JIANGXI KMAX INDUSTRIAL CO., LTD.

VR Software for Practical Training on Maintenance of Construction Machinery Chassis System

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PRODUCT INTRODUCTION

Content

1. Product Overview

VR Software for Practical Training on Maintenance of Construction Machinery Chassis System is a practical teaching product designed and developed for secondary vocational, higher vocational, and application-oriented undergraduate colleges to assist in the teaching of engineering machinery. This software adopts the most advanced VR virtual simulation technology to simulate the disassembly and assembly of the loader chassis system and related principle teaching. It is developed through real data collection and university research, and guided by well-known domestic experts. Students can learn the structural principles of the loader chassis system, wet axle, dry axle, and manual transmission disassembly and assembly training through virtual scenes. The 3D materials in the software are modeled 1:1 according to real objects, which can clearly display the relevant structures of the loader chassis system in front of students. The software perfectly combines theoretical and practical teaching, not only enhancing students' interest in learning, but also reducing the cost of practical training consumables in schools.

2. Target Audience

The target users of this software are teachers and students in the construction machinery-related majors of community colleges, technical colleges and universities.

3. Compatible Devices

KMAX desktop VR All-In-One machine or PC.

4. Product Value

This VR teaching and training software effectively addresses the following pain points in the educational process of colleges and universities:

- **Comprehensive Teaching and Training:** The software not only covers theoretical knowledge points found in professional materials but also includes practical training Works related to the disassembly and assembly of wet-drive axles, dry axles, and manual transmissions. This helps make the training phase of teaching more efficient.
- **Standardized and Professional Training:** It strictly follows standardized operating procedures and the repair manual processes provided by manufacturers, ensuring the professionalism and standardization of teaching and training.
- **Highly Realistic 3D Modeling:** The model resources are based on the structure of a loader and are precisely modeled at a 1:1 scale according to the dimensions of each component, providing a highly realistic representation.
- **Enhanced Learning Assessment:** In traditional teaching, it is difficult for teachers to accurately collect the information of students knowledge acquisition. Practical training with real vehicles is often limited to fixed training points and specific vehicles.

The VR training software overcomes these limitations, allowing for more flexible and

comprehensive assessment of students' learning progress.

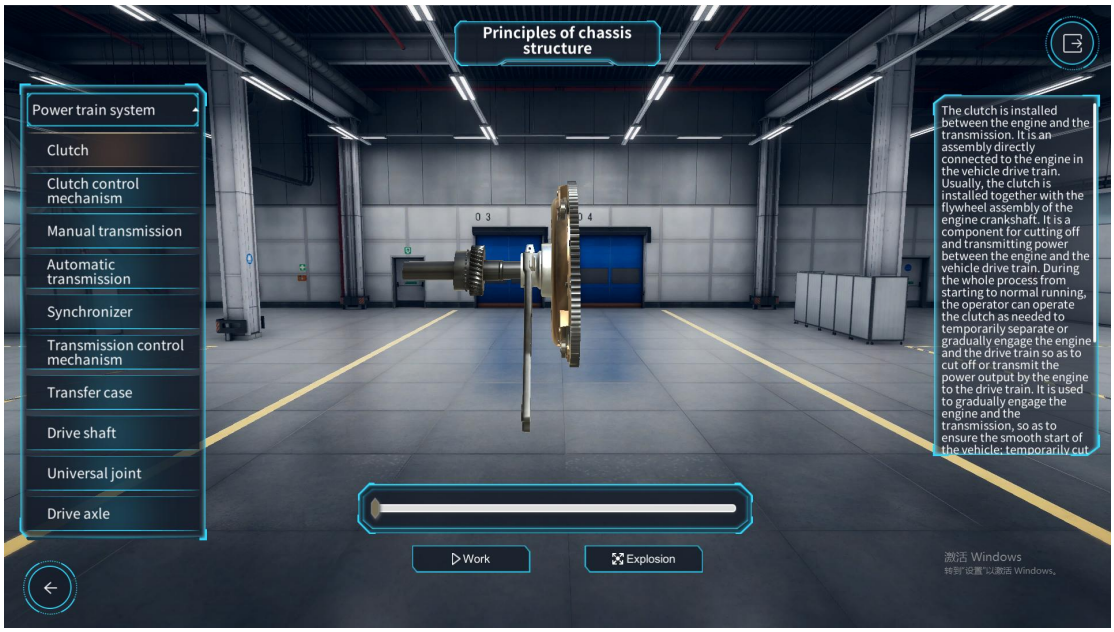
5. Content List

Module	Mode	Specific Content	Presentation Form
Structural Principles	Cognitive Learning	Clutch, Clutch Control Mechanism, Automatic Transmission, Manual Transmission, Synchronizer, Transmission Control Mechanism, Transfer Case, Propeller Shaft, Universal Joint, Drive Axle, Differential	Text Description, Model Display, Principle Animation
Disassembly Training	Practical Training	Disassembly of Wet Axle, Disassembly of Dry Axle, Disassembly of Manual Transmission	Interactive Practical, Training Exercises
Assembly Training		Assembly of Wet Axle, Assembly of Dry Axle, Assembly of Manual Transmission	
Fault Diagnosis		Loader transmission missing gears, loader drive axle noise,insufficient braking force of loader, no power output from the entire loader machine, heavy steering of the entire loader machine.	

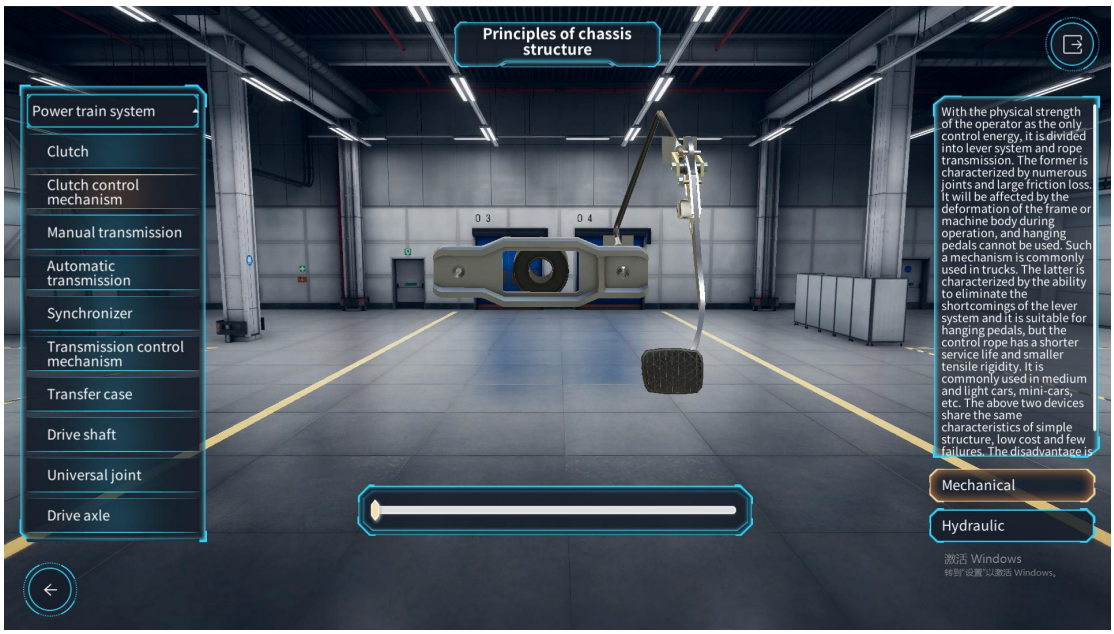
6. Functionality Introduction

6.1. Structural Principles

On the principles of chassis structure, the left side shows the module classification of the chassis system. Click on the first level menu and scroll down to expand the second level menu. Click the "Back" button in the bottom left corner to return to the homepage. The text description of the displayed model will be displayed in the prompt box on the right. Click the "Work" button on the page to play the corresponding principle animation of the model.

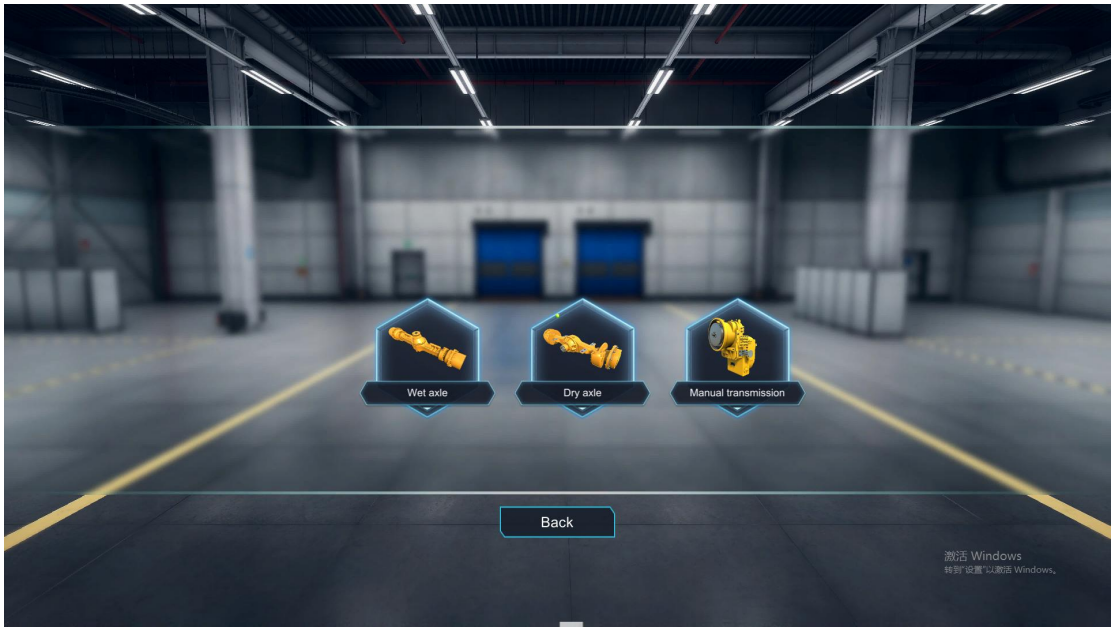


Clicking on the left menu bar allows users to switch between the structural principle displays of different components. Holding the middle button of the stylus enables users to drag the slider at the bottom of the scene, thereby playing the interactive animation between the model and the UI.



6.2. Disassembly and Assembly Training

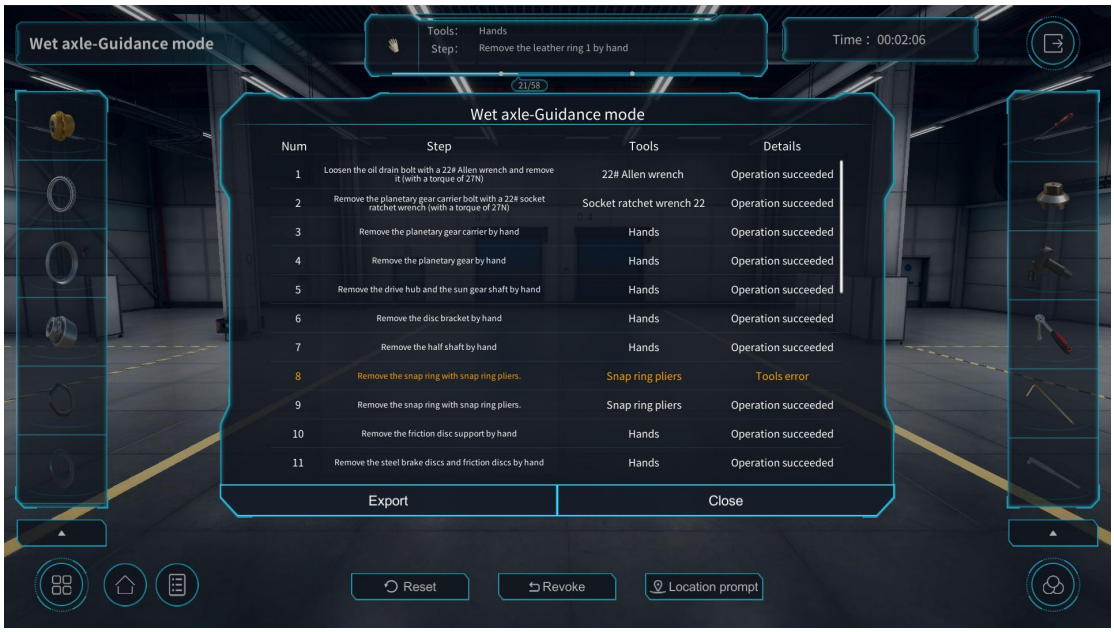
After clicking on "Practical Training on Removal" users will enter the transition interface for disassembly training, where users can select disassembly tasks. Clicking the “Back” button will take users back to the homepage.



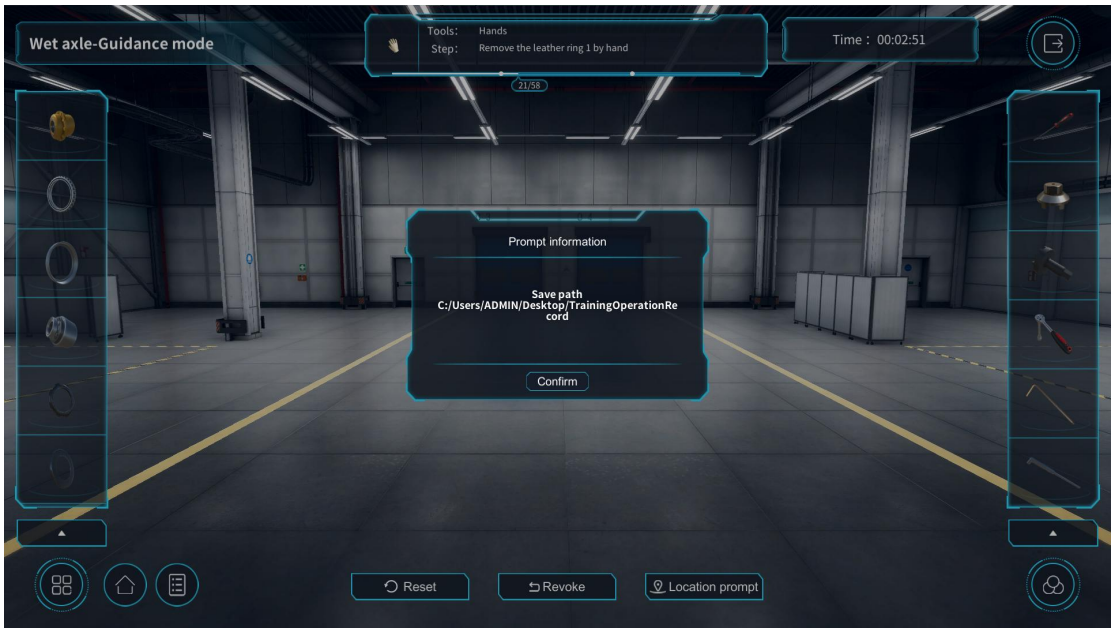
6.2.1. Wet Axle-Guidance Mode

After entering the disassembly training scene, the top of the page displays textual prompts for Workable steps and the step count. The bottom of the page features buttons labeled "Reset""Revoke" and "Location Prompt. "Clicking "Reset" Backs the model to its initial state; clicking "Revoke" reverts the disassembly process to the previous step; and clicking "Location Prompt" highlights the tools, parts, and Work points required for that step within the scene. The bottom left corner expands to reveal "Back" and "Record" buttons. The left side of the page is the parts bar, where users can click to select specific parts. The right side is the tools bar, where users can click to select the tools needed for disassembly and assembly. Clicking the semi-circular arrow buttons on either side controls the expansion and retraction of the parts and tools bars. Clicking the circular button on the progress bar allows users to jump to different steps.

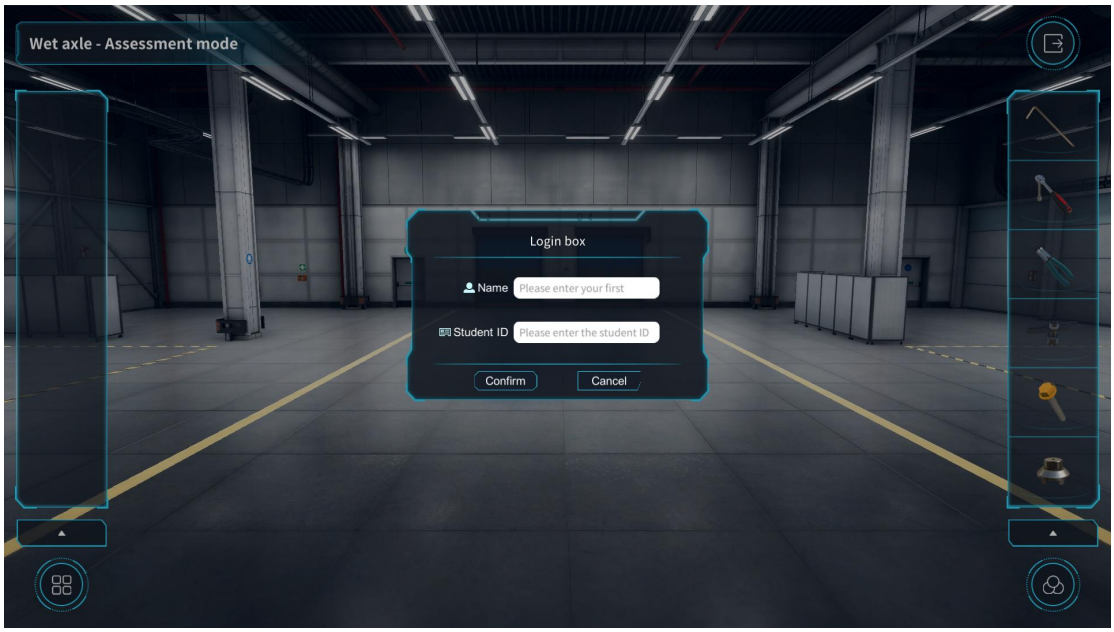
The bottom left corner expands to reveal “Back” and “Record” buttons.Clicking “Back” takes users back to the disassembly transition page. Clicking the “Record” button brings up the Work records for the current task.



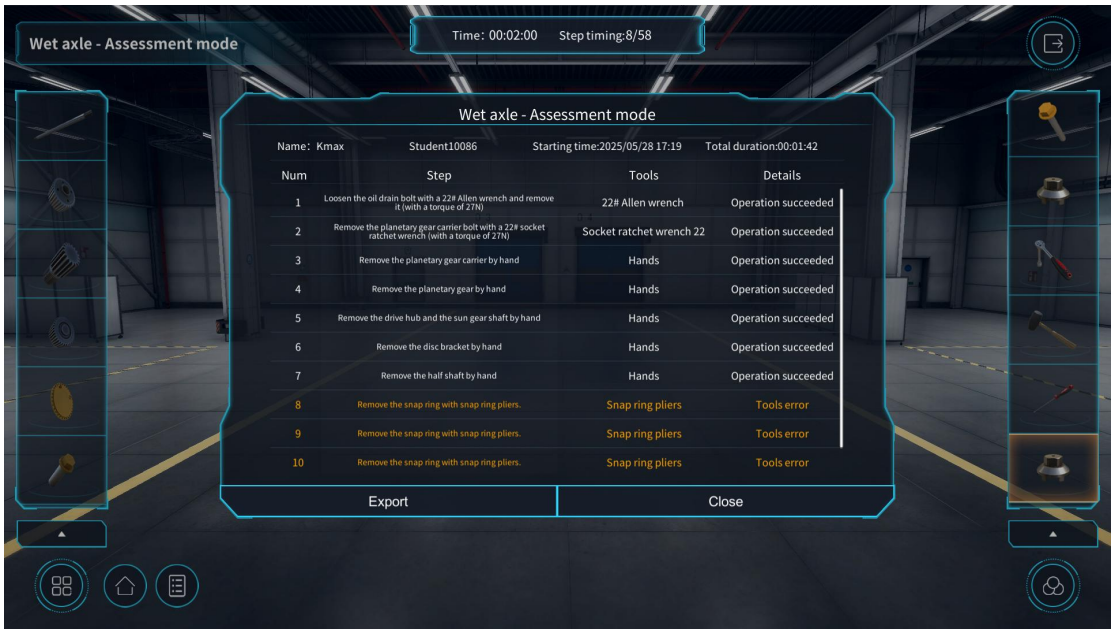
Clicking the "Export" button allows users to export the Work records in PDF format to the local desktop folder.



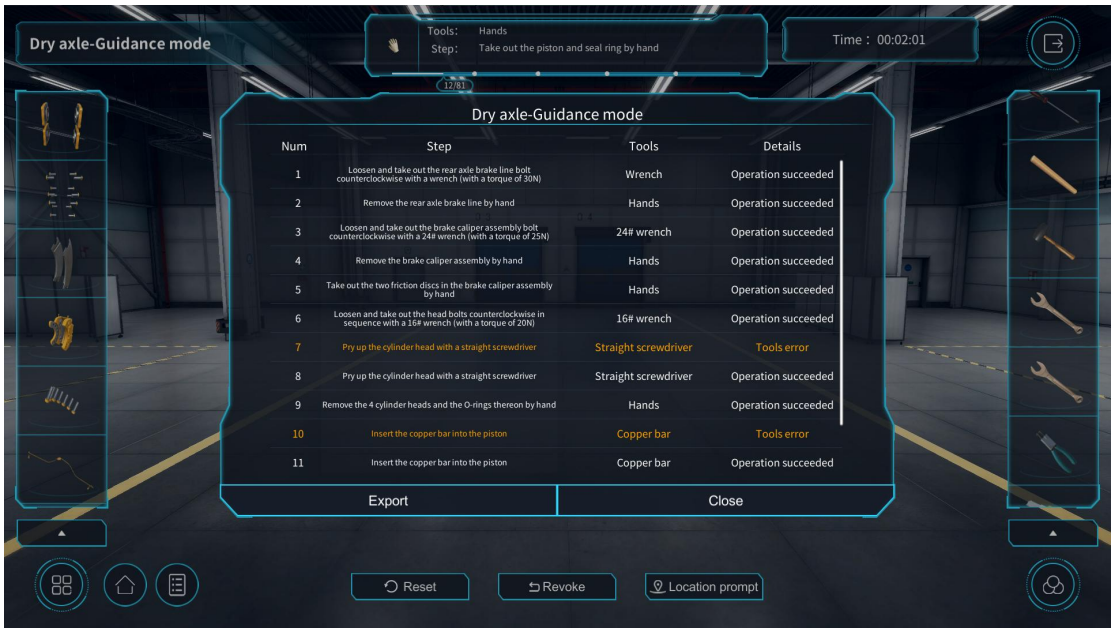
The bottom right corner expands to reveal “Guide”“Training” and “Assessment” buttons. Clicking these buttons allows users to switch between Guidance Mode, Training Mode, and Assessment Mode. In Guidance Mode, the tool parts and Work locations are automatically prompted. In Training Mode, users need to manually click the “Location Prompt” button to prompt the tool parts and Work locations. In Assessment Mode, the name and student number of the person being assessed must be entered, and all hint functions are disabled while the Work timing function is activated.



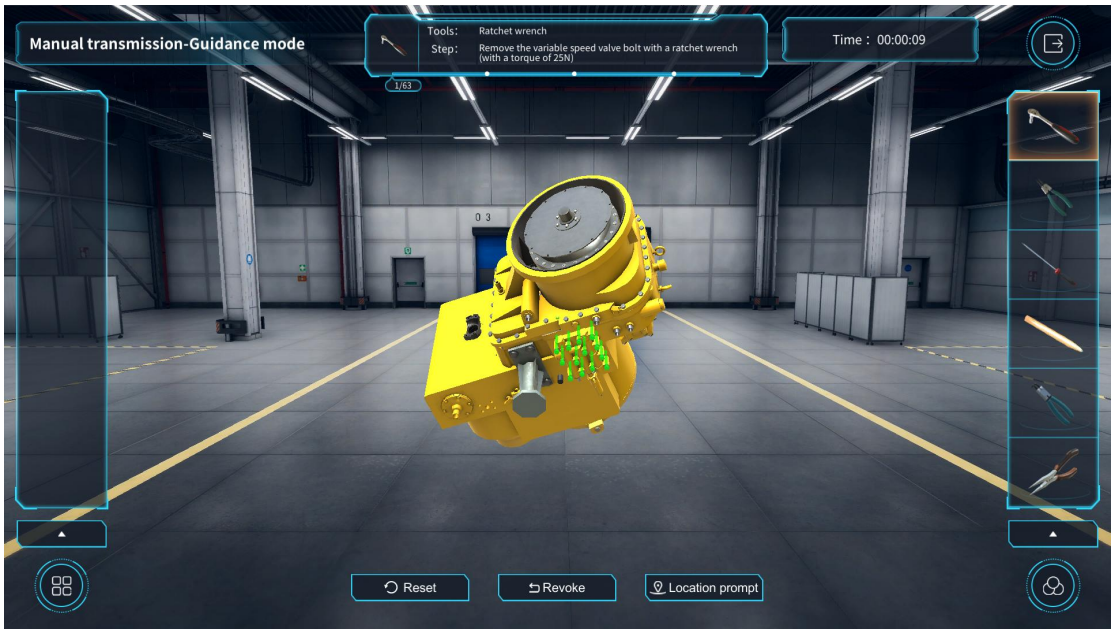
In Assessment Mode, the Work record displays the candidate's name and student number, as well as the start time and total duration of the assessment.

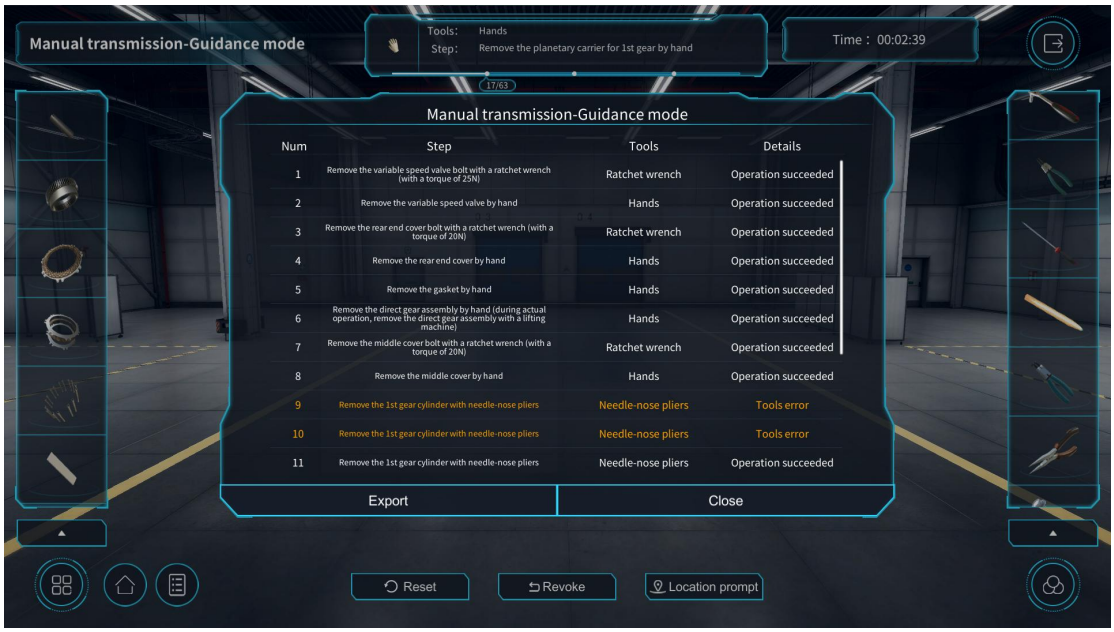


6.2.2. Dry Axle-Guidance Mode



6.2.3. Manual Transmission-Guidance Mode





6.3. Fault Training

After clicking on "Fault Diagnosis", users will enter the transition interface for fault diagnosis, where users can select the fault diagnosis tasks. The software includes a total of 5 fault points. Clicking the "Back" button will take users back to the homepage.

6.3.1. Loader gearbox out of gear

Fault diagnosis is divided into four major steps: fault symptoms, on-site inspection, fault determination, and on-site repair.

After entering the fault symptom scene, the top of the page indicates the current process location. The middle section displays the fault symptom, while the text box on the right shows a description of the fault symptom and the overall machine condition. The bottom left corner of the page features a "Back" button, which allows users to go back to the fault diagnosis transition interface. There is also a "Start Diagnosis" button at the bottom right of the page; clicking it takes users to the next step.

The next step is the on-site inspection scene,as shown in the figure below:

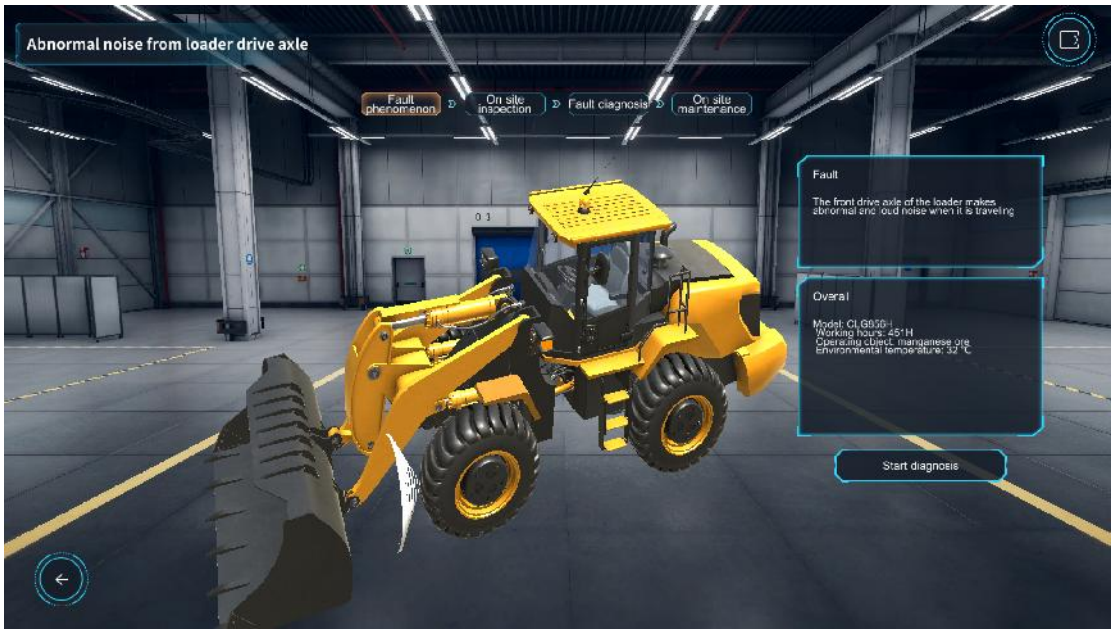
The middle of the page displays the entire machine or the relevant components; the top of the page shows text prompts for Workable steps and the step count. The bottom of the page features a "Start Failure Analysis" button and a switch Work bar.Clicking the "Start Failure Analysis" button displays the optimal view for the current Work. Clicking the switch components in the switch Work bar opens the corresponding switch UI for further Works. The text box on the left side of the page shows the inspection result, summarizing the text results of all previous inspection steps. The right side of the page is the toolbar,where users can click to use tools for further inspection of the components. After completing all inspection steps, a "Start Fault Analysis" button will appear. Clicking it takes users to the fault analysis scene, as shown in the figure below:

After entering the fault diagnosis scenario, the display and text description of possible fault causes are in the middle of the page. Click to enter the schematic display page. On the left side of the page is the selection of possible causes of faults. Click to switch between possible fault causes. After viewing all fault causes, the "Start Inspection" button will appear at the bottom of the page. Click to enter the on-site repair scenario.

After entering the on-site repair scene, the middle of the page displays models of the relevant entire machine or components. The left side of the page is the parts bar, where users can click to select parts for repair Works. The top of the page shows text prompts for Workable steps and the step count.

The bottom of the page features a "Location Prompt" button and a switch Work bar. Clicking the "Location Prompt" button displays the optimal view for the current Work. Clicking the switch components in the switch Work bar opens the corresponding switch UI for further Works. The right side of the page is the toolbar, where users can click to use tools to check and confirm the post-repair status of the components.

6.3.2. Abnormal noise from loader drive axle



6.3.3. Insufficient Power of Loader

6.3.4. The entire loader has no power output

6.3.5. The entire loader steering is heavy

7. Feature Highlights

- The software is a teaching tool developed for the chassis system of construction machinery. It allows seamless switching between disassembly training,assembly training, and different modes such as guidance mode, training mode,and assessment mode. It also records the training Work steps and duration, enabling students to significantly enhance their practical hands-on skills.
- In the Structural Principles module, users can freely drag, rotate, and zoom in/out on the models. The clear and intuitive analysis of structure and principles supports Works such as pausing, replaying,and exploding the models.
- The product can be used with the world-leading KMAX Desktop VR All-in-One Machine or on a PC. It offers a better interactive experience and stronger display effects.

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