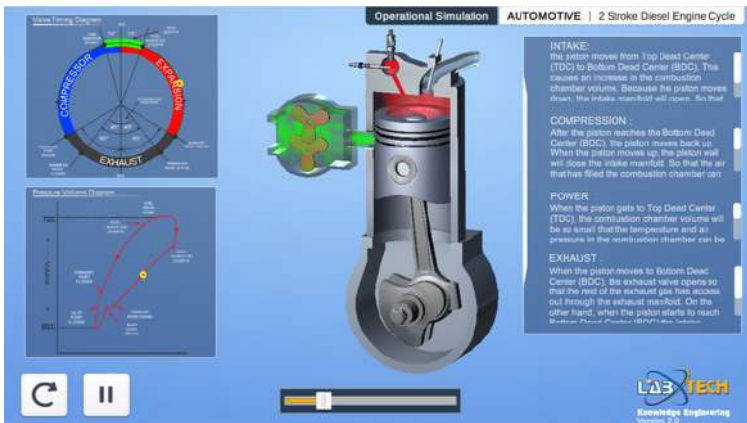
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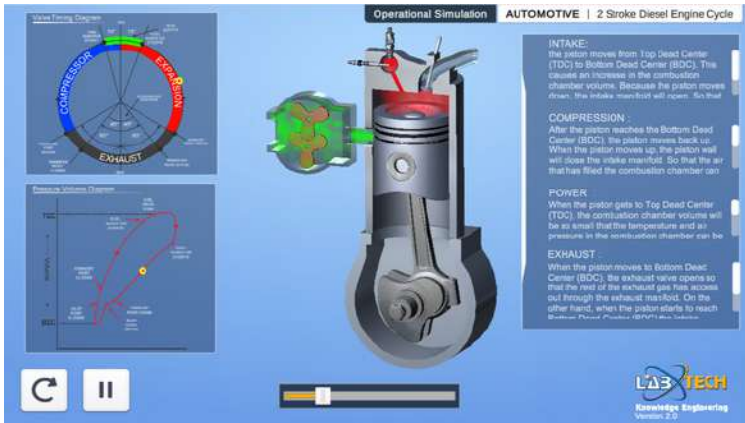
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4 STROKE DIESEL ENGINE CYCLE Model Number : VTD-AUT-01-04



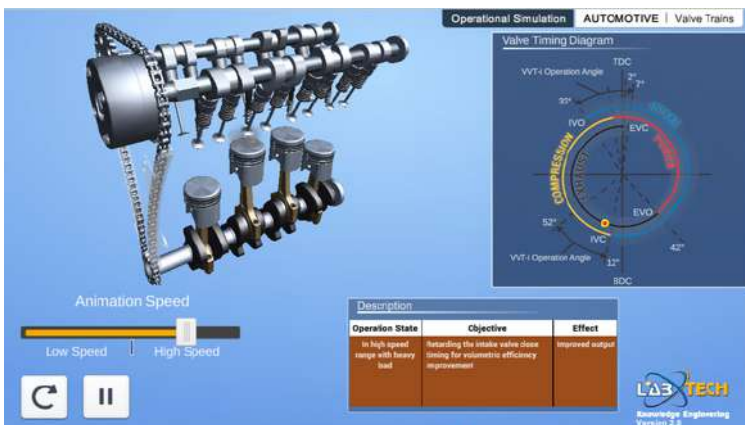
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ENGINE COOLING SYSTEM
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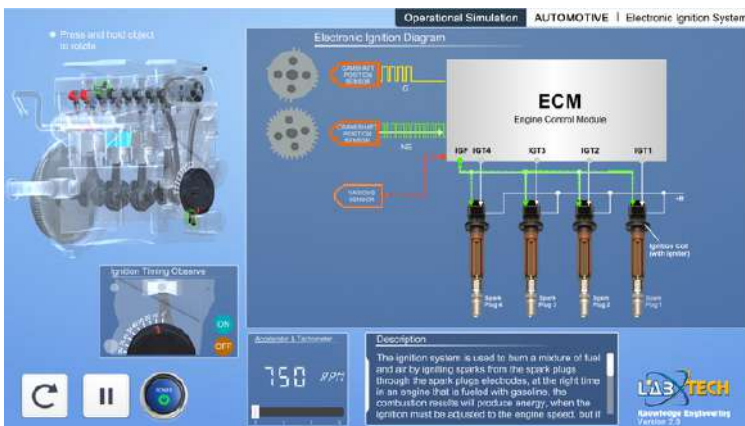
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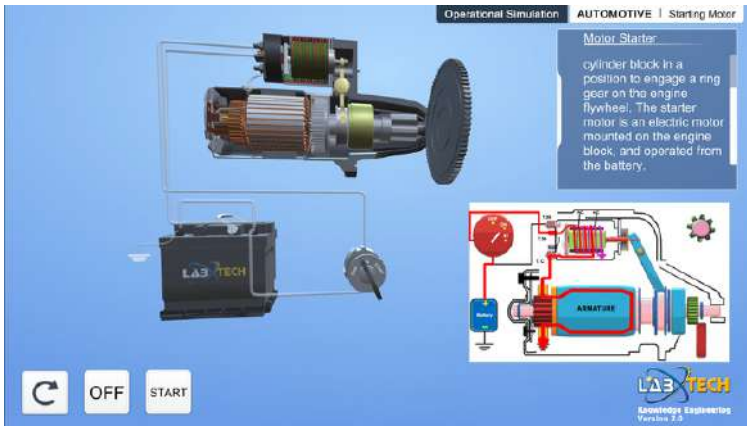
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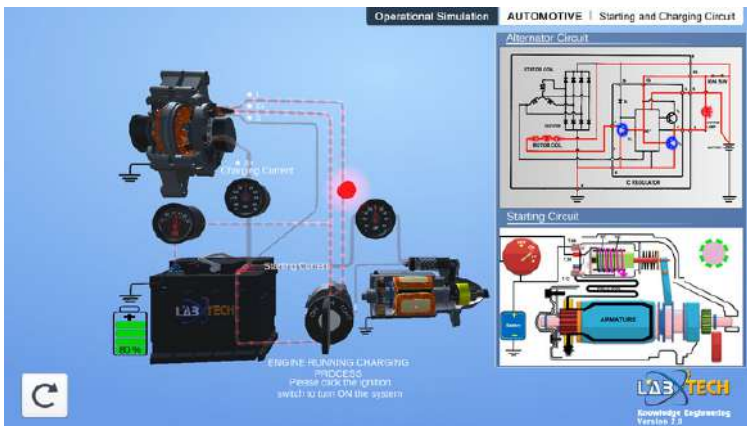
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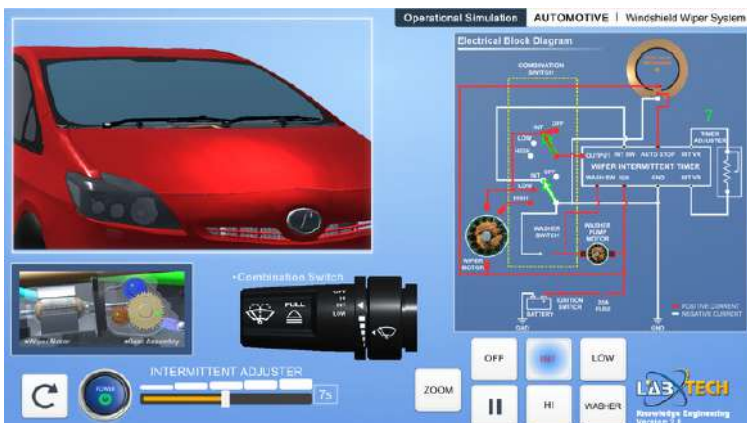
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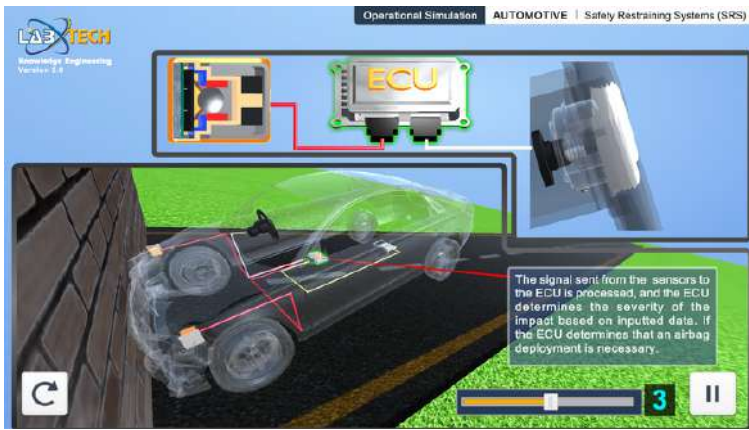
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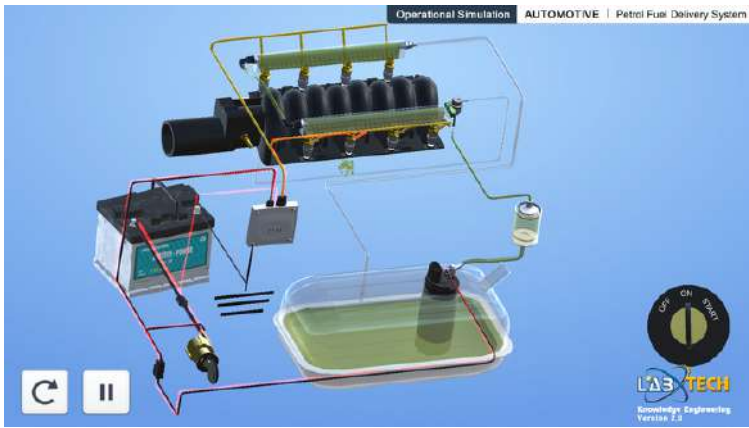
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AUTOMOBILE BATTERY

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PETROL FUEL DELIVERY SYSTEM

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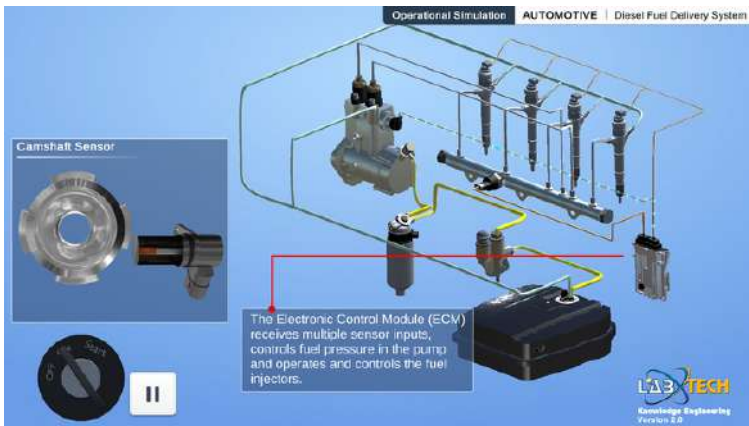
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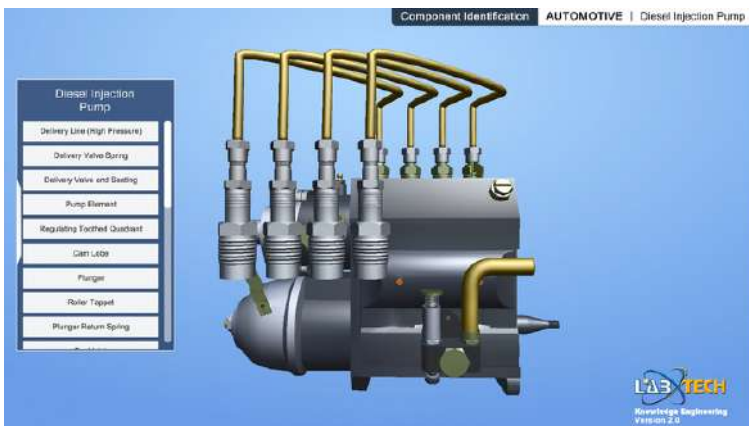


MECHANICAL PETROL FUEL PUMP

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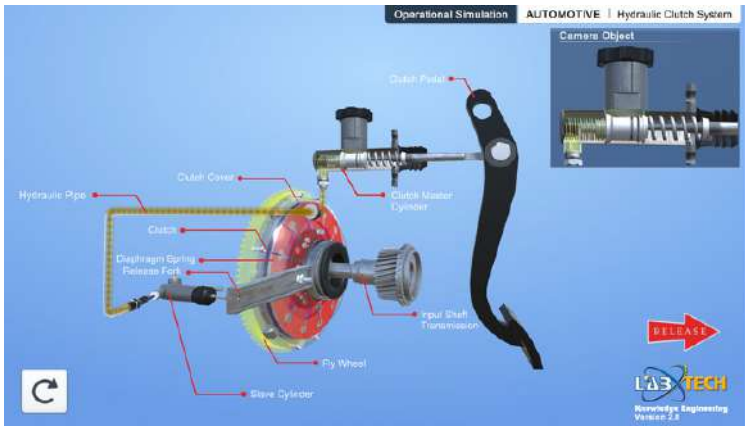
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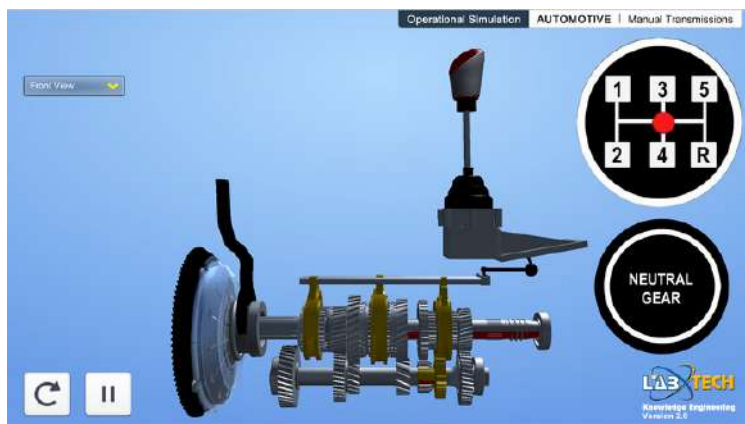
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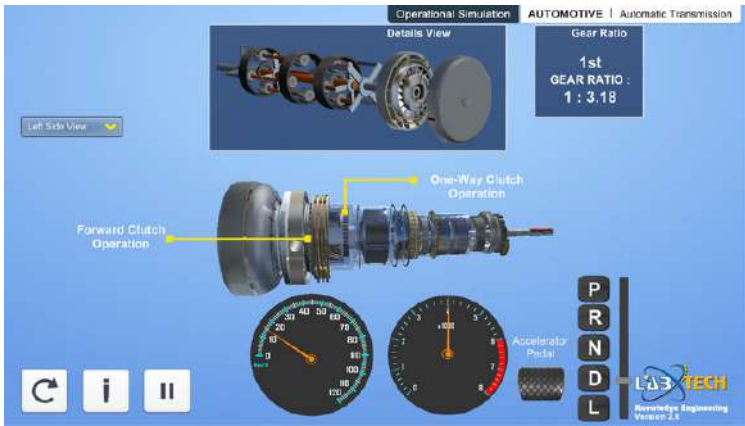
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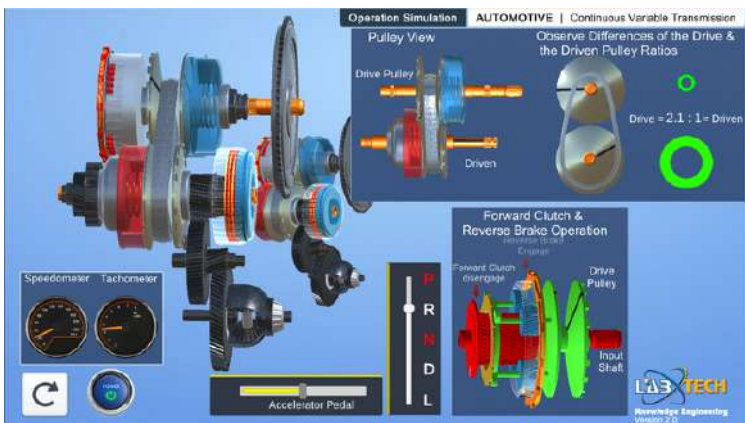
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MANUAL TRANSMISSION
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AUTOMATIC TRANSMISSION
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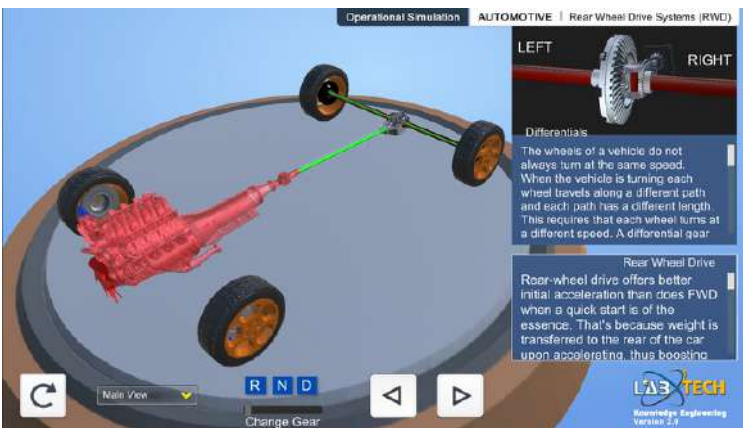


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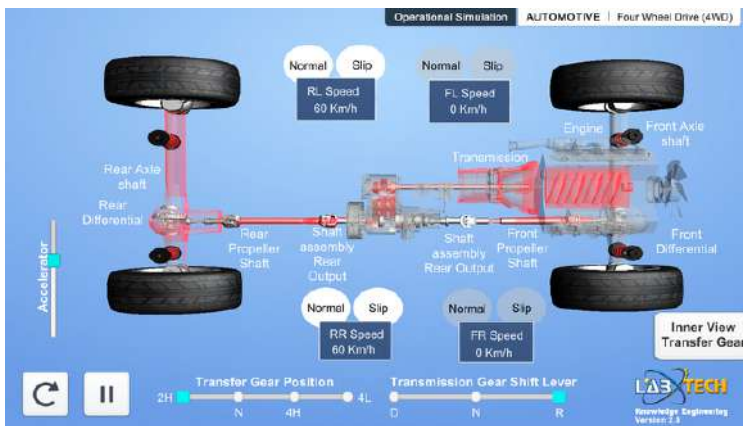
FRONT WHEEL DRIVE SYSTEMS (FWD)

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REAR WHEEL DRIVE SYSTEM (RWD)

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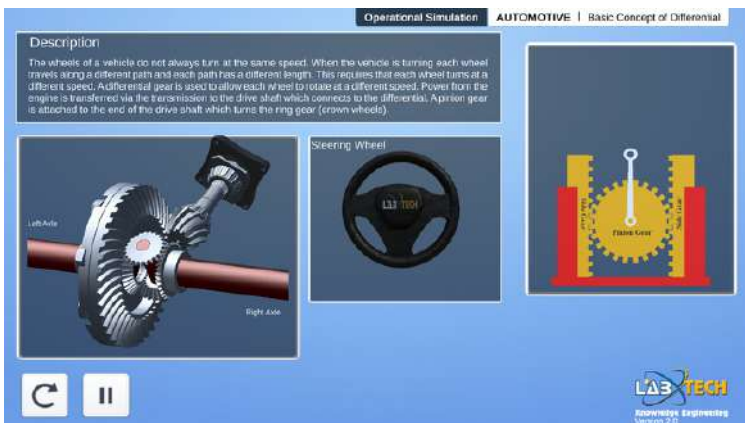


FOUR WHEEL DRIVE SYSTEMS (4WD)

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DRIVE SHAFTS
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DIFFERENTIAL SYSTEMS
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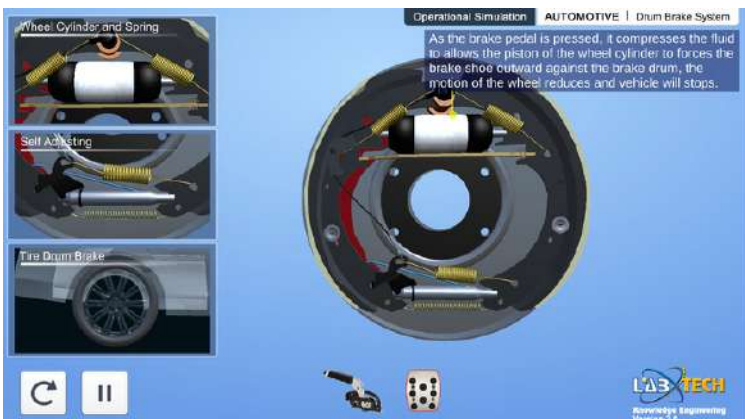
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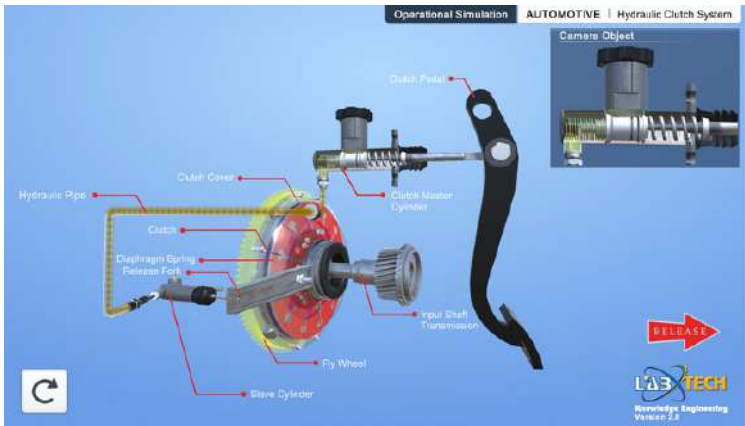
POWER ASSISTED HYDRAULIC BRAKE SYSTEM
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DISC BRAKE SYSTEM
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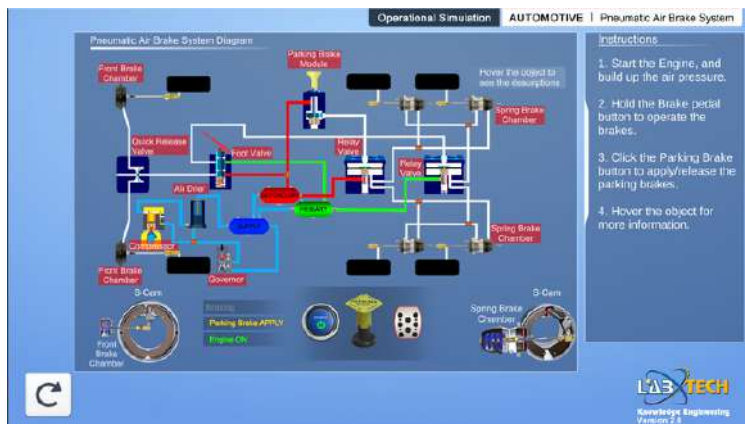
DRUM BRAKE SYSTEM
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ABS ANTI-LOCK BRAKING SYSTEM
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TRACTION AND STABILITY CONTROL
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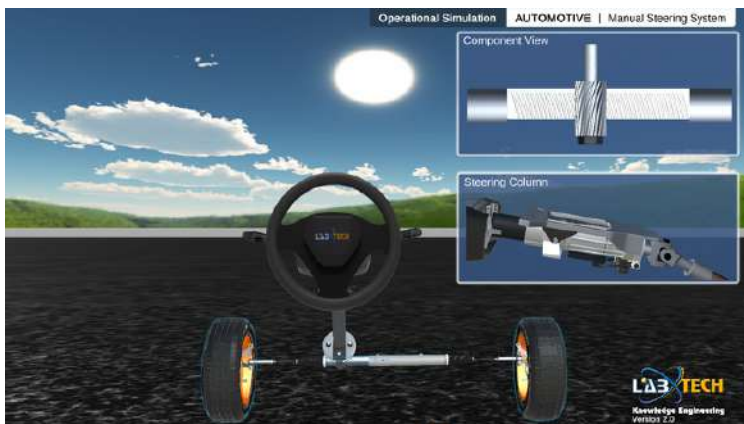
PNEUMATIC AIR BRAKE SYSTEM
 Model Number : VTD-AUT-10-07



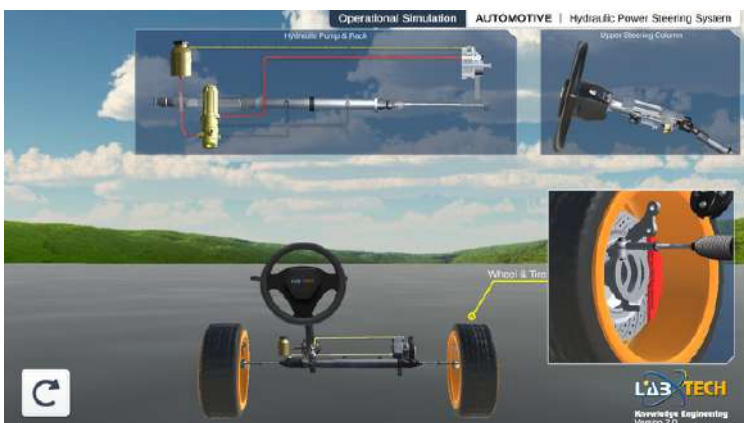
ROAD WHEELS AND TIRES
Model Number : VTD-AUT-11-01



WHEEL GEOMETRY (ALIGNMENT)
Model Number : VTD-AUT-11-02



MANUAL STEERING SYSTEM
Model Number : VTD-AUT-11-03



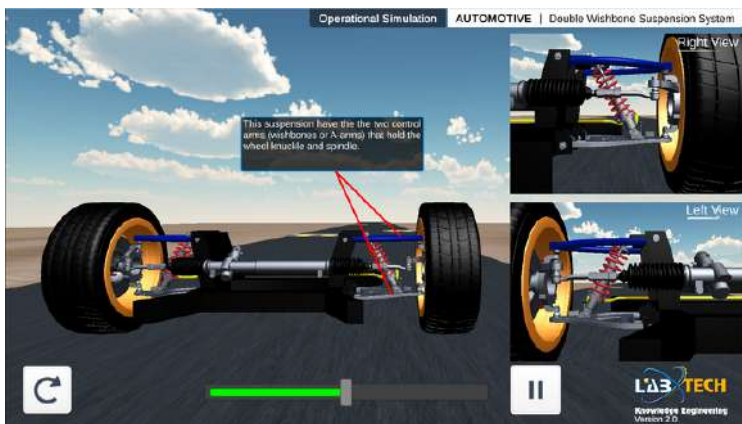
HYDRAULIC POWER STEERING SYSTEMS
Model Number : VTD-AUT-11-04



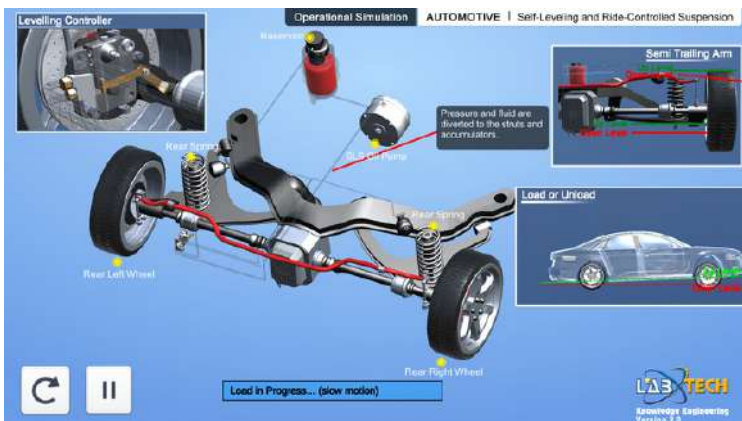
ELECTRIC POWER STEERING SYSTEMS
Model Number : VTD-AUT-11-05



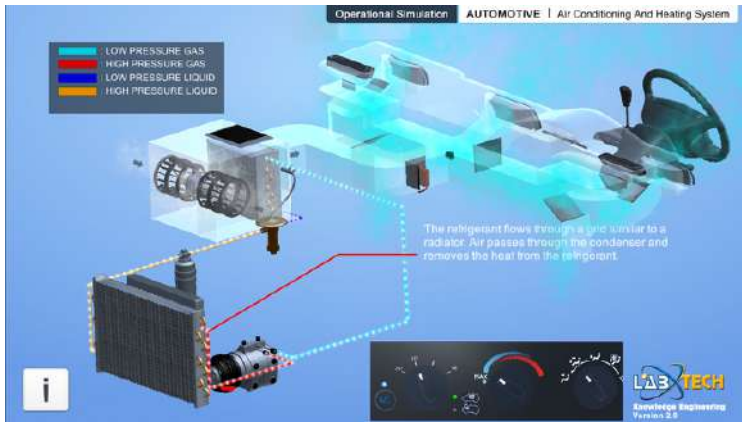
MACPHERSON STRUT (RACK & PINION) SUSPENSION SYSTEM
Model Number : VTD-AUT-11-06



DOUBLE WISHBONE (PARALLELOGRAM) SUSPENSION SYSTEM
Model Number : VTD-AUT-11-07

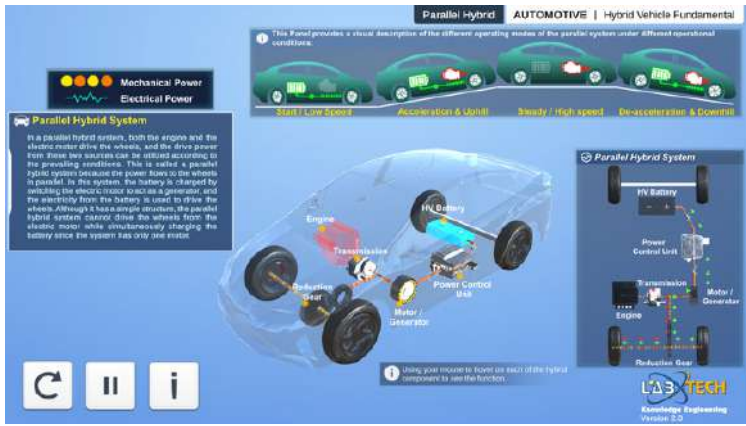


SELF-LEVELING AND RIDE-CONTROLLED SUSPENSION
Model Number : VTD-AUT-11-08



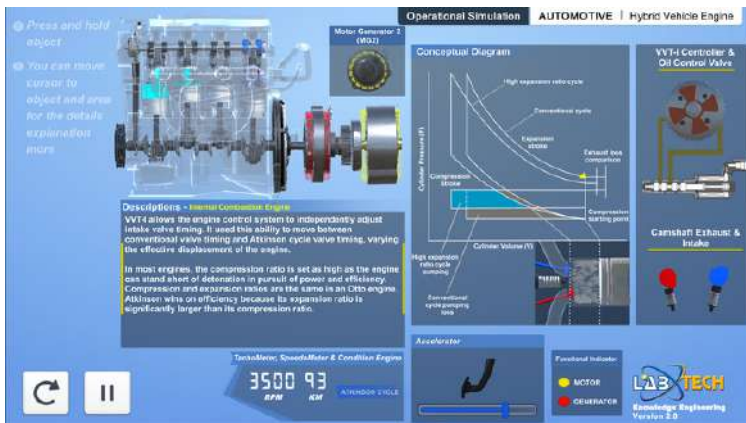
AIR CONDITIONING AND HEATING SYSTEM

Model Number : VTD-AUT-12-01



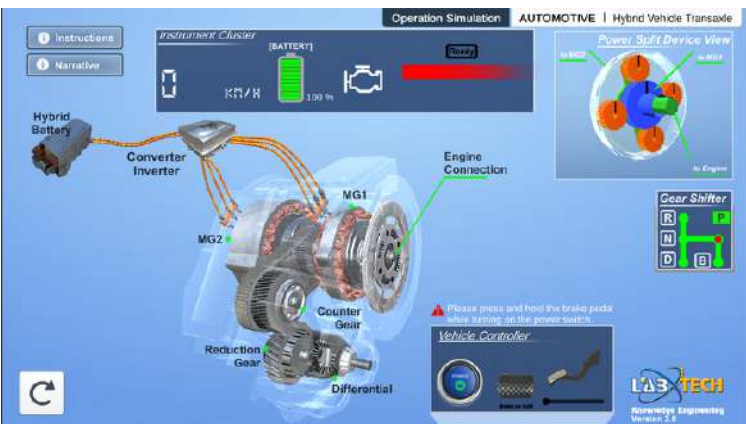
HYBRID VEHICLE FUNDAMENTALS

Model Number : VTD-AUT-13-01



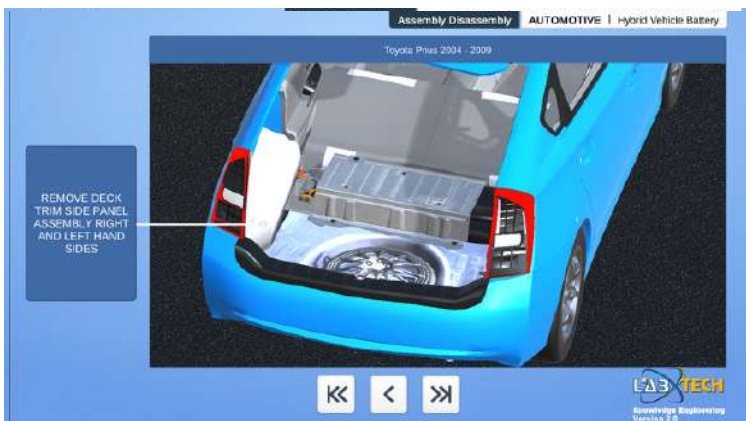
HYBRID ENGINE

Model Number : VTD-AUT-13-02



HYBRID TRANSAXLE

Model Number : VTD-AUT-13-03



HYBRID BATTERY

Model Number : VTD-AUT-13-04

Operational Simulation | AUTOMOTIVE | Hybrid Vehicle Power Control Unit (PCU)

Description
 Converter changes the voltage (either AC or DC) of an electrical power source. There are two DC/DC Converter.

LA3 TECH
 Knowledge Engineering
 Version 2.0

HYBRID POWER CONTROL UNIT (PCU) Model Number : VTD-AUT-13-05

Operational Simulation | AUTOMOTIVE | Hybrid Vehicle Electric Motor and Generator

LA3 TECH
 Knowledge Engineering
 Version 2.0

ELECTRIC MOTOR AND GENERATOR Model Number : VTD-AUT-13-06

Operational Simulation | AUTOMOTIVE | Electronic Devices and Control in Hybrid Vehicles

Electric motor as motive force
Engine is the motive force
Regenerative Braking Cooperative Control
Electric Power Steering
Air Conditioning Control

Observe several processes shown in the animation to understand the electrical control when MG2 drives the vehicle.

Running with electric motor
 Toyota Prius has several modes of operation which involve stand alone or combination usage of internal combustion engine and electric motor. The mode of operations are based on driving condition of the vehicle, some sensors are responsible to determine this driving.

HYBRID ELECTRONIC DEVICE CONTROL

LA3 TECH
 Knowledge Engineering
 Version 2.0

ELECTRONIC DEVICES AND CONTROLS IN HYBRID VEHICLES Model Number : VTD-AUT-13-07

Operational Simulation | AUTOMOTIVE | Air Conditioning in Hybrid Vehicles

The compressors sucks the low pressure gas from the evaporator and the cycle continues. The refrigerant cycle removes heat from the evaporator and releases it to the outside air through the operation of the condenser.

Click To Expand

LA3 TECH
 Knowledge Engineering
 Version 2.0

AIR CONDITIONING IN HYBRID VEHICLES Model Number : VTD-AUT-13-08

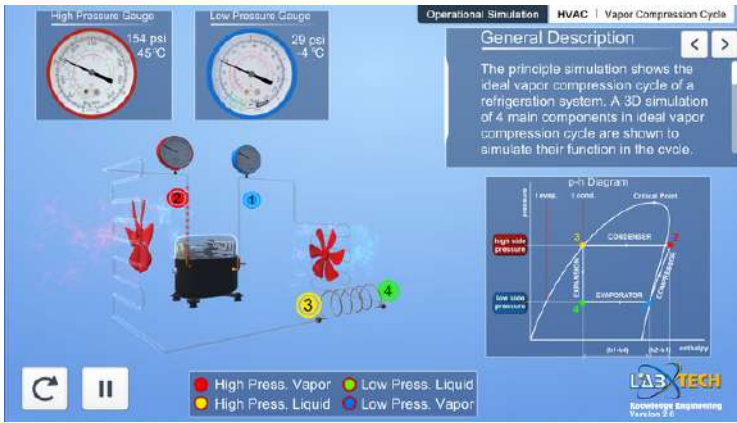


ELECTRONIC BRAKING IN HYBRID VEHICLES

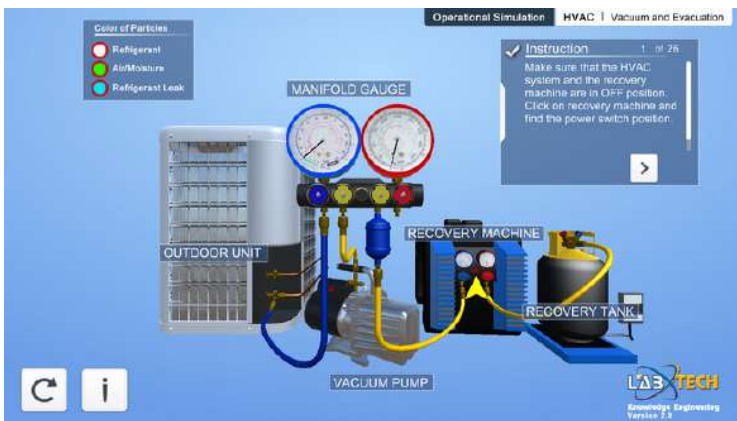
Model Number : VTD-AUT-13-09



DIGITAL CONTENT – HVAC



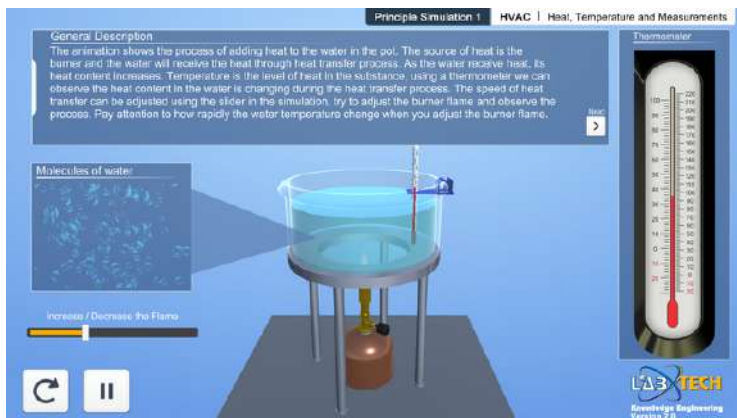
VAPOR COMPRESSION CYCLE
Model Number : VTD-RAC-01-01



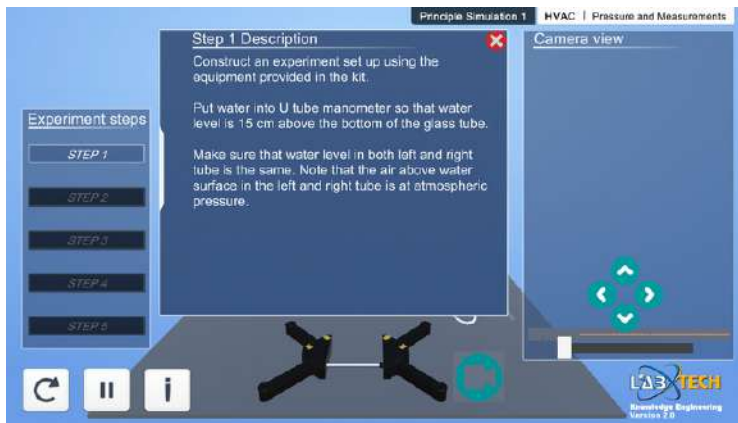
VACUUM AND EVACUATION
Model Number : VTD-RAC-01-02



RECHARGING AND RECYCLING
Model Number : VTD-RAC-01-03

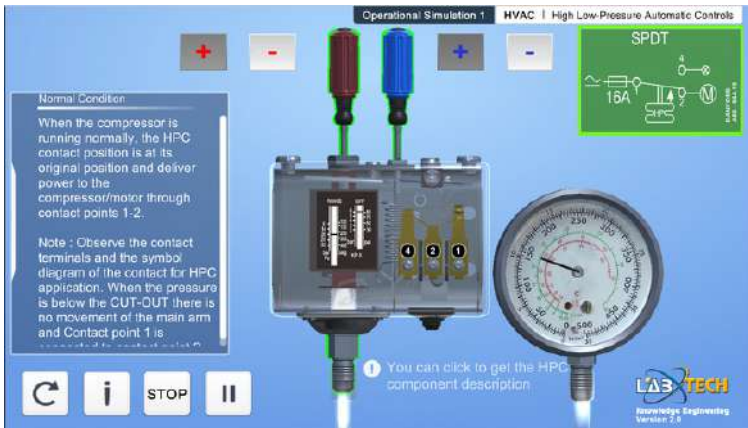


HEAT, TEMPERATURE AND MEASUREMENTS
Model Number : VTD-RAC-01-04

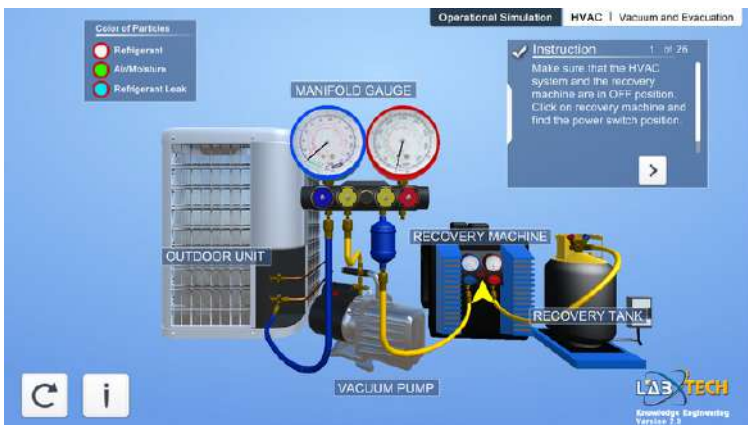


PRESSURE AND MEASUREMENTS

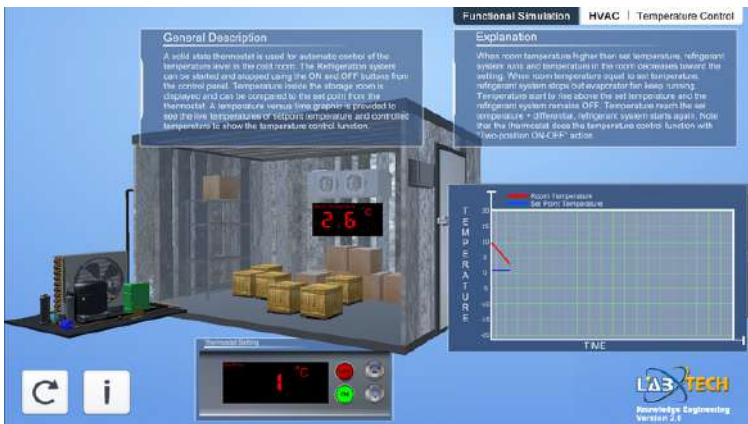
Model Number : VTD-RAC-01-05



**HIGH LOW-PRESSURE
AUTOMATIC CONTROLS**
Model Number : VTD-RAC-02-01



**HIGH LOW-PRESSURE
MANUAL CONTROLS**
Model Number : VTD-RAC-02-02



TEMPERATURE CONTROL
Model Number : VTD-RAC-02-03

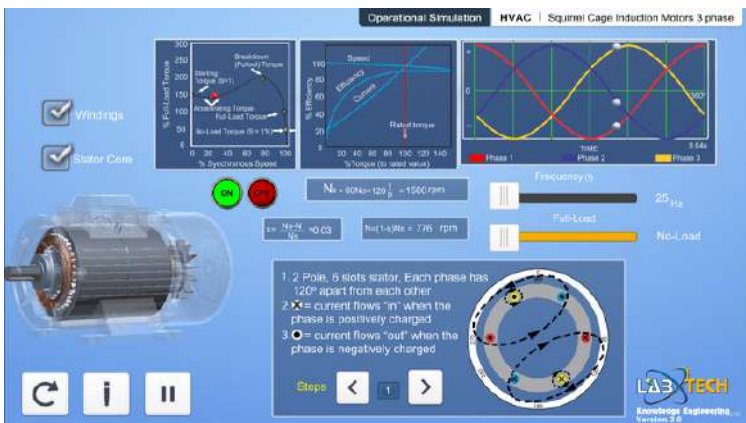


DEFROST CONTROL
Model Number : VTD-RAC-02-04



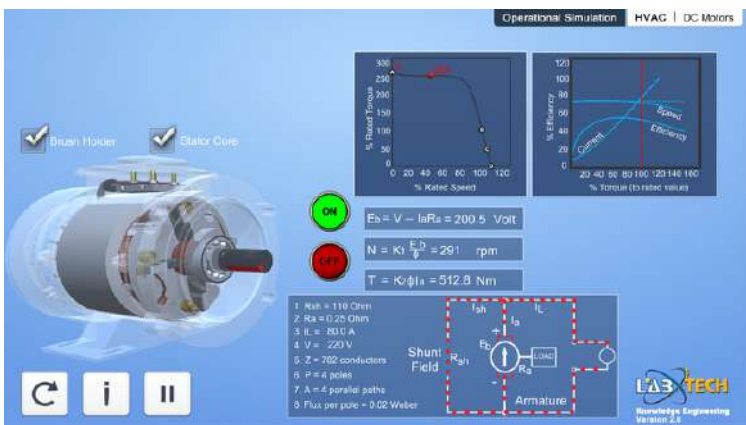
SQUIREL CAGE INDUCTION MOTORS, 1 PHASE

Model Number : VTD-RAC-03-01



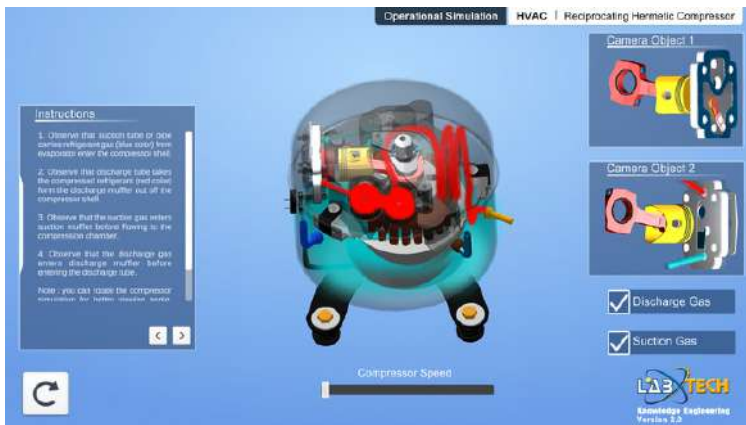
SQUIREL CAGE INDUCTION MOTORS, 3 PHASE

Model Number : VTD-RAC-03-02



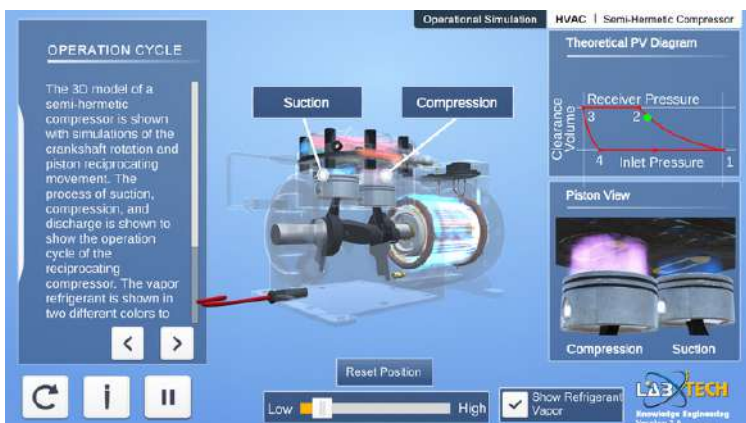
DC MOTORS

Model Number : VTD-RAC-03-03



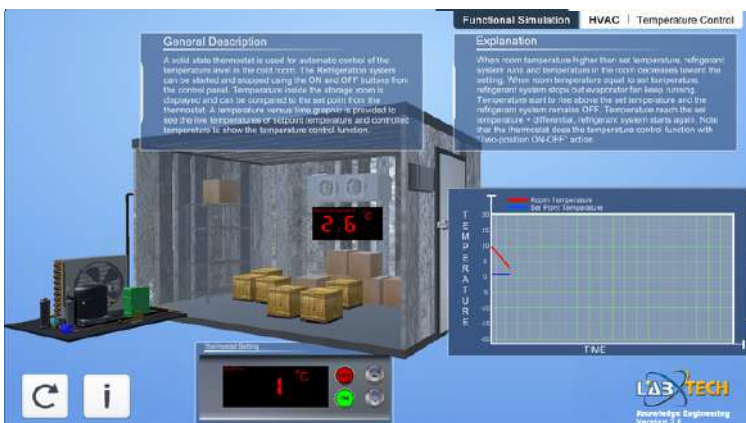
RECIPROCATING HERMETIC COMPRESSOR

Model Number : VTD-RAC-04-01



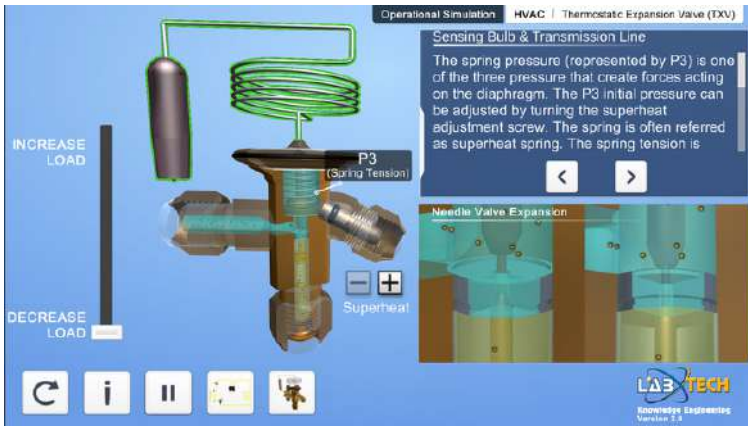
SEMI-HERMETIC COMPRESSOR

Model Number : VTD-RAC-04-02



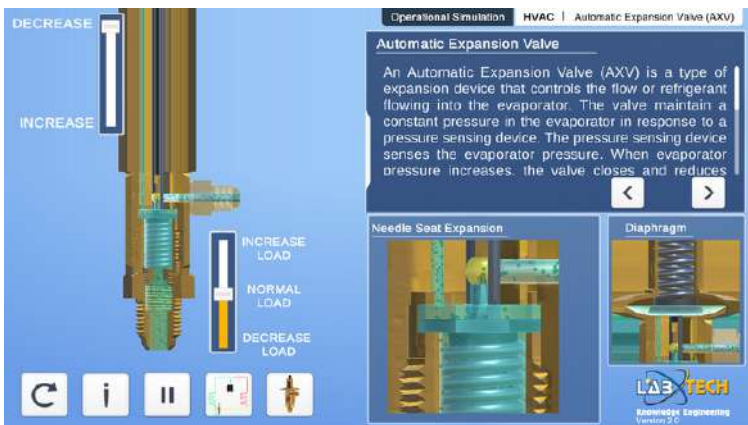
OPEN TYPE COMPRESSOR

Model Number : VTD-RAC-04-03



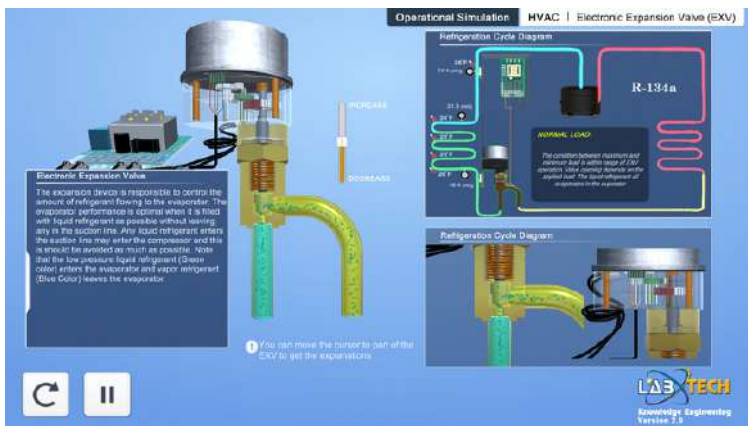
THERMOSTATIC EXPANSION VALVE (TXV)

Model Number : VTD-RAC-05-01



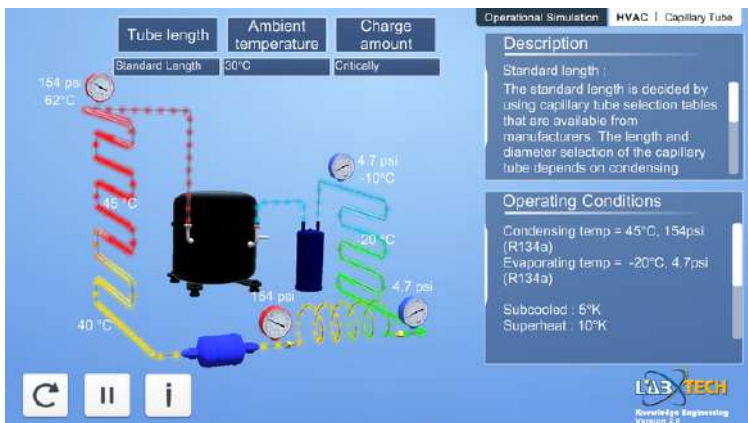
AUTOMATIC EXPANSION VALVE (AXV)

Model Number : VTD-RAC-05-02



ELECTRONIC EXPANSION VALVE (EXV)

Model Number : VTD-RAC-05-03



CAPILLARY TUBE

Model Number : VTD-RAC-05-04

Operational Simulation HVAC | Evaporator Air Cooled Forced Air

General Description
The evaporator is one of the main components of a refrigeration system, in which refrigerant evaporates for the purpose of extracting heat from the surrounding air, cooled water, or other substances. In vapor compression refrigeration systems, the evaporator is also an indirect contact heat exchanger (the refrigerant exchange heat through the evaporator tube coil wall). The forced air direct expansion evaporator uses additional fin to enlarge the heat exchange surface and a fan motor to force the surrounding air to move through the fin area.

Refrigeration Cycle Diagram

Instruction

- Use the slider to change the Evaporator fan speed.
- Hover/Click the cursor on several locations of the Evaporator coil (beginning of the coil, middle of the coil and end of the coil) to see the explanation.

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Knowledge Engineering Version 2.0

EVAPORATOR, AIR COOLED, FORCED AIR

Model Number : VTD-RAC-05-05

Operational Simulation HVAC | Condenser Air Cooled Forced Air

General Description
The condenser is one of the main components of a refrigeration system, in which refrigerant condenses for the purpose of rejecting heat from the refrigerant to surrounding air, cooled water, or other substances. In vapor compression refrigeration systems, the condenser is also an indirect contact heat exchanger (refrigerant exchange heat through the condenser tube coil wall). The forced air direct expansion condenser uses additional fin to enlarge the heat exchange surface and a fan motor to force the surrounding air to move through the fin area.

Refrigeration Cycle Diagram

Instruction

- Use the slider to change the condenser fan speed.
- Hover/Click the cursor on several locations of the condenser coil (beginning of the coil, middle of the coil and end of the coil) to see the explanation.

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Knowledge Engineering Version 2.0

CONDENSER, AIR COOLED, FORCED AIR

Model Number : VTD-RAC-05-06

Operational Simulation HVAC | Plate Type Heat Exchanger

DESCRIPTION
The hot fluid normally enters through one of the upper connections and leaves through the connection underneath.

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Knowledge Engineering Version 2.0

PLATE TYPE HEAT EXCHANGER

Model Number : VTD-RAC-05-07

Operational Simulation HVAC | Shell and Tube Heat Exchanger

Counter-current page 01 of 20

Equations page 01 / 20

Mass flow rate (kg/s) = flow rate (m³/s) x density (kg/m³).
The power emitted from the hot stream Q_e can be found using the equation.
 $Q_e = V_{hot} \cdot \rho_{hot} \cdot C_{p,hot} \cdot (T_{in} - T_{out})$ Watt

Where:
V_{hot} = volumetric flow rate (m³/s) of the hot fluid
ρ_{hot} = density of the hot fluid (kg/m³) at mean temperature (T_{in} + T_{out})/2
C_{p,hot} = heat capacity of the hot fluid at mean temperature (T_{in} + T_{out})/2

Hot Flow: 0.000 m³/s, Shellside Hot In: 60.00 °C, Tubeshide Cold In: 15.00 °C, Tubeshide Cold Out: 32.31 °C, Shellside Hot Out: 50.39 °C, Cold Flow: 0.400 m³/s


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Knowledge Engineering Version 2.0

SHELL AND TUBE HEAT EXCHANGER

Model Number : VTD-RAC-05-08

Operational Simulation HVAC | Filter Drier

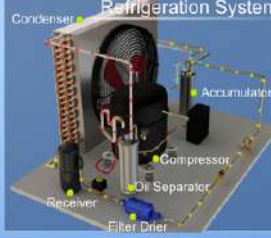
General Description
 Filter drier normally located in the liquid line to filter the refrigerant before flowing into the expansion device or after refrigerant leave the receiver. A Single flow filter drier only let refrigerant flows in one direction which is shown by the arrow on the filter drier case.



Color of Particles

- Liquid Refrigerant
- Moisture Refrigerant
- Small Particle
- Acid

Refrigeration System




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 Knowledge Engineering
 Version 2.1

FILTER DRIER
 Model Number : VTD-RAC-05-13

Operational Simulation HVAC | Accumulator

General Description
 Suction-line accumulator is considered as a compressor protection device. The refrigerant entering the compressor must be in the vapor state. The vapor refrigerant is expected to be superheated before entering the compressor. Liquid refrigerant



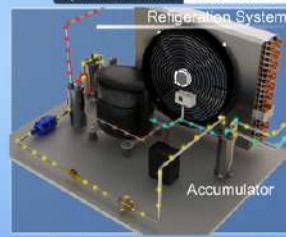
Inlet from Evaporator Outlet to Compressor

Decrease Increase
 Evaporator load

Color of Particles

- Low Pressure Vapor Refrigerant
- Low Pressure Liquid Refrigerant
- High Pressure Liquid Refrigerant
- Oil

Refrigeration System

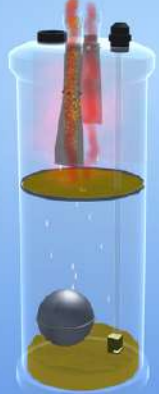


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 Version 2.1

ACCUMULATOR
 Model Number : VTD-RAC-05-14

Operational Simulation HVAC | Conventional Oil Separator

General Description
 Oil separator is installed in the compressor discharge line. The oil separator is usually a vertical canister with the inlet and outlet gas connections, and an oil return port at




ON Cycle OFF Cycle

ON
OFF

Color of Particles

- High Pressure Vapor
- Oil

Refrigeration System



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OIL SEPARATOR
 Model Number : VTD-RAC-05-15

Operational Simulation HVAC | Receiver

General Description
 Liquid Receiver is used in refrigeration system especially on system which use low side float or expansion valve type refrigerant control. Most of domestic and small refrigeration system that use capillary tube do not use liquid receiver. The liquid is store in the evaporator during off-cycle. In large system used in commercial and industrial application




Color of Particles

- Liquid
- Vapor
- Small Particle
- Moisture

Back Seated
 Front Seated

Refrigeration System



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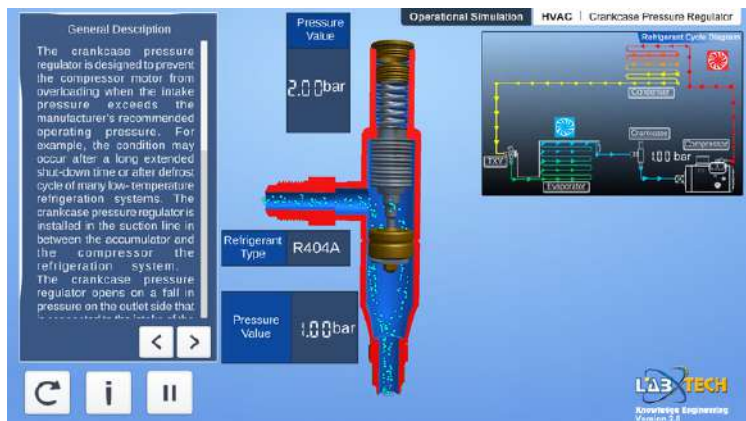
RECEIVER
 Model Number : VTD-RAC-05-16



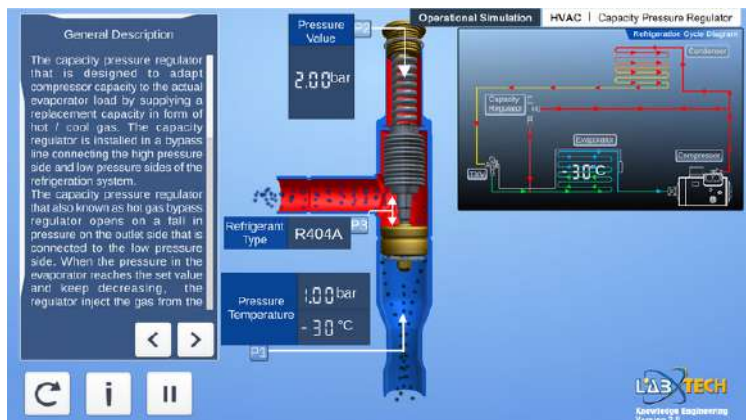
EVAPORATOR PRESSURE REGULATOR
Model Number : VTD-RAC-05-17



CONDENSER PRESSURE REGULATOR
Model Number : VTD-RAC-05-18



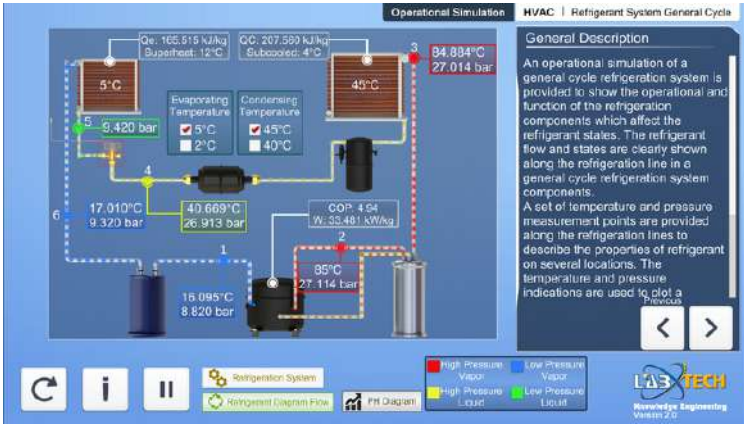
CRANKCASE PRESSURE REGULATOR
Model Number : VTD-RAC-05-19



CAPACITY REGULATOR
Model Number : VTD-RAC-05-20



RECEIVER PRESSURE REGULATOR Model Number : VTD-RAC-05-21



REFRIGERATION SYSTEM GENERAL CYCLE

Model Number : VTD-RAC-06-01



BASIC REFRIGERATOR SYSTEMS

Model Number : VTD-RAC-06-02



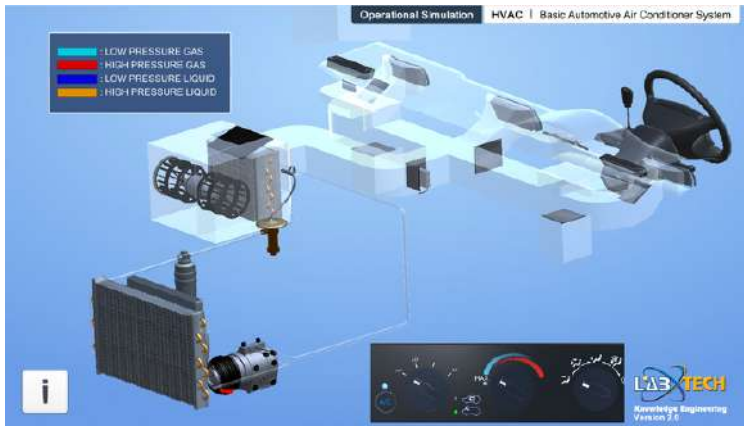
BASIC FREEZER SYSTEM

Model Number : VTD-RAC-06-03



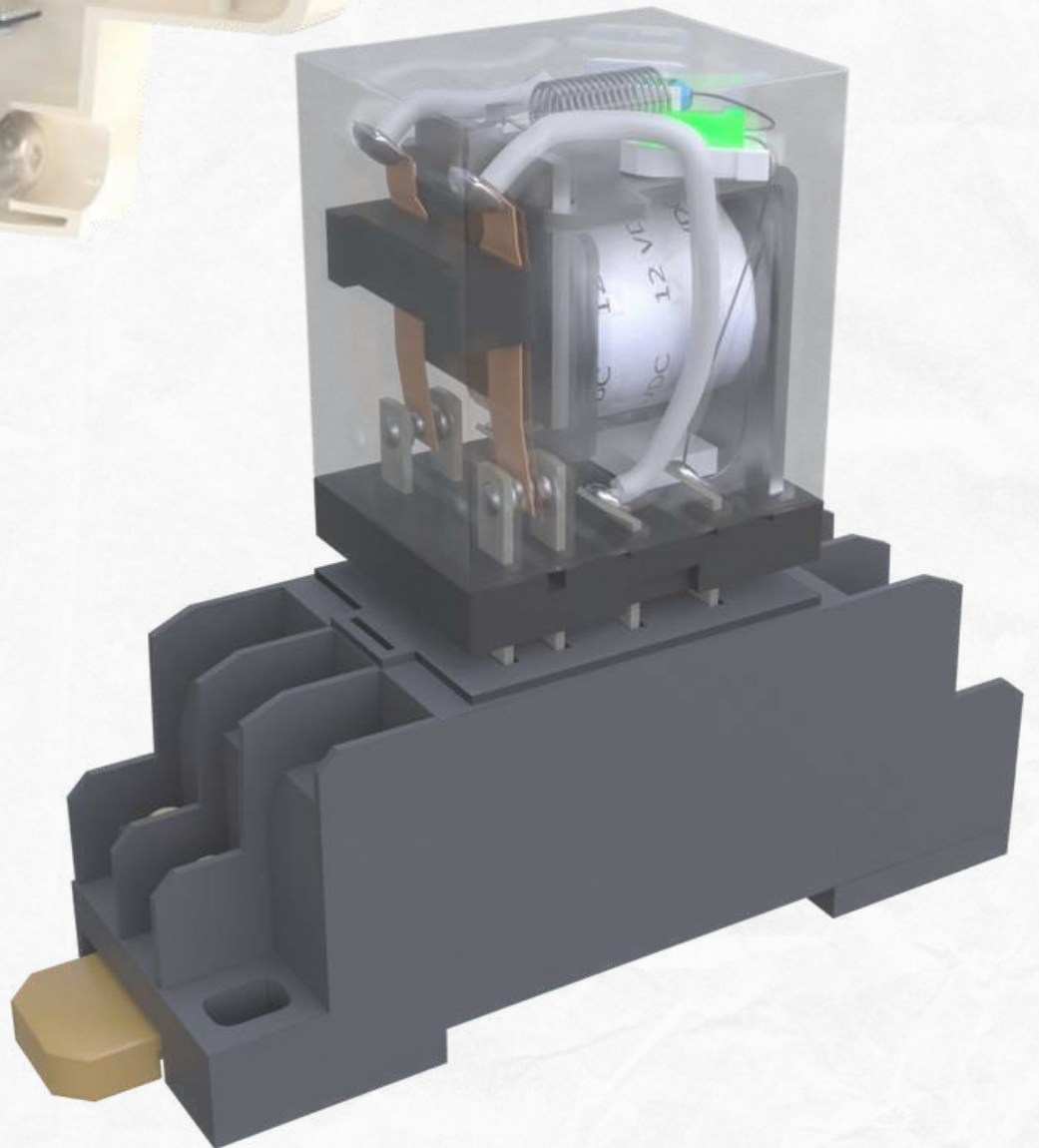
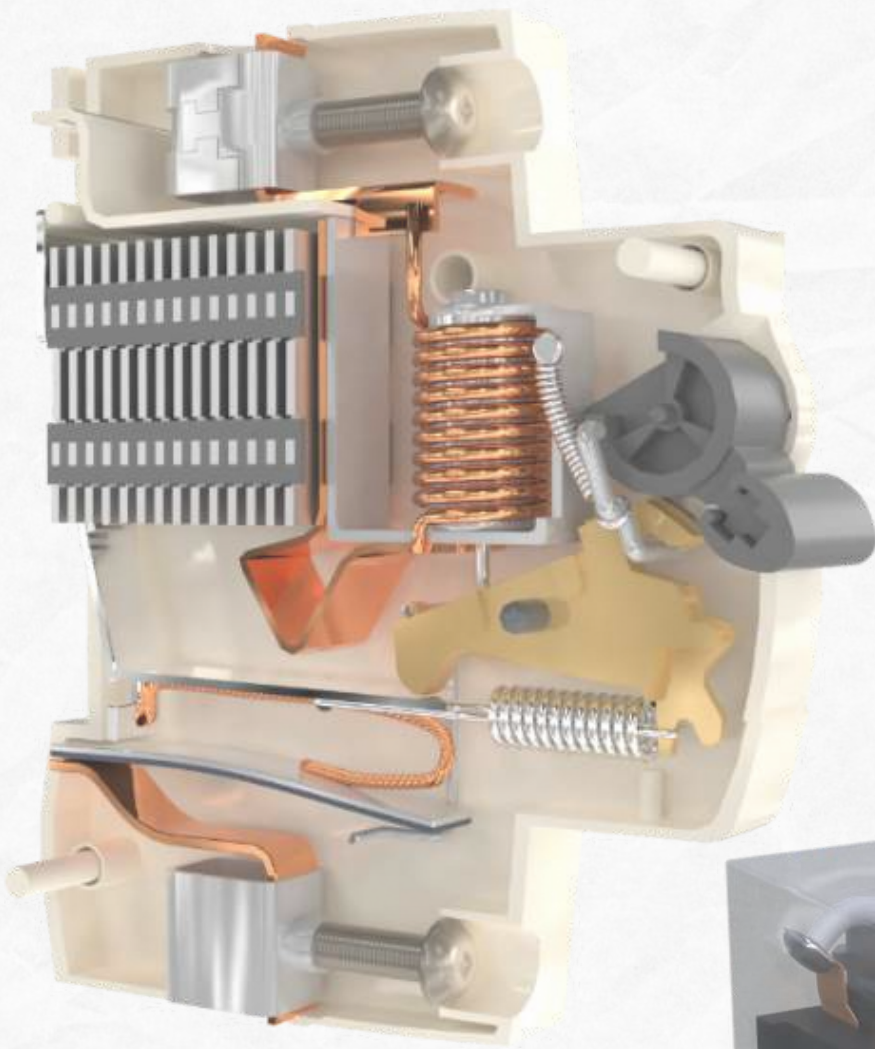
COLD ROOM REFRIGERATION SYSTEM

Model Number : VTD-RAC-06-04



BASIC AUTOMOTIVE AIR CONDITIONER SYSTEM

Model Number : VTD-RAC-08-01



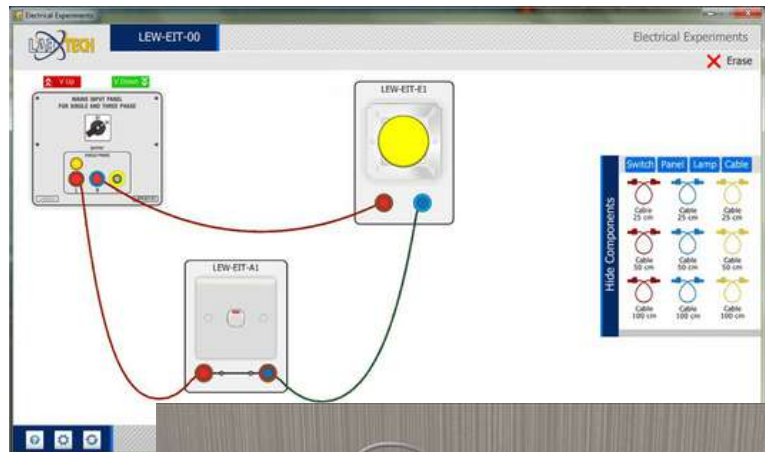
DIGITAL CONTENT – ELECTRICAL

Electrical Fundamentals :

- Electromagnetism
- OHM's Law; Voltage, Current and Resistance
- Series and Parallel Circuit

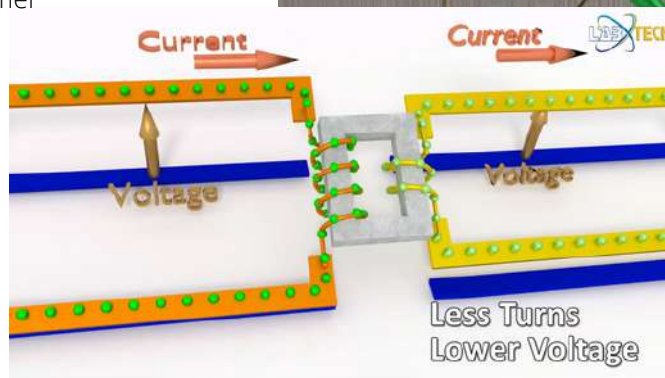
Electrical Instruments/Panel Meters :

- Analog Multimeter
- Digital Multimeter
- Digital Clampmeter
- Digital Insulation Tester
- Galvanometer
- Amperemeter (Analog & Digital)
- Voltmeter – Panel Type (Analog & Digital)
- Watt Meter (Analog & Digital)
- VAR Meter (Analog & Digital)
- Power Factor Meter (Analog & Digital)



Electrical Components :

- Isolation Transformer Step up/Step down
- Autotransformer/Variable Transformer
- High Voltage Distribution Transformer
- Residential Switches
- Commercial Switches
- Relay
- Magnetic Contactor
- Timer
- Solid State Relay
- MCB
- ELCB
- Thermal Overload



Electrical Machines :

- Squirrel Cage Induction Motors, 1 phase
- Squirrel Cage Induction Motors, 3 phase
- DC Motors
- DC Generator
- Synchronous Motors
- AC Synchronous Generator
- Electrical Protection Devices
- Residential Electrical Installation

Electrical Appliances :

- Electric Oven
- Electric Fan
- Washing Machine

Wiring and Installation :

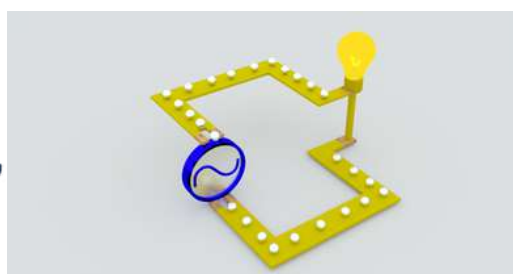
- Residential Lighting Switches and Power Outlet
- Commercial; 3 Phase Distribution Panel

DC Power Supply :

- Full Bridge DC Power Supply
- Four Quadrant Power Supply

Motor Control :

- DOL Motor Starting
- Star/Delta Motor Starting
- DC Motor Starting





DIGITAL CONTENT – ELECTRONICS

Circuit Theory :

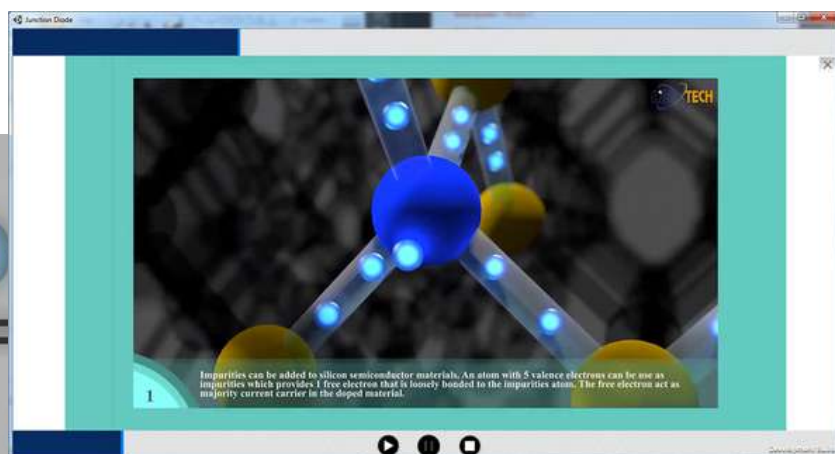
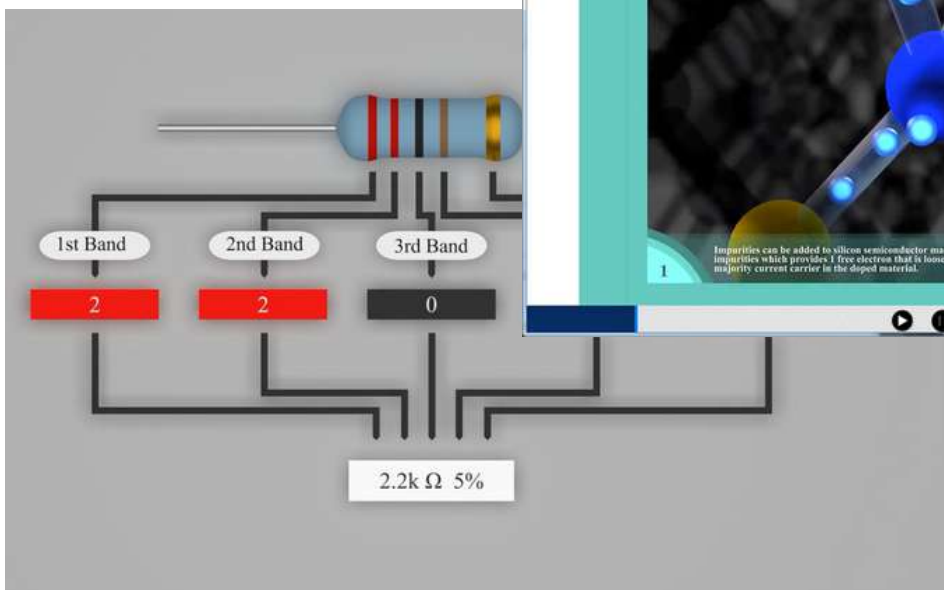
- Resistor
- DC Voltage and batteries
- Ohm's Law
- Series, parallel and series-parallel circuits
- Kirchoff's Law
- Superposition Theorem
- Thevenin's Theorem
- Norton's Theorem
- Millman's Theorem
- Inductors
- Capacitors
- RL, RC and RLC circuits
- Impedance
- Resonant circuits
- Low pass and High pass filters

Digital Electronics :

- Digital gates
- Gate circuits.
- Product of sums.
- Sum of products
- D type latches.
- JK Flip-flop.
- shift register.
- Counters.
- Shift register.
- Decoders.Encoders
- Multiplexer & Demultiplexer.
- DAC and ADC

Analog Electronics :

- Diodes
- Opto electronics
- Diode circuits
- Rectifiers
- Transistor familiarization
- Transistor configurations
- Transistor amplifiers
- FET
- MOSFET
- Operational amplifier
- Operational amplifier circuits
- Oscillators





Mechanical Joints

This series of demonstration models are designed for teacher led classes and students to learn about the mechanical principles and engineering characteristics of various types of joints, couplings, screws, gears and other power transmission mechanisms.

This set of models consists of the following joints and couplings that clearly demonstrate how two shafts can be coupled or joined together.

Model Listing :

- a. Different Joints
- b. Single Universal Joints
- c. Double Universal Joints
- d. Flexible Coupling
- e. Rigid Coupling
- f. Cotter Joint
- g. CV Joint
- h. Splined Joint
- i. Riveted Joint



Flexible Coupling



Rigid Coupling



Cotter Joint



Single Universal Joints



Double Universal Joints



CV Joint



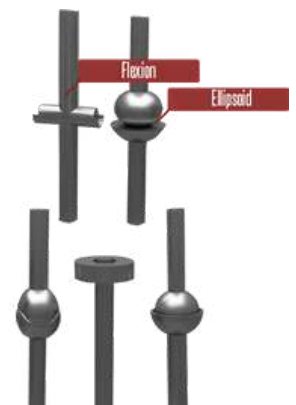
Splined Joint

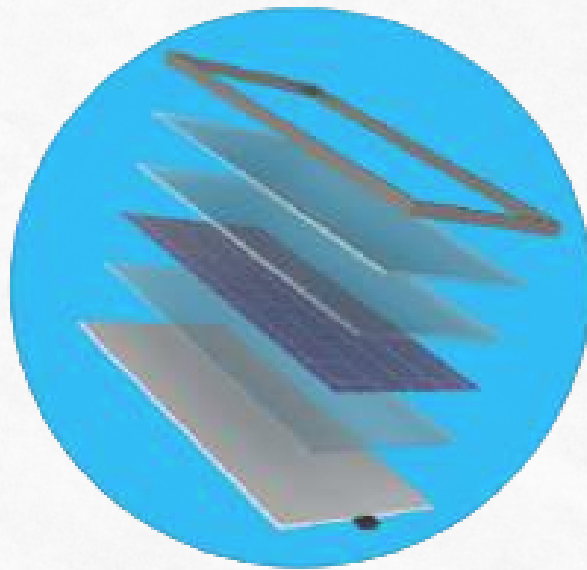
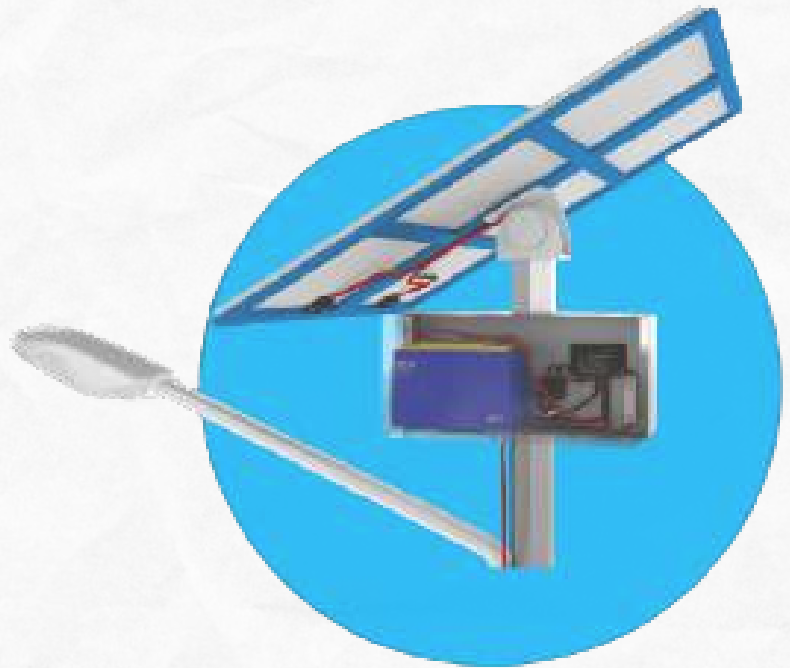
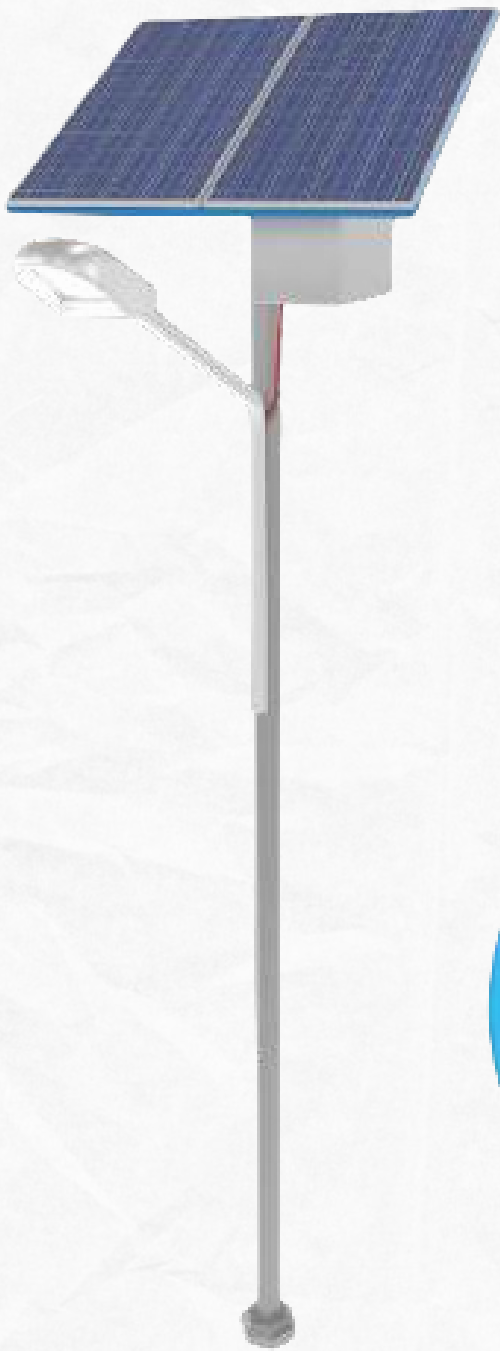


Riveted Joint

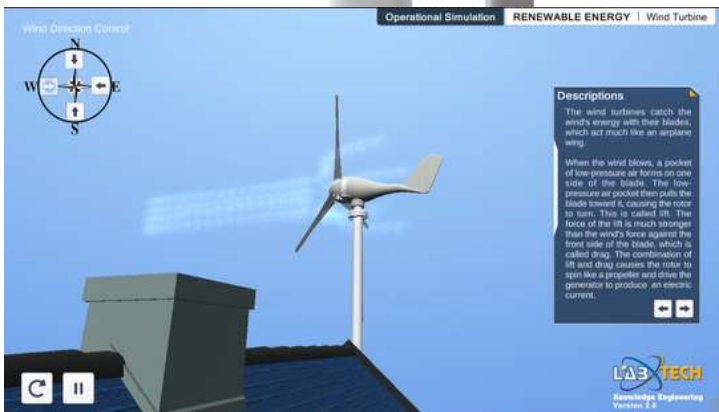


Different Joint





**DIGITAL CONTENT – GREEN TECH RENEWABLE
TECHNOLOGY**



Fundamentals of Electricity and Electric Power :

- Working Principles of Electrical systems
- Electric charge, electric current, electric field, electric potential
- Electromagnetics, electric circuits and devices
- Basics of motors and concepts of power generation
- Concepts of electrical measurement and control on AC and DC current.

Fundamentals of Electronics :

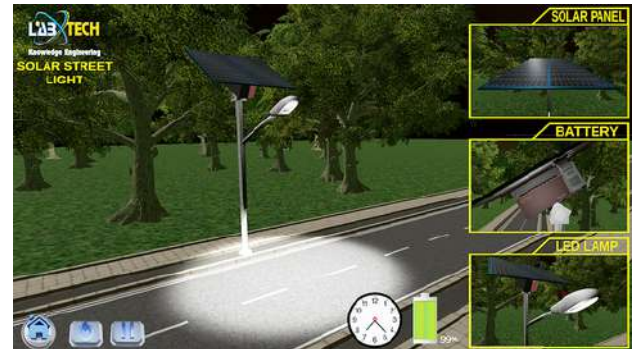
- Working Principles of electronics systems
- Analog electronics circuits and components
- Digital electronics and components
- Application of various circuits and systems in electronics.

Fundamentals of Green and Renewable Energy :

- Energy Science, Fossil Fuels & Climate Change
- Exploring Home Energy Use and Conservation
- Energy Efficiency in Buildings
- Energy Savings through use of low power lighting and systems
- Basic Intro to Solar Thermal Systems
- Basic intro to Solar Photovoltaic Systems
- Basic Intro to Wind Power Generation
- Basic Intro to Fuel Cells
- Concept of Electrical and Hybrid Vehicles
- Basic Intro to Biomass and Bio Fuels
- Basic Intro to Geothermal Energy
- Basic Intro to Hydropower

Supporting Systems :

- Electrical Measurement and Control
- Electrical Conversions
- Batteries and Storage
- Home Green Power Systems
- Power Electronics
- Power Systems Protection and Control
- Grid Integration
- Energy Efficient Lighting Systems
- Integrated Green Power Management Systems



Green Tech Systems Simulations

- Solar Thermal System for hot water production
- Solar Cooling System
- Solar Photovoltaic Systems
- Concentrated Solar Power System
- Solar Power Water Pumps
- Solar Power Street lighting
- Wind Turbine System
- Energy Efficient Air Conditioning Systems
- Geo-Thermal Systems
- Bio Fuel
- Bio Mass
- Hybrid Vehicle Systems
- Electric Car
- Micro Hydro
- Green Tech Control Circuits Simulation

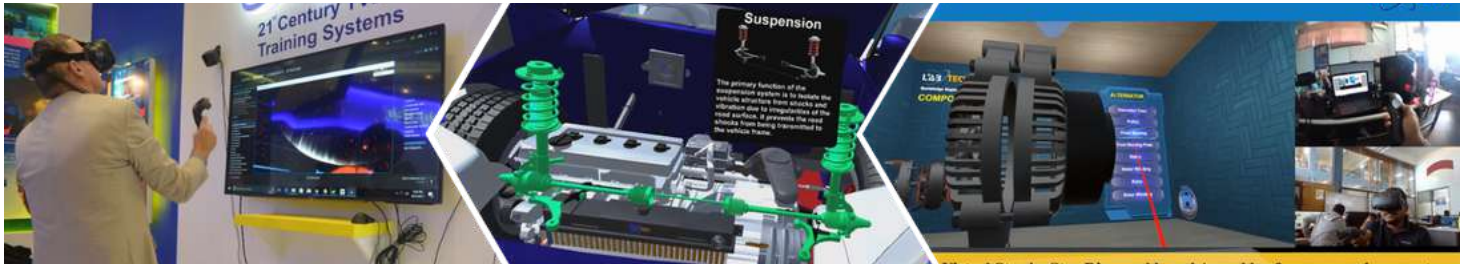




DIGITAL CONTENT – VIRTUAL REALITY

Virtual Reality Learning Systems – A Prime tool for Industry 4.0

Virtual Reality has been a hit with the gaming community, but it is also a serious tool for learning as well. It is perfect for immersive learning situations such as realistic simulators for teaching operational skills on large and expensive equipment such as aircraft, marine vessels and heavy equipment. At Labtech we are using this tool to create new types of learning experiences that will enhance the learning process by using the unique characteristics of VR for immersive learning.



Labtech Models are made in true 3D and VR Ready:

Labtech has become a developer of Virtual Reality learning applications and has been working on this technology for quite some time now. We have ensured that all of our 3D Learning Modules and Knowledge Objects are able to be imported and programmed within the virtual reality environment. As such we can quickly reformat the content and transfer it over into VR systems as demand increases. This will be a program that will be of increasing importance to education over the next few years as more VR learning centers are set up.

When and Where to use VR?

It is important to use VR wisely and deploy it where it will make a difference and add significantly to the learning experience. The cost of VR gear is still a quite high when considering the VR headset and high power PC with good graphics cards. But costs are coming down in the near future as headsets with controls shift from a computer tethered platform to be wireless based. New products are coming on the market each year such as new VR headsets (complete with controllers) which do not require supporting high powered PCs.

In the near future we should concentrate on producing content that has high value and reflects the cost of delivery. In our thoughts, VR learning experiences should be considered when the training object is too large or costly to fit in the classroom or workshop or when the training program will benefit from an immersive experience. Things like the following will be very suitable for this technology:

- Complete vehicles and heavy equipment
- Large systems like HVAC and building controls systems
- Industrial processes such as in industrial plants
- Safety Training for workshops or factories
- Activity Based Training to perform certain tasks
- Realistic Simulation of complex or expensive equipment
- 3D-360 degree immersive videos

These would all be good candidates. Also, it is a good use of VR for when the safety of the learner is at issue. VR is a great way to learn and to make mistakes without getting hurt. These would all be good considerations that would be worth while for using VR gear for training purposes.

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- Large systems like HVAC and building controls systems
- Industrial processes such as in industrial plants
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360Degree Videos

Labtech is embarking on a new program to film selected activities and experiences in 360-degree formats. The students can have a 3D experience just as if they were there. We are using this for some servicing activities on large equipment, factory tours and experiences to see industry in action and other applications. This is also a very good use of VR to transport the learner to a new environment and one that they cannot experience at their own training institution.



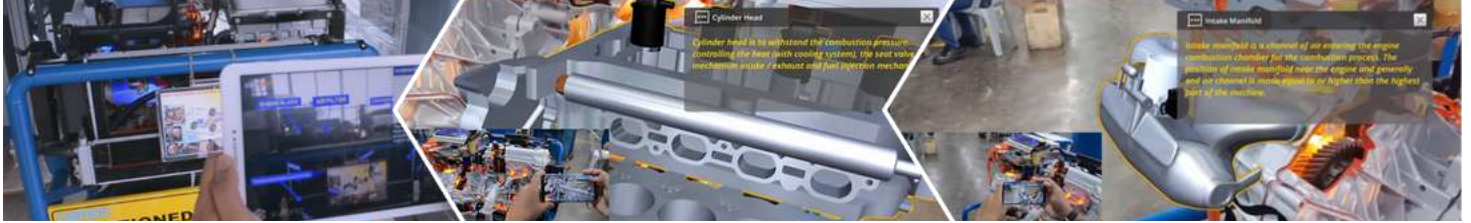
Custom Work

Labtech has the ability to develop custom VR experiences and learning applications for educational intuitions and industry. Just send us an enquiry and see if we can help you in your VR or 360 Degree Video development needs.

Augmented Reality and Mixed Reality Learning Systems

A Prime tool for Industry 4.0

AR and MR allows us to introduce digital learning and mix it with our physical and real surroundings. It has great potential for training and is already being used by industry particularly in the service sector and for guidance of various activities. Industry is using it to project expert real time assistance to remote technicians, to provide guidance on servicing tasks and to monitor complex processes and systems. Labtech is working hard on bringing this technology to the TVET classrooms so that we can learn in the same way that we will work for Industry 4.0.



Labtech Models are made in true 3D and AR Ready:

Labtech is able to develop Virtual Reality learning applications and is currently working on creating new learning strategies that are complementary to this technology. We have ensured that all of our 3D Learning Modules and Knowledge Objects are able to be imported and programmed within the augmented reality environment. As such we can quickly reformat the content and transfer it over into AR and MR systems as demand increases.

Where and When to use AR and MR?

AR and MR technology, we believe, is going to be very useful in the classroom and in the workplace. It will become an increasingly more powerful tool that allows students to transform their learning experience in several ways.

- **Interaction with real training systems:** We can use AR/MR to interact with equipment and training systems in the workshop or lab. We can layer on information so that students can identify parts and components and see into the processes at work. This adds another dimension to the learning experience and provides additional information and reference materials to the learner.
- **Guidance in tasks:** The learner will be able to do physical tasks in the workshop and have instruction, guidance and helpful information available to him during his workshop time. This service and task-based guidance are already being used by Industry as part of Industry 4.0 to make workers more productive and operate inter-dependently. We can do the same for the learning process and this will be good preparation for them for the future.
- **Building Real Skills:** AR/MR is also very good at guiding and honing the development of skills. Its use in areas like welding are already very well established. In these cases, useful guidance and feedback are provided to the learner so that their skills can advance more quickly and safely in the lab or workshop.

Deployment of AR/MR

- **Mobile Phones/ Tablets:** These types of learning applications can be deployed in some cases with just a normal mobile phone or tablets. The cameras can be the eye of the learner to view information about the system being worked on.
- **AR/MR Headsets:** In other cases, the new AR/MR headsets can be considered for a more immersive and interactive experience. Any surface can be used to convey information to the learner, assistance and videos can pop up as needed or objects can be interactive with to provide information or control.

360 Degree Virtual Object Interaction

Labtech is embarking on a new program to film and develop selected activities and experiences in 360-degree formats. For AR/MR this means we can create fully formed technical objects that can appear as if they were there in the room with you. These could be interacted with and changed according to desired parameters. This could mean that you might be able to change the design elements or the color and size of things. Or it could allow the learner pull up information on an operating system and enable them to control its parameters. There are many ways that we can make systems come alive with the AR/MR experience that would be useful for the process of learning. In the gaming world, this application is being used to create and overlay virtual games in the space around us. Imagine if we can apply that concept to learning!

Custom Work

Labtech has the ability to develop custom AR/MR experiences and learning applications for educational intuitions and industry. Just send us your enquiry and see if we can help you in your AR/MR development needs.

TVET LMS (Learning Management System)

The Labtech TVET LMS is a comprehensive education tool designed to enrich courses by embedding digital content and assessments into traditional teaching and learning. A full suite of content creation tools is included to enable instructors and instructional designers to enhance their courses with customized digital content. Scheduling, communication, and web 2.0 tools allow multiple options for students and instructors to meet the diverse needs of learners in the 21st Century.

**MULTILINGUAL
CONTENT DELIVERY
SUPPORTS OVER 40
LANGUAGES INCLUDING
ARABIC, JAPANESE,
AND CHINESE
CHARACTERS.**

The Labtech TVET LMS incorporates many instructor friendly features which enable complete course delivery or supplemental course materials.

Instructors are able to design their own curriculum, modify Labtech content, and import SCORM compliant modules for students to view.

Instructors have complete control over content, assessment and grading scales. The Labtech TVET LMS content delivery system tracks individual student's progress as they are guided through technology rich curriculum, which enhances 21st Century Skill competency, in addition to ensuring students meet the required learning outcomes of the course.

The Labtech TVET LMS is a versatile learning platform which supports 21st Century learning models such as blended learning, and flipping the classroom.

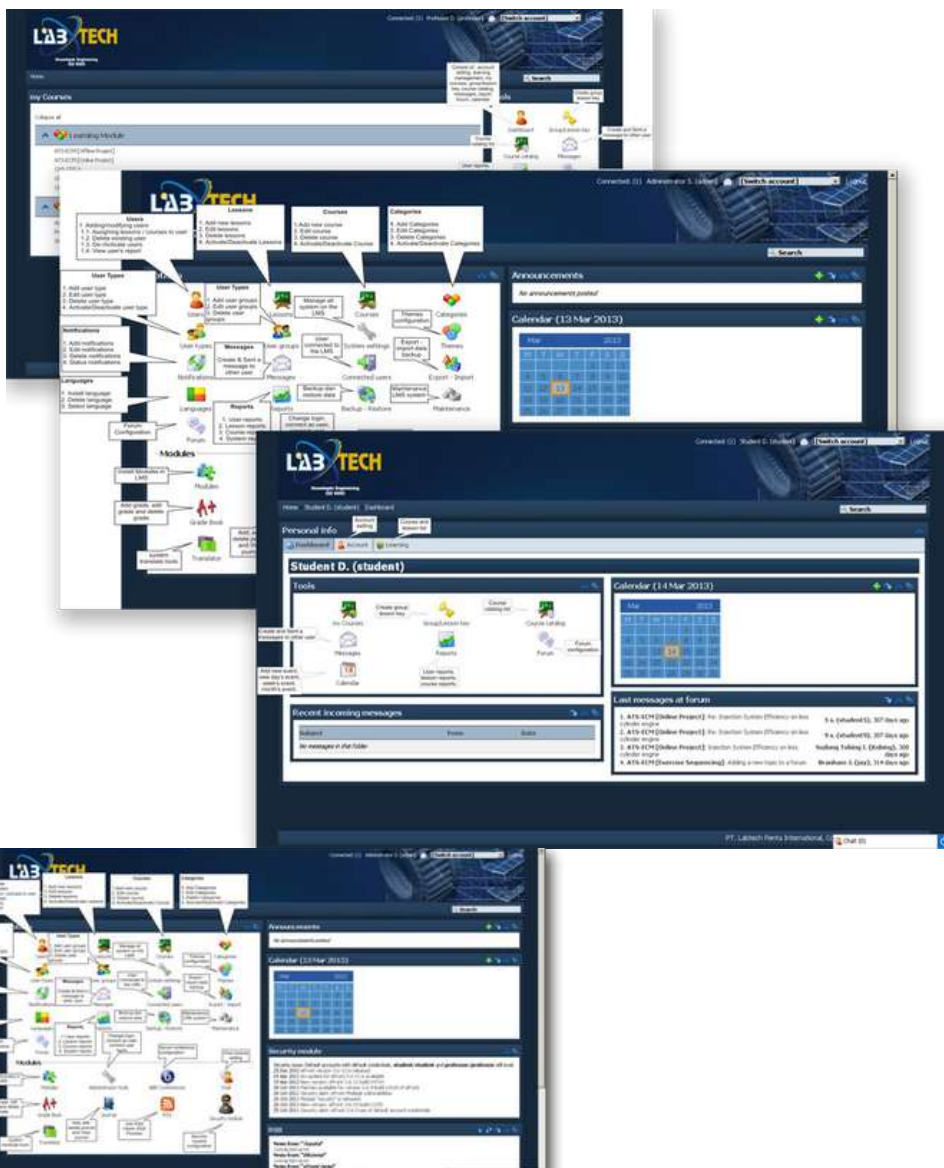
This flexibility enables institutions to create the most valuable learning opportunities possible and to maximize student capacity for independent learning.

WEB 2.0 TOOLS

1. Web 2.0 tools for communication including :

- Calendar
- RSS Feeds
- Bulletin Boards
- Blogs
- Links and more...
- Internal Email
- Wikis
- Forums
- FAQs

1. Multi-Language Support including Indonesian and Arabic.



CONTENT DEVELOPMENT

Full featured WYSIWYG content editor with optional HTML mode

- Modify Labtech content or import SCORM compliant modules
- Upload audio video, graphics or text
- Create a variety of examinations

ASSESSMENT DEVELOPMENT

- Students tests are delivered electronically, graded and recorded automatically
- Seven different test question types :
 - Multiple choice
 - Drag and Drop
 - Choose all or any
 - True/False
 - Matching
 - Short answer
 - Essay
 - (fill-in-the-blank)

CONTENT DELIVERY

- View seamless multimedia curriculum and SCORM compliant
- Lesson Sequencing can be linear or self-directed
- Project and tests can be inserted into courses at any time
- Workbooks, gradebook, journals, certificate generation and other supporting materials can be attached to courses
- Unlimited student logins
- Track students progress with linear tracking



USES of LMS :

- Compatible with Labtech computer Aided Instructional (CAI) materials for the Labtech Training Systems (Can Automate Assessments)
- Compatible with Labtech Virtual Digital Content (Can Automate Assessments)
- Compatible with scorm compliant content developed by thirdparties
- Also features content creation tools for subject matter content and assessment

System Requirements :

Delivery is through a browser based system

LAN Network System : Wired an Wireless

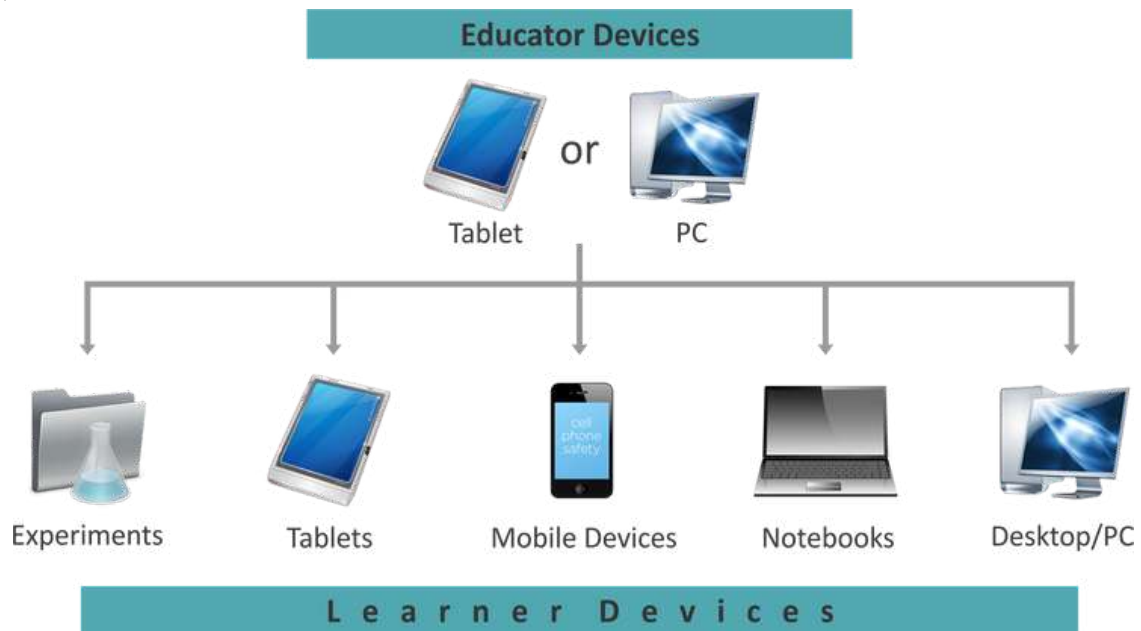
Server : Either Classroom or School

Devices : PC Laptop and Tablet

OS : Any Platform OS that features a browser (Windows, Mac, IOS, Android)

CLASSROOM 21 SOFTWARE SUITE

Labtech's Classroom21 Software Suite is the next generation of educational software that assists educators in utilizing and managing a computer multimedia lab or a 1:1 classroom. It goes beyond the traditional CMS (Classroom Management System) to become a Mobile Learning Environment (MLE), transforming traditional classrooms into educational platforms. This allows learners to develop 21st Century skills and educators to manage an ICT rich classroom without compromising the way they naturally would prefer to teach.

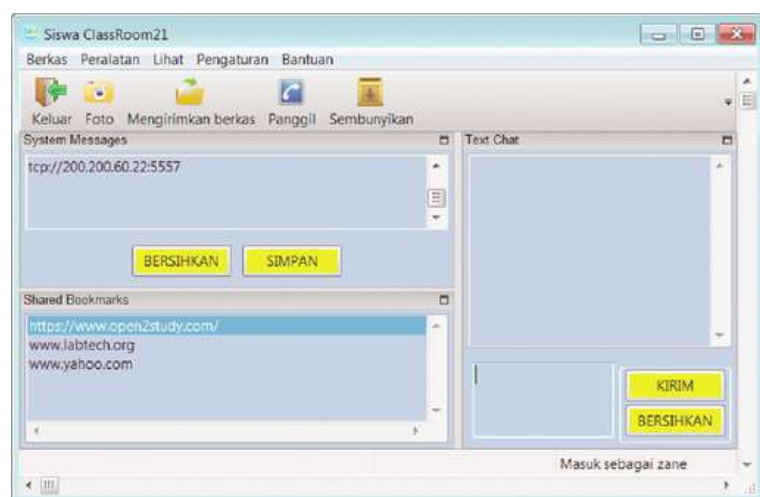


ClassRoom21 utilizes cutting edge features which allow for a broad range of learning techniques and communication methods. Educators and learners use features such as screen broadcasting and sharing, learner monitoring, file sharing, voice and text communications and many others to maximize learning effectiveness in a 21st Century classroom. ClassRoom21 Standard is the core product in the suite that provides monitoring and control functionality as well as serving as the modular foundational platform for the ClassRoom21 Share and ClassRoom21 Speak modules.



ClassRoom21 Speak builds upon the foundation of the ClassRoom21 Standard software, adding language lab functionality to an already robust CMS to ensure an affordable and modular approach to language learning.

ClassRoom21 Speak enhances classic language learning by using new technology to make teaching and assessments easier for the educator. Learners can be grouped together even if they are physically scattered across the school. Assessment becomes more accurate as the educator is better able to monitor and grade a learner's spoken progress over the duration of a course. Educators are also able to listen in and hear what different groups of learners or 1 to 1 pairings are saying, perfect for monitoring and assessing various role playing activities.



Classroom21 will run on Windows, Linux, and MacOS desktops/laptops as well as Android, IOS, and Windows Tablets.

ClassRoom21 Standard Educator Features Summary :

- An Educator is able to fully CONTROL a learner device, a group of learners devices or an entire class of devices from his/her device including Shutdown, Restart, Freeze, Lock, Screensaver, Standby and Logoff functions.
- An Educator is able to fully MONITOR a learner device, a group of learners devices or an entire class of devices from his/her device including Peak (request/receive thumbnail), Look (request/receive screenshot), Watch (continuous screen monitoring), Check (connection status), Battery (check levels) and Buzz functions.
- An Educator is able to SHARE with a learner , a group of learners or an entire class from his/her device including Text Chat, Send File, Share Emoticon, Send Screenshot, Share Desktop (continuously) and Share Bookmarks functions.
- An Educator can CUSTOMIZE size/placement of all Windows, Creation/Deletion of Learner Group windows, dragging/dropping learner into groups, foreground/ background/button Colors, Performance Tuning Options and other Preferences for file locations, system messages, languages, users, database utilities, reports and more.

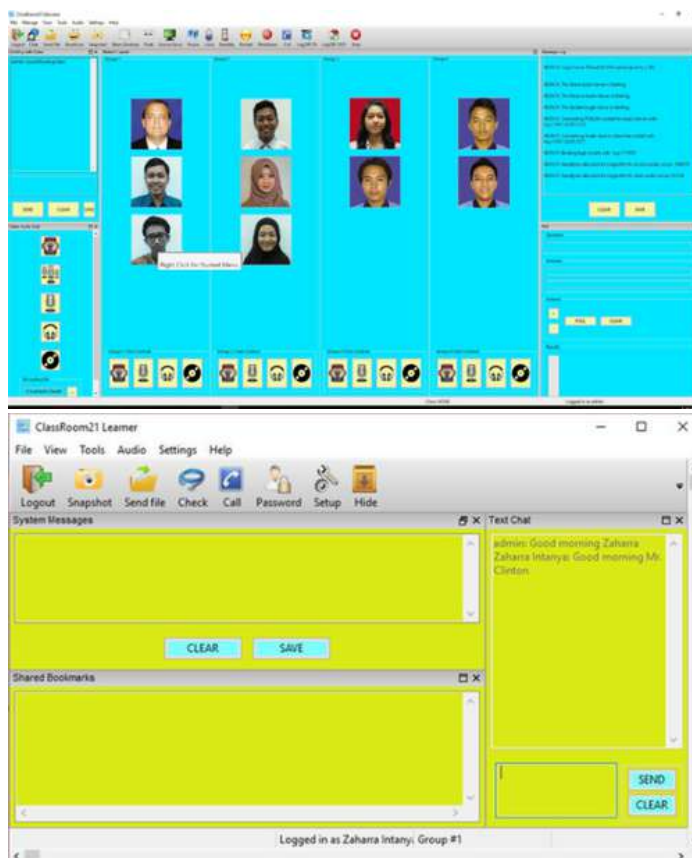
ClassRoom21 Standard Learner Features Summary :

- All Learners can COMMUNICATE by Calling, Checking (connect status) and Text Chatting with the educators device.
- All Learners can SHARE by using Send File and Send Screenshot functions to the educator device.
- All Learners can CUSTOMIZE size/placement of all Windows, foreground/background/ button Colors, Performance Tuning Options and other Preferences for file locations, system messages, languages and more.

ClassRoom21 Speak Features Summary :

For Language Learning and Collaborative Activities

- An Educator controls LANGUAGE LAB functions and can Broadcast or Audio Chat with a learner, a group of learners or an entire class and can also create Chatrooms for pairs, groups or an entire class of learners. The Educator can join chatrooms in Stealth or Non-stealth modes and can make Recordings of all broadcasts, audio chats and chatrooms for later Playback. The educator and all learners can also make audio recordings of their Own Voice and save to a file for sharing, playback and assessment later.
- An Educator can COLLABORATE with a learner, a group of learners or an entire class by sharing an Interactive Whitebord, creating a sophisticated Poll for real time learner assessment or creating a true/false or yes/no Quick Poll.
- All Learners have enhanced COLLABORATION functions including Send File, Share Desktop and private Text Chat to either a single learner, their group of learners or the entire class if enabled by the Educator.



Mobile Learning Lab

Labtech has developed Mobile Learning Labs specifically for Technical Vocational Institutions which have unique needs most e-Learning solutions aren't designed to address. The most significant of these needs is the balancing of the practical hands-on learning inherent in vocational learning with the power and efficiency of virtual learning.



Mobile Learning Labs include the following items:

- Up to 40 Charging Bays for Tablets
- Up to 40 Student Tablets Multiplatform Teacher Laptop
- Digital Projector with Mobile Projector Screen Functionality.
- Audio Headset
- Classroom Management Software
- Language Learning Software
- Classroom Server
- UPS
- Wireless Access Point
- Digital Learning Content\
- Optional VR System



Benefits of Mobile Learning Labs

- Easy to move between classes to ensure technology investment is always being used
- Charges tablets in a secure environment
- Classroom Management software to enhance teaching with mobile devices
- Can connect with digital learning content hosted in a learning management system
- Enhances 21st Century learning instructional approaches
- Digital content teaches both theory and practical experiments



TVET Learning Management System

The Labtech TVET LMS is a comprehensive Learning Platform designed to enrich TVET courses by embedding digital content and assessments into traditional teaching and learning. A full suite of content creation tools is included to enable instructors and educational designers to enhance their courses with customized digital content. Scheduling, communication, and web 2.0 tools allow many options for students and instructors to meet the diverse needs of learners in the 21st Century. Blended learning curriculum and content for Labtech's TVET equipment is also available for use with the Labtech TVET LMS.

Classroom21 (Classroom Management System)

Labtech's Classroom21 is a new generation of software that assists educators in utilizing and managing a computer multimedia lab or 1:1 classroom. Classroom21 utilizes cutting edge features which allow for a broad range of learning techniques and communication methods, while harnessing features such as screen monitoring, broadcasting, device/screen locking, file sharing, and many more to maximize learning effectiveness in a 21st Century classroom.

LABTECH VIRTUAL DIGITAL CONTENT FOR TVET BLENDED AND VIRTUAL LEARNING FOR PRACTICAL TRAINING

Labtech has two main types of Virtual e-learning content which are available for use in the classroom and workshop. Both are designed to enhance the learners learning experience and keep track of their progress and assessments. They can be used to extend the learning space into virtual learning for either the Labtech training systems or even generic subject content. In the graph below we see the brown areas are content such as the CAI and AR which interact with the lab equipment. The blue areas show the virtual program which the student uses digital devices to access the content for Virtual learning.

1. Computer Aided Instructional Modules (CAI) for Labtech Training Systems

CAI modules are available for most hands on Labtech training systems. They combine all the elements of the learner manuals into a media rich e-learning format which incorporates many color photos, illustrations, videos and simulations. The learner is led through the courseware on the training system, is given assessments of the theory then proceeds onto the experiments which detail the steps often including videos showing key procedures being performed. It also facilitates the learner to enter in his results for review by the teacher. The CAI offers a comprehensive step-by-step program to guide the learner through the use of the training system. This content is best used on our Learning Management System which enables tests to be delivered and scored and to record the learner's progress.

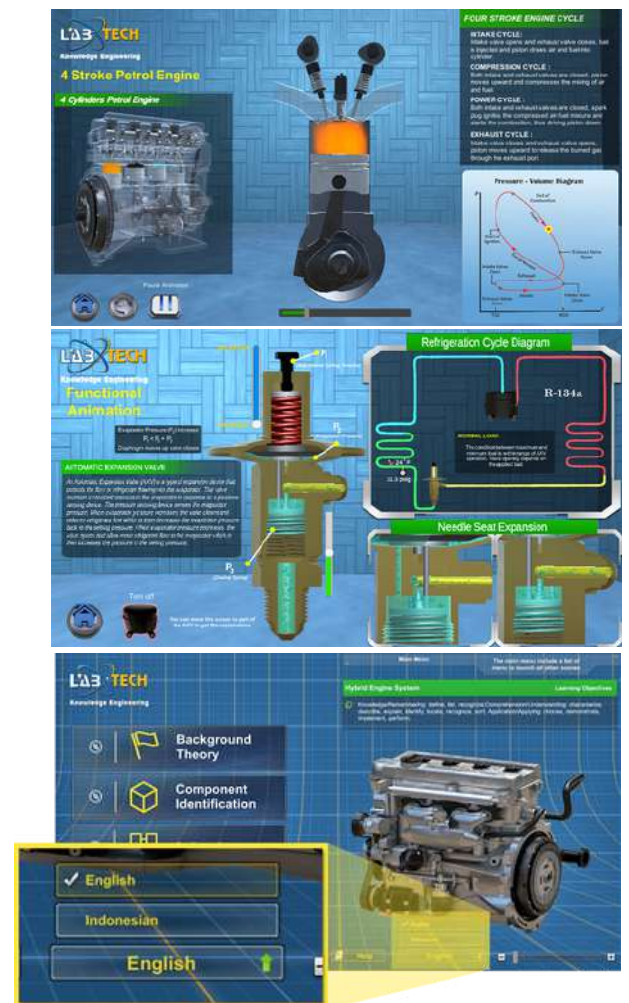
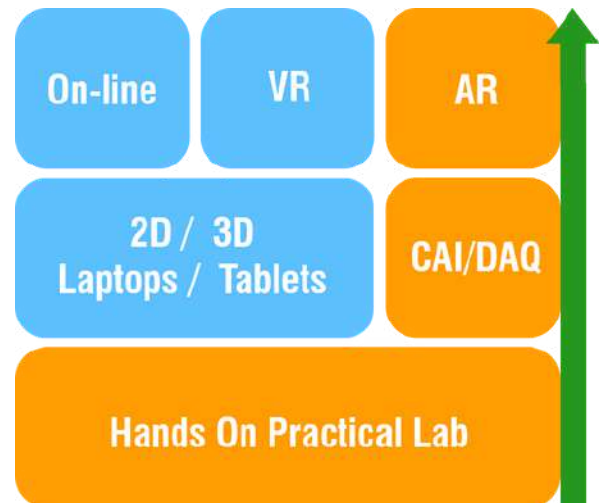
2. Virtual TVET Learning Modules (stand-alone content for technical subjects)

Labtech's digital content is designed as generic topical learning elements which are modular so as to integrate with most school or national curriculums. The Topics are benchmarked to major International standard curriculms from around the world. Each module deals with a distinct single learning topic that is common to most curriculums and provides enhanced learning materials for the learner to explore and learn about these topics. They are provided in such a way that they can be used as supplemental learning materials to enhance the learning process or they can be incorporated into the main classroom activities. The content is organized in a systematic way and is easily accessed by the teacher and the learners. Each module can be utilized according to the training schedule of the teacher so the materials are available when and where they need them.

Contents of the Virtual TVET Modules: The modules contain realistic interactive graphic animations and simulations of the topic selected for study. They also have information about the associated theory and science about the topic, construction of the component, identification exercise for constituent components, illustrations of operational processes, examples of real industry parts and videos of real systems. Assessments are included which challenge the learner to test what he has learned. The formative assessment can guide the learner to reflect further on parts of the topic which he may not have mastered. Students can work at their own pace and complete each module in about 45 to 90 minutes.

Language Features: The content comes in english but also has a feature to add a second language.

21st Century Learning Environment



DEPLOYMENT METHODS

FROM TEACHER LED TO STUDENT CENTRIC TO NATIONWIDE

1. Encrypted USB

The USB can be used by the teacher to launch the learning modules and display them to the class via a projector or a large screen. In this way the teacher can use these materials to supplement his lecture and demonstrate various principles to the class. This is aimed at Class group learning. Advantages: Can be used Immediately and is Locally Run. Easy and quick to deploy. A good low-cost entry level for schools to try out the content and see how the students engage with it.

2. Class/Lab Deployment with Mobile Trolley:

This is deployed on the Labtech Mobile Learning Trolley which comes complete and ready to operate with sturdy laptops, teacher computer, class server, wireless connectivity and class projector. Advantages: Can be used Immediately and is Locally Run. Easy and quick to deploy. A good medium cost entry level for schools to try out the content and see how the students engage with it. System is portable and can be taken and used in the workshop/labs so that it can enhance the hands-on learning.

3. School wide deployment with network server:

This is where the content is installed on a school wide server and network system. All the Content, school LMS and CMS systems can be deployed on the school server for all the subjects taught in the school. This facilitates 1:1 self-paced learning. Advantages: An effective school wide solution that will make Virtual TVET a centerpiece of school learning. Can be combined with Mobile cart approach so that students can work in the Labs and workshops with the digital content together with the hands on. Note : This requires schools to have a network system with multimedia PC learning labs.

4. Cluster School Network:

This is where the content is installed on a school wide server and network system at the Cluster School CLRS and each Satellite schools. All the Content, school LMS and CMS systems can be deployed on the school server for all the subjects taught in the school. The schools will be connected together in a group that allows for communication and monitoring of the group's activities. Advantages: This will create effective learning hubs that will allow senior schools to mentor lesser schools and make more will make more effective use of Virtual TVET. Can be combined with Mobile cart approach so that students can work in the Labs and workshops with the digital content together with the hands on. Overall saving will be considerable with this approach as only minor small equipment needs to be provided to the Satellite school thereby saving money to make a much better fully equipped labs at the Cluster School CLRS.

5. Cloud System:

A Cloud space can be set up for the school or supervising authority. All the Content, school LMS and CMS systems can be uploaded and deployed to school servers for all the subjects taught in the school. The cloud will update all the local school server content. Data and results of LMS and digital learning performance will be collected for monitoring. It can also allow students to access the system to do off campus after hours learning as this feature is made available for learning anywhere anytime. Advantages: It will use cloud connectivity to receive school performance data and send content updates. It solves the problem of managing updates across large school networks. Data can be monitored to see the effectiveness of the programs at all levels. This will greatly facilitate an integrated and nationally monitored Virtual TVET program that can enhance the performance of all schools.



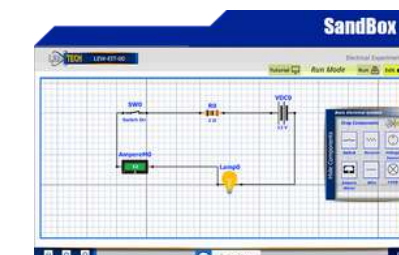
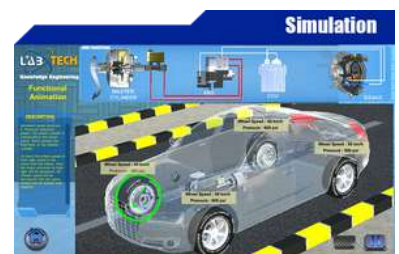
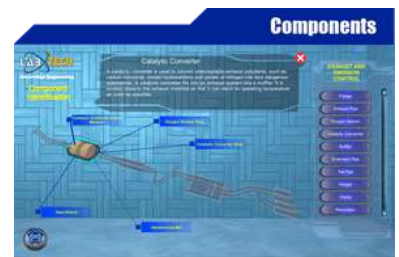
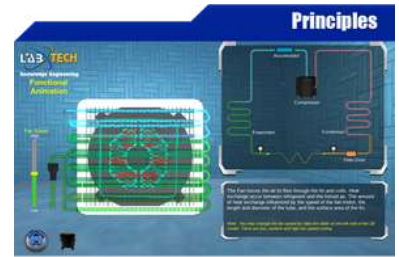
LABTECH VIRTUAL TVET® LEARNING METHODS

Flexible Interactive Virtual Learning Modules can match any Curriculum

Labtech's Virtual Digital Content is designed to be complete stand-alone instructional modules that facilitate individual learning in topics that are typically included most Technical/Vocational curriculums or STEM Programs. Each Topic module deals with a distinct and single element of the curriculum and provides enhanced educational materials for the student to explore and learn about these topics. They are provided in such a way that they can be used as supplemental materials to enhance the learning process or they can be incorporated into the main classroom activities.

Methods of Presentation for Virtual TVET Topic Modules: Labtech has created several special learning categories, each of which facilitates a certain type of learning method which matches with the varying nature of the different topics. Each topic is designated to use one of these methods and features a variety of matching Learning Elements which are selected to deliver and enhance the topic. The framework for the methods is shown below:

1. **Principles and Theory:** This method is used for topics about theoretical or technical principles that may be difficult for the student to understand as they are often not visible in real applications or systems. By experiencing an interactive animation of these principles such as electron theory, catalytic conversion, fluid dynamics and others the student is better able to grasp these principles which underpin the basic technical systems in the world around us. A solid understand of the underlying principles of technology and their relationships is key to developing a good technician. These are great foundational modules and very suitable for STEM as well. **Class/Lab Deployment with Mobile Trolley:**
2. **Technical Components:** This method is designed to present information on industrial or technological components which are used in various applications or systems. Examples of this would be an alternator, starter motor, fuel pump, circuit breaker, electrical motor, valve etc. The student will learn about the construction of the component, its constituent parts, their name, function, assembly sequence, disassembly sequence, general purpose and operational characteristics. These modules are good foundational topics and many are suitable for STEM as well.
3. **Functioning Systems:** These are complete operating systems that often are made up of the individual technical components that fit together to form larger functioning systems. Examples would be power steering systems, braking systems, engine fuel systems, Air Conditioning systems, charging systems, controls systems, etc. These would be operational systems in which the student can explore the system function, performance characteristics and inter-relationship of the components during operation. In many modules, there are variables which the student can control which will show the system operation under various conditions. Some of these modules are also suitable for STEM.
4. **Training System Simulation:** This is a full simulation of our physical training systems in which we have re-created in a virtual environment the function of our traditional Labtech hands on trainers. In these modules, the student will be able to explore the construction of the system and its component parts. He will be able to run and operate the system and perform many of the experiments as if he was using the real system. Also, in a number of cases trouble shooting and fault insertion are included. Some of the hands-on work cannot be effectively included but the student is able to go through a large part of the learning program virtually. These modules are very useful for pre-lab work and for shortening the amount of time needed on the physical trainer.
5. **Activity or Task:** For this method the student is guided through a task or activity that simulates a real task in the laboratory or workshop. The learner would experience this in a virtual way as a Pre-Lab preparation exercise. The objective would be to deliver preparational knowledge and information about the activity so that when he goes into the lab/ workshop that he is well prepared to perform the real activity or task in a quick and safe manner.
6. **Engineering Sandbox:** These are applications that provide an open sandbox environment for students to model and create their own circuits and systems. This is a nice complement to any training program whereby the student can creatively use his newly acquired knowledge to build and construct new operational systems. We have various programs available for this for electrical, motor controls,electronics, HVAC controls, auto circuits, etc.

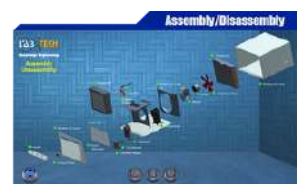
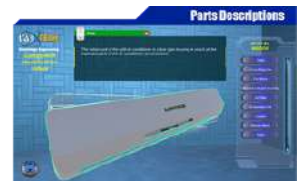


INTERACTIVE LEARNING ELEMENTS EMBEDDED INTO TOPICAL MODULES:

Labtech has been pioneering the Development of new and novel learning elements for our Virtual TVET program. These address major types of learning styles and activities that teachers would ideally like to incorporate into the class or lab. Often these new approaches can do things that would be otherwise difficult for the teacher to do without the aid of virtual materials. Below are listed some of our learning elements which can be used strategically throughout our Module types (as previously described) to enhance the learning of each topic. Our goal is to develop Competency Based learning where students can take their time to learn deeply about the topic and to review the material with our formative assessments.

Triangulation of Learning: The Learning Elements are synchronized during specific activities in order to triangulate the learning process. We do this by reviewing and covering key topics in various ways so that if a student does not understand the information the first time then it is presented in a different (tangential) way which can often aid in understanding.

- 1. Interactive Technical Animations:** This is a full color interactive animation of the topic done in great detail which shows the learner the main operational characteristics of the technology being studied. The animations include interactive variable operational elements that can be controlled by the student (or teacher) to show how functional relationships change according to these variables. For example, on a four-stroke engine module, the speed of the engine can be changed.
- 2. Description of Parts in 3D:** This provides information on the parts that make up the unit under study. For example, the starter motor would have all the parts displayed in 3D format, labeled and explained with narrative text. This can be used for component identification exercises. In many cases, an interactive learning animation with the selected parts being highlighted and can be rotated or enlarged for closer inspection.
- 3. Component Assembly and Disassembly:** Some of the modules feature an animation of the main component under study which shows disassembly and reassembly. This animation shows this process in the correct sequence so that the learners may become familiar with the general approach to this task and therefore it assists to prepare them for the practical hands on work to follow in the lab or workshop. This saves a lot of time for the teacher by providing this detailed explanation and allows the student to individually practice until they master the sequence.
- 4. Illustrated Glossary:** A glossary is provided that describes each of the parts. The description is accompanied by a photo or illustration of the part itself.
- 5. Background learning materials:** Information on the process, component or part being studied is provided to aid in the student understanding of the use, operation and function of the unit under study.
- 6. "Transitional learning" for Industry:** This is a special feature that is included in some of the modules where the animation part is shown and compared to a real part as used by industry. This helps learners to transition from theory to practical so that they become familiar with what the real parts look like as they encounter them on the job.
- 7. Instructional or Demonstration Video (2D or 3D):** In some cases videos are also provided which show the part or process in action in a real situation. This also enhances the learners understanding of the real process at hand. Often these videos are taken on Labtech training systems from our Labs and workshops. We are now working on developing 360 degree 3D videos which can transport the student into the workplace. This can be viewed with the Virtual Reality headsets.



Formative Assessments: Our assessments are designed as formative learning experiences. These challenge the student's knowledge and understanding and lead him to discover what he may have missed. The assessments have several features to assist the student if they do not understand the material. These can be in the form of reflection, referring back to the theory or background materials, video or hints We have several different kinds of assessments:

- Multiple Choice: Our questions are designed to get the student thinking about operational and performance relationships to develop his understanding about cause and effect in the system under study.
- Component Part Identification: This tests the student's knowledge of the parts of the system under study. This is done in a game format matching the terminology with the picture of each item.
- Parts Location: This tests the learners understanding of where the parts are located. It is a useful pre-exercise for the assembly assessment.
- Components Assembly Exercise: The student is presented with all the parts of the component or system and must assemble them in the correct sequence and drop them into their appropriate position.

Features Courses on Labtech Academy

The screenshot displays the Labtech Academy course interface. On the left is a sidebar menu with the following items: Engine Fundamentals, Participants, Competencies, Grades, General, VTD-AUT-01-01 Engine Fundamentals, VTD-AUT-01-02 4 Stroke Petrol Engine, Combustion Cycle, VTD-AUT-01-03 2 Stroke Petrol Engine, Combustion Cycle, VTD-AUT-01-04 4 Stroke Diesel Engine, Combustion Cycle, VTD-AUT-01-05 2 Stroke Diesel Engine, Combustion Cycle, VTD-AUT-01-06 Engine Cooling System, VTD-AUT-01-07 Engine Lubrication System, VTD-AUT-01-08 Valve Trains, Course Exam and Completion Certificate, Home, and Dashboard.

The main content area is titled "GENERAL" and contains the following text:

LABTECH ACADEMY IS MOBILE FRIENDLY AND SUPPORTED ON ANY MODERN WEB BROWSER. FOR BEST PERFORMANCE WITH LANGUAGE TRANSLATION FUNCTIONALITY WE RECOMMEND GOOGLE CHROME ON A DESKTOP, LAPTOP OR TABLET.

FOR THE BEST LEARNING EXPERIENCE PLEASE FOLLOW THE STEPS AS INDICATED AFTER SELECTING YOUR TOPIC OF INTEREST.

Below the text is an "Announcements" section featuring a grid of course thumbnails:

- VTD-AUT-01-01 Engine Fundamentals
- VTD-AUT-01-02 4 Stroke Petrol Engine, Combustion Cycle
- VTD-AUT-01-03 2 Stroke Petrol Engine, Combustion Cycle
- VTD-AUT-01-04 4 Stroke Diesel Engine, Combustion Cycle
- VTD-AUT-01-05 2 Stroke Diesel Engine, Combustion Cycle
- VTD-AUT-01-06 Engine Cooling System
- VTD-AUT-01-07 Engine Lubrication System
- VTD-AUT-01-08 Valve Trains
- Course Exam and Completion Certificate

Features Participants on Labtech Academy

The screenshot shows the Labtech Academy participants interface for the "BASIC ENGINE FUNDAMENTALS" course. The breadcrumb trail is: Home > My courses > Engine Fundamentals > Participants.

The main section is titled "PARTICIPANTS" and includes a search filter for "Labtech Staff". Below the filter, it states "4 participants found".

The participants list is as follows:

First name / Surname	Email address	Roles	Groups	Last access to course
Arnaud Delvaux	arnaud@labtech.org	teacher non editing	Labtech Staff	1 day 10 hours
Mona Rai Situmorang	monarai@labtech.org	teacher non editing	Labtech Staff	7 secs
Mr. Shahrir Shafiek	shahrir@labtech.org	teacher non editing	Labtech Staff	Never
Shafiek Sultan	shafiek@labtech.org	teacher non editing	Labtech Staff	10 days 22 hours

Below the table, there is a "With selected users..." dropdown menu.

On the right side of the interface, there are three panels:

1. "SEARCH FORUMS" with a search input field and an "Advanced search" link.

2. "LATEST ANNOUNCEMENTS" with a message: "Add a new topic... (No announcements have been posted yet.)"

3. "UPCOMING EVENTS" with a message: "There are no upcoming events. Go to calendar..."

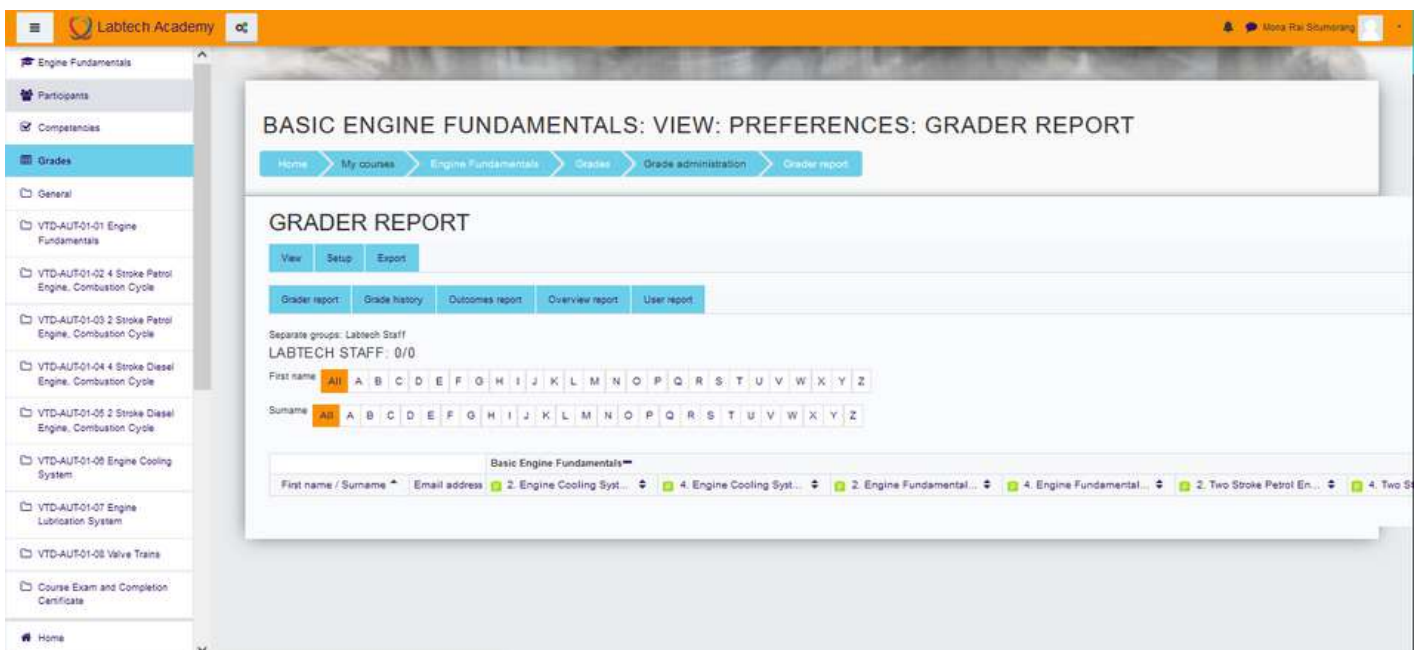
4. "RECENT ACTIVITY" with a message: "Activity since Friday, 6 July 2022, 3:37 PM. Full report of recent activity... No recent activity"

Features Plan Activities on Labtech Academy

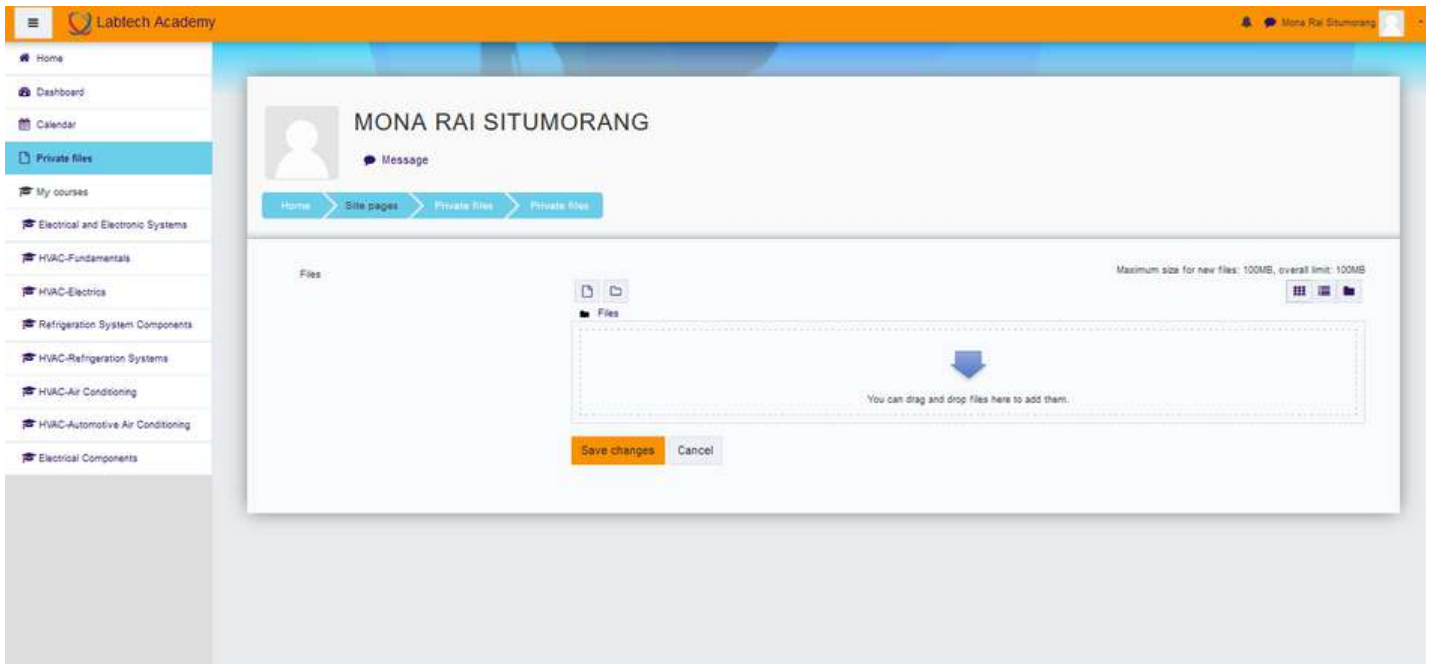


Features Grades on Labtech Academy

For export their grades into an Excel spreadsheet to ease the review/evaluation



Features Private Files on Labtech Academy To save a file that can only be viewed by yourself





Labtech Training Systems are used in over 75 countries world wide and indicated in blue on this map.
We also have 6 regional operational locations marked with a flag .

Labtech Product Areas :

- Air Conditioning and Refrigeration Technology
- Automotive and Transportation Technology
- Biomedical Technology
- Computer & Networks Technology
- Digital TVET Content for Virtual Learning
- Electrical Technology
- Electronics Technology
- Learning Management Systems / Classroom21 CMS
- Renewable Energy and Green Tech
- TVET Learning Management System

Labtech has obtained major Quality Certifications from TÜV Rheinland, Germany:
ISO 9001:2015 Quality Management System



Management System
ISO 9001:2015



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9001 Certification Categories: Research, Assessment, Design and Development of Educational Training Systems, Programs and Products. Manufacturing of Educational Training Systems and Products to International Standards which includes the processes of: Production, Manufacturing Resource Planning (MRP), Quality Control and Assurance (QC/QA), International Sales & Marketing, Project Implementation and Consulting Services, Training Programs and Customer Services.

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