Virtual Auto Expert

V1.1.1

User and Customer Support Guide

Table of Contents

1. Introduction

1.1. Objective

This manual provides installation and operating instructions for users of Virtual Auto Expert V1.1.1.

1.2. Background

1. The software is named Virtual Auto Expert. The current version is 1.1.1.
2. The software is released by Shenzhen GTA Education Tech Ltd. and developed by its 3D Production Development Center. The software is to be used on zSpace devices.
3. The software comprises of a foreground display system and a background courseware system. The foreground display system includes the structural display and principle teaching of modules including for the engine, transmission, drivetrain system, wheel and axle, suspension system, steering system, and brake system and body-related electrical apparatuses. The background course builder enables users to compile courseware to meet their needs.
4. The software application provides online registration. Users can activate the application with the provided activation key to enter the software operation interface. When activating the application, a network connection is required to verify the key. The software must be operated on zSpace devices.
5. The software application can also use **zView** to enhance the teaching and learning process.

2. Purpose

2.1. Function and Features

Compiled according to courses from mainland China, the software includes the following modules in the current version.

Type	Name	Description	Notes
Structure and Maintenance of an Automotive Engine	General Introduction to Engine	● Operational principle of 4-stroke engine and 4-stroke gasoline engine ● Technical terms of engine (top dead center, bottom dead center, piston stroke, cylinder volume, and compression ratio)	

	Crank and Connecting Rod Mechanism	● Load condition of crank and connecting rod mechanism (gas force and reciprocating inertial force) ● Multi-cylinder engines (in-line, v shape, and horizontally-opposed) ● Types of cylinder liners (wet and dry) ● Shapes of combustion chambers of engines (wedge, basin-shaped, and hemispherical) ● Oil sump structure ● Types of piston rings (compression ring and oil-control ring) ● Cylinder block structures (general, gantry, and tunnel) and related advantages and disadvantages ● Piston connecting rod set structure ● Piston skirt deformation and thermal expansion ● Principles of crankshaft/flywheel set structure and related mechanical analysis	
	Valve Mechanisms	● Principles and parameters of valve mechanism ● Valve mechanism parts and composition ● Camshaft arrangement (overhead, middle, and bottom) and related advantages and disadvantages ● Camshaft drive arrangement (belt drive, chain drive, and gear drive) ● Valve clearance ● Valve timing diagram ● Variable valve timing (Toyoda, Honda, BMW, and Audi)	
	Engine Supercharging System	● Mechanical supercharging system and turbocharging system	
	Cooling System	● Types of engine cooling system (natural air cooling, forced cooling, and water cooling) ● Composition of cooling system ● Structure and types of radiators (cross-flow and down-flow) ● Structure and operational principle of cooling fan, thermostat, water pump, and cooling control system	

		● Coolant temperature sensor	
	Lubrication System	● Internal lubrication mode of engine (pressure lubrication, splash lubrication, grease lubrication, and mixed lubrication of fuel oil and lubricating oil) ● Composition of lubrication system ● Structure and operational principle of lubricating oil pump, oil filter, and oil pump strainer	
	Ignition System	● Composition of ignition system ● Structure and operational principle of spark plug, power supply ● Operational principle of ignition system and generator	
	Engine Start System	● Structure and operational principle of the engine start system and starter	
Structure and Maintenance of Automotive Chassis	Clutch	● Structure and operational principle of clutch ● Structure and operational process of torsional vibration damper ● Service condition of mechanical clutch operating device	
	Transmission	● Composition of transmission ● Types of transmission structures (hydraulic, two-shaft, and countershaft) ● Structure and service condition of synchronizer, transmission control device (self-locking and interlocking), transfer case ● Structure and operational principle of the hydraulic automatic transmission (fluid torque converter, multidisc clutch, and planetary gear set) ● Structure and operational principle of continuously variable transmission	
	Automotive Drivetrain System	● Brief introduction to automotive drivetrain system ● Types of universal joint (non-constant-velocity joint, quasi-constant velocity joint, and constant-velocity joint), drive shaft	

		● Structure and principle of drive axle structure (non-disconnect drive axle and disconnect drive axle) ● Structure and operational principle of final drive, gear drive ● Structure and operational principle of differential ● Structure of half shaft.	
	Wheel and Axle	● Steering axle, wheel alignment parameter (kingpin caster, kingpin inclination ● Front wheel camber and toe-in) ● Wheel structure ● Tire types (bias tire, radial Tire, tubed Tire, and vacuum Tire) ● Tire wear	
	Suspension	● Suspension structure (independent suspension and non-independent suspension) ● Shock absorber types (mono-tube shock absorber and twin-tube shock absorber) ● Elastic element types (leaf spring, coil spring, torsion bar spring, air spring, and rubber spring)	
	Automotive Steering system	● Steering system (manual steering gear and power steering system) ● Ideal relationship between steering wheels on both sides ● Steering gear types (rack and pinion steering, recirculating ball steering, worm gear steering, and worm and peg steering) ● Steering control mechanism ● Steering linkage mechanism	
	Automotive Brake System	● Brake System composition ● Brake types (Drum Brake and Disc Brake) ● Structure and principle of wheel speed sensor	
Structure and Maintenance of Automotive Electrical Apparatus	Air Conditioning System	● Composition of air conditioning system, air distribution box, and air compressor	
	Air Compressor	● Structure and principle of air compressor	
	Airbag	● Operational principle of airbag	

	Windscreen Wiper	● Composition and operational principle of windscreen wiper	

3. Runtime Environment

3.1. Hardware Environment

CPU	Intel Processor 500GB Hard Disk 8GB RAM
Graphics Card	AMD FirePro W5170M
Resolution	1080p
Display Size	20.5’ H * 11.5’ V, 23.6’ D (52.07 cm * 29.21 cm * 59.94cm)
Rise Time / Fall Time	Tr: 1.3 ms Tf: 4.3 ms
Power Requirement	19 V, 200 W Power Adapter
Hardware Device	Power Adapter Stylus Pen Polarized Glasses (3D and 2D) Mouse Keyboard
Space Requirement	Height: 9-15’ (24-39cm) Width: 25’ (64cm) Depth: 10-20’ (27-52cm)
Environment Requirement	Temperature: 10-35°C Humidity: 10-80%NC
Cables	USB 2.0-3 Ports USB 3.0-2 Ports Audio Input / Output Port HDMI Port Supporting Ethernet Connection Operation Pen Port DC Power (19V)

3.2. Software Environment

Operating System – Windows 10 (64-bit)

4. Operating Instructions

4.1. Installation and Initialization

Double click the software installation setup package to enter the installation interface as shown below. Select ‘Next’ to install or ‘Cancel’ to terminate the installation. Users can continue the installation process by following the instructions.

4.2. Software Registration

Double click the application shortcut icon on Windows Desktop to launch the application and enter the registration interface. Retrieve the product key from the product management center. Enter the product key and click‘Activate License’ to start using the software. The license activation requires a network connection to verify the key. The registration interface is shown below.

4.3. 3D Resources

Enter the initial interface as shown below after the registration. The current interface displays the 3D resource list. Users can operate the corresponding options in the system by clicking the left mouse button or pressing the middle button of the stylus according to their operating habits.

Click on the  button to enter the “Settings” interface shown below. Users can adjust pupillary distance and find their license and version information. In the license management section, users can stop using the existing license. By selecting 

, the following confirmation message appears. Select ‘Yes’ to deactivate the license, or ‘No’ to

continue using the license. Deactivating the license requires a network connection to recycle and reuse the license key.

Click on the  button to start **zView** display interface. This requires connecting the **zView** camera first.

Click on the  button to exit the current application.

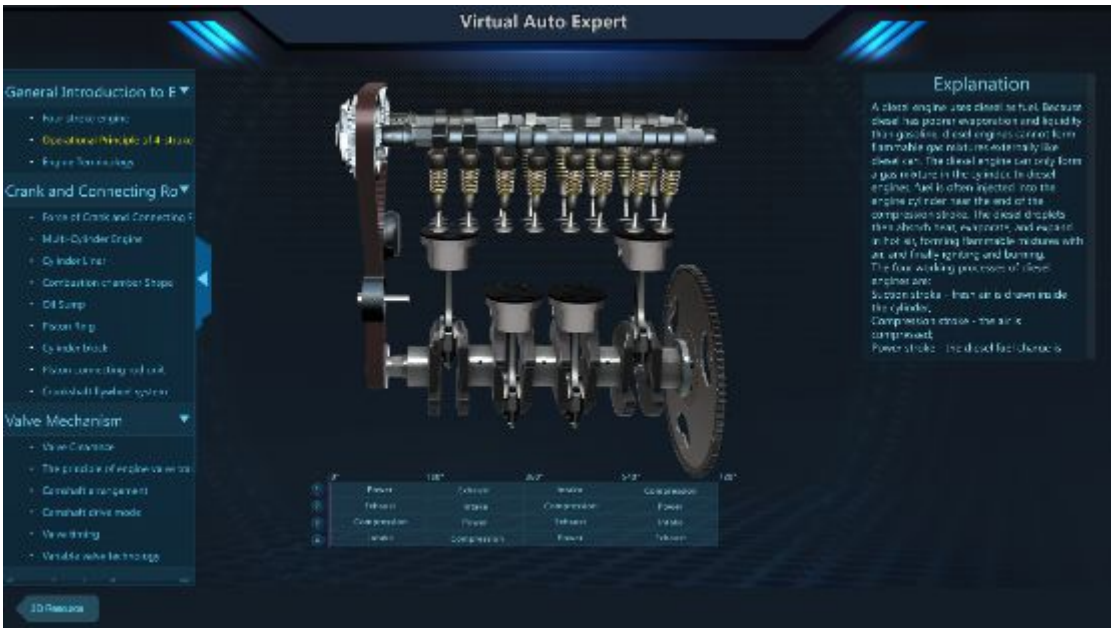
Select 

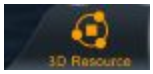
, 

or 

to enter the corresponding interface.

Select the corresponding automotive assembly option and enter the resource display interface as shown below. The operating tool is limited to the stylus in this functional interface.



Press and hold the middle button of the stylus to drag and rotate 3D models. Press and hold the right button of the stylus and drag 3D models in and out of the screen to resize. Select 

to return to the previous menu and select other functional buttons to utilize their corresponding functions.

4.4. Customized Courses (Featured Courses)

Select 

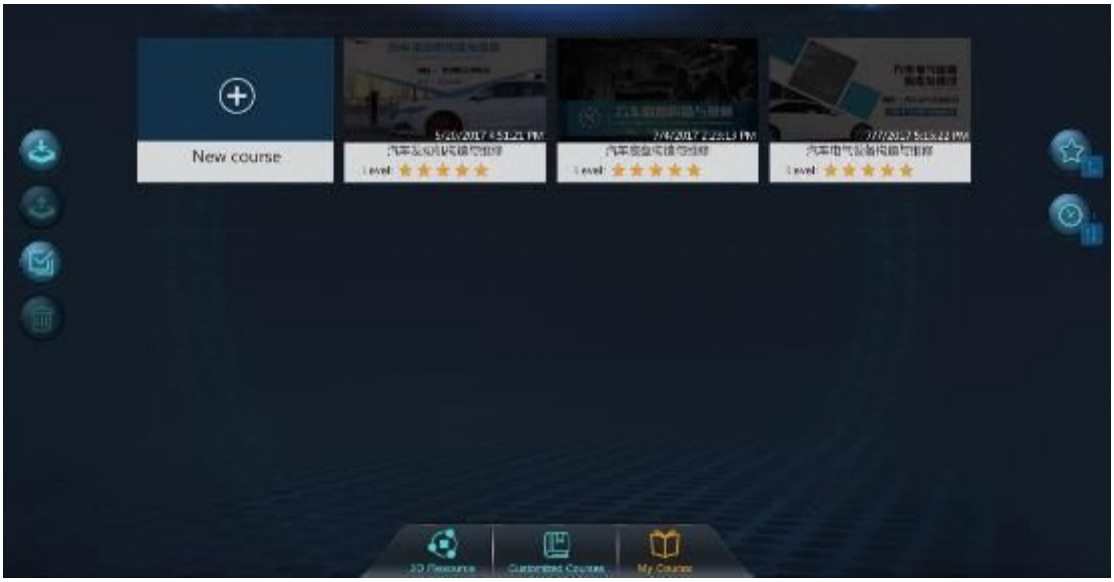
to enter the course interface, where users can import important resources. As Shenzhen GTA Education Tech Ltd. provides for customized course development, users can select a course resource package conforming to their specific teaching requirements.

Click on the  button to import VR courseware (courseware is limited to edited courseware on the Virtual Auto Expert). Click on the  button to select all courseware in the current interface. After selecting the corresponding courseware, click on the  button to delete the corresponding courseware and click on the  button to arrange courseware according to grade level. Click on the  button to arrange courseware in terms of time.

4.5. My Course

Select 

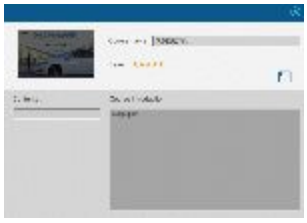
to enter the My Course interface. Users can find previously edited courseware and/or edit all courseware.



Click on the  button to select the courseware. Click on the  button to export the courseware. Other options have been introduced in the My Course interface, so they will not be elaborated on here.

Select the corresponding course within the interface or select ‘New Course’ to enter the course editing interface as shown below. Users can edit course information.

Click on the button to enter the course information-editing interface as shown below.



All information can be edited. After editing, click on the button to save the edited information.

Select to enter the “New Chapter” interface as shown below.

Here, course catalogs can be added.

Select Edit to enter the Contents interface  in which course chapters can be edited. Select the corresponding catalog name to enter the course-editing interface as shown below.

Select 

to return to the previous interface. Select 

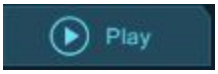
to import edited PowerPoint images. The image name must be a number, so that the system can place the images automatically in order.

Select 

to insert 3D resources. Users can select the resources they want. After inserting, resources can be moved and/or zoomed in or out in the PPT editing interface.

Select 

to insert pictures, flash, and videos from the local computer.

Click on the 

button to play the currently edited courseware. Select 

to store the courseware.

5. Application Notes

1. After the software is registered, a TXT file will be generated on the desktop, which contains the password for deleting Customized Courses. The administrator should keep this file securely.

2. Use **Ctrl+X** to start **zView** to enhance the teaching and learning process.
3. The stylus can be used to play Customized Courses, instead of opening.
4. The stylus can be used to play My Courses, instead of opening and editing.
5. Press the **R** key to reset.