EN_AL02_SoftwareUserManual_V24.110.1

Chapter 1 Software Operation Instructions

1. Overview

In order to facilitate the user's understanding of the operation and use of the software, this manual will introduce the main use of the system and related auxiliary functions from the perspective of a new user.

Note - New users are required to complete the installation and debugging of the system for the first time in order to carry out the operation smoothly.

2. Installation and commissioning

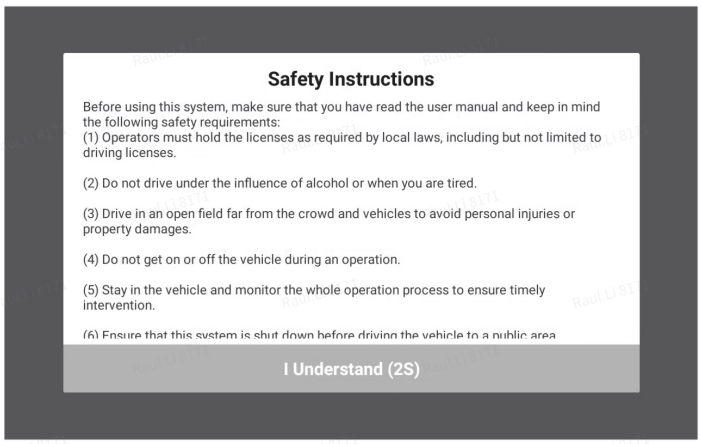
The initial installation and commissioning process of the FJDynamics 3D Land Leveling System is as follows:

Select the language → Register and login account → Enter The Auto Steer System → Switch The 3D Land Leveling System → Connect to a signal source → Set the implement library → Complete installation and commissioning.

2.1 Select the language

Turn on the control terminal,and after the screen starts, the user should select the language of this system and read the safety instructions.

Select the language



Read the safety instructions

2.2 Registration/Login

After completing the language settings,enter the registration/login screen(if you have not insert the SIM card, you need to scroll down and tap the Wi-Fi icon for Wi-Fi connection first).

Registration: New users are required to register for the first time. Click the **"Register"** button to enter the registration page, enter the account number, verification code and password to complete the registration, and then automaticallyenter the home screen.

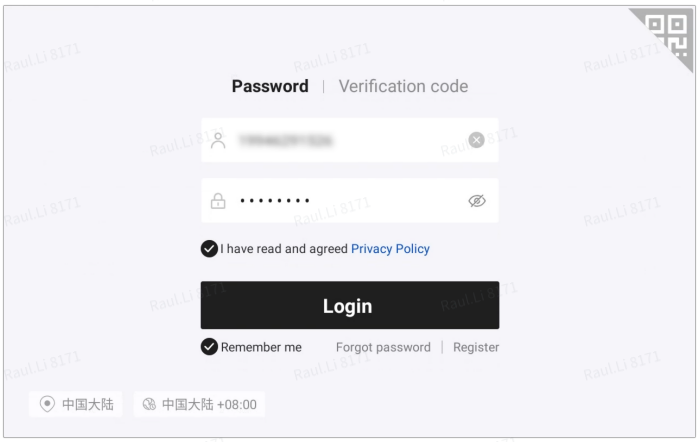
Login by account and password: Registered users could click the **"Password"** button, and then enter the account and password and click the **"Login"** button to enter the home screen of the system.

Login by account and verification code: Registered users could click the **"Verification Code"** button, and then enter the account and verification and click the **"Login"** button to enter the home screen of the system.

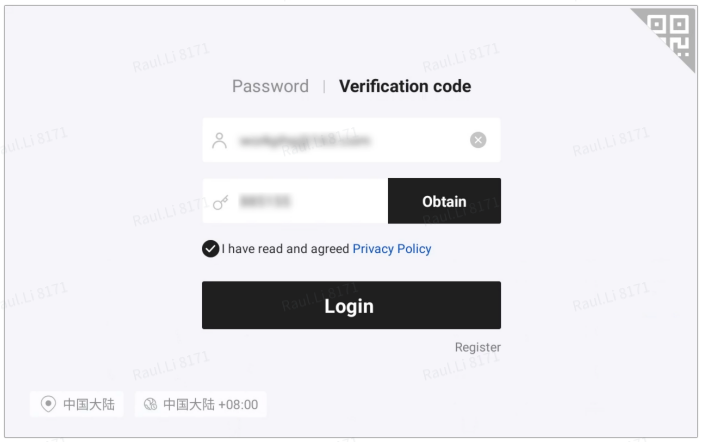
Login by scanning QR code: Registered users could click the **"QR Code"** icon, and then scan the QR code on the screen through FJDynamics APP to enter the home screen of the system.

Forgot password: If registered users forget their password, they could click **"Forgot Password"** button, and then enter the account, verification and new password in the password reset screen.

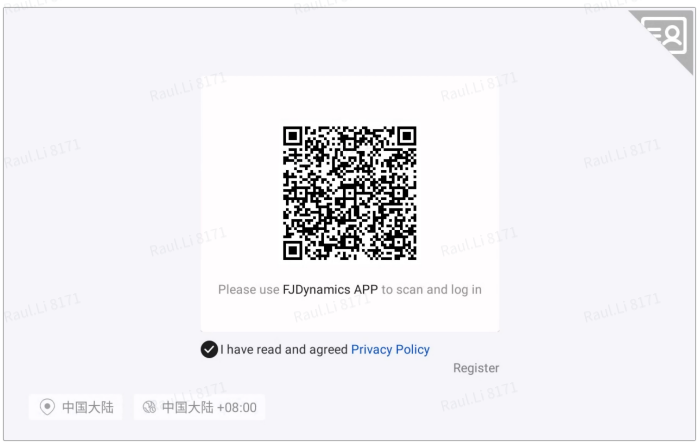
Remember me: After checking the box, if you logged out and want to log in, the account and password of the last login will be entered automatically.



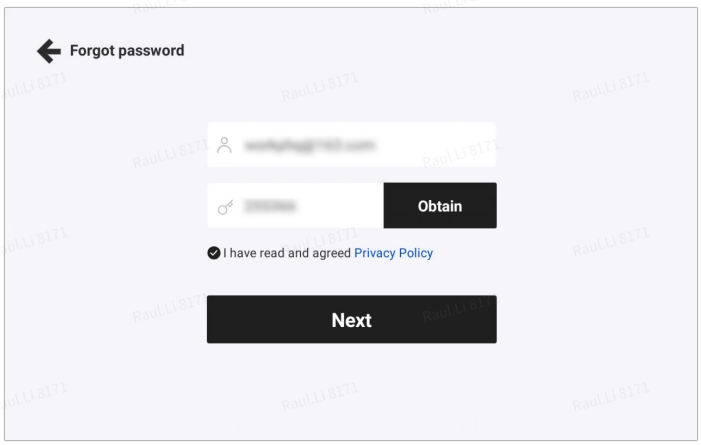
Login by password



Login by verification code



Login by scanning QR code



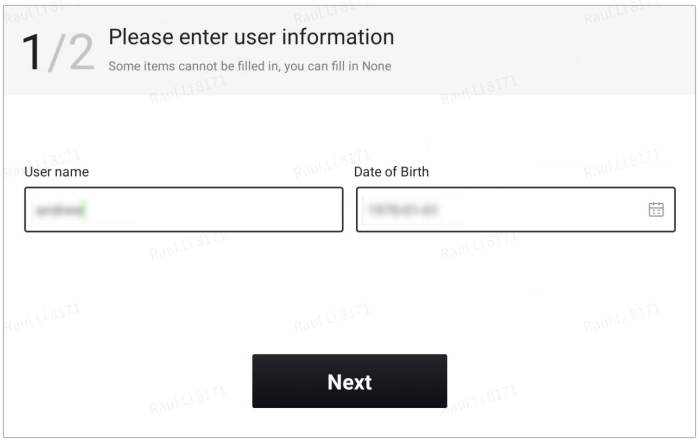
Forgot password

2.3 Enter the installation information

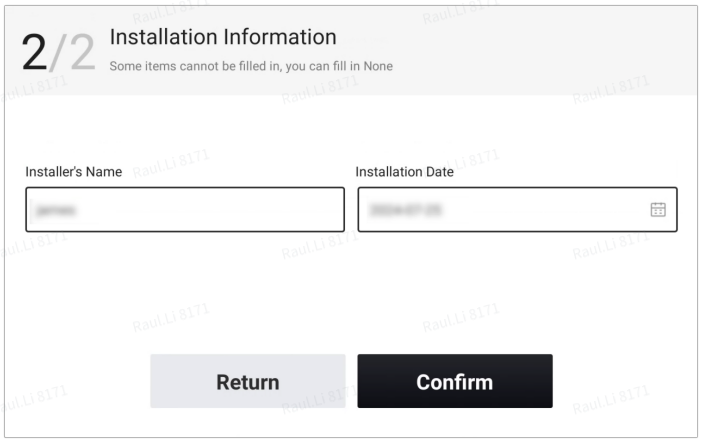
After completing the login, you need to enter the relevant user's information and installation information. Please note that the initial information you enter will directly or indirectly affect your after-sales service. Therefore, please follow the following steps strictly.

Step 1: Enter the relevant user information, and click the **"Next"** button.

Step 1: Enter the relevant installation information, and click the **"OK"** button.

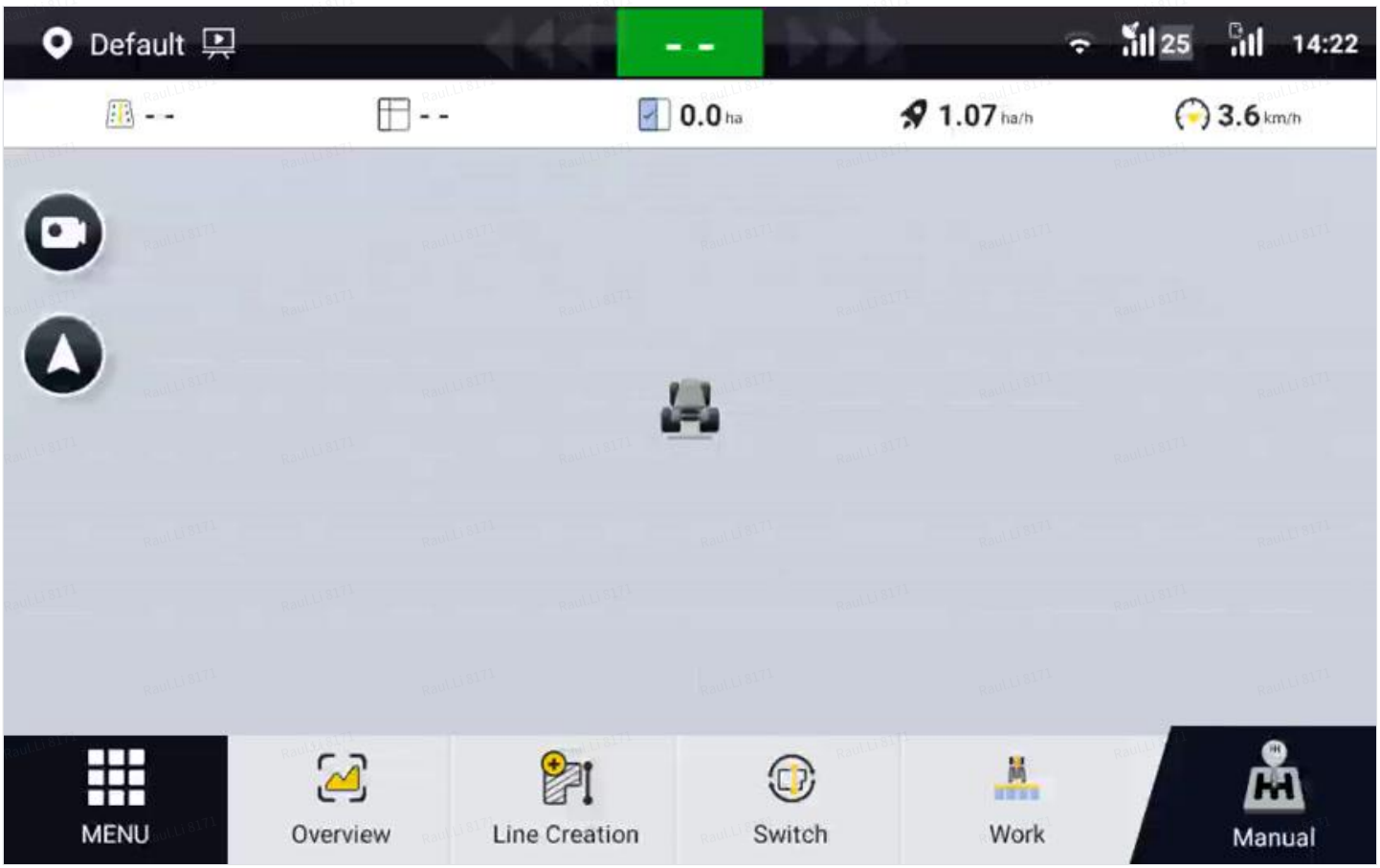


Enter user informaton



Enter installation information

2.4 Home screen



Video——Switch to land leveler application

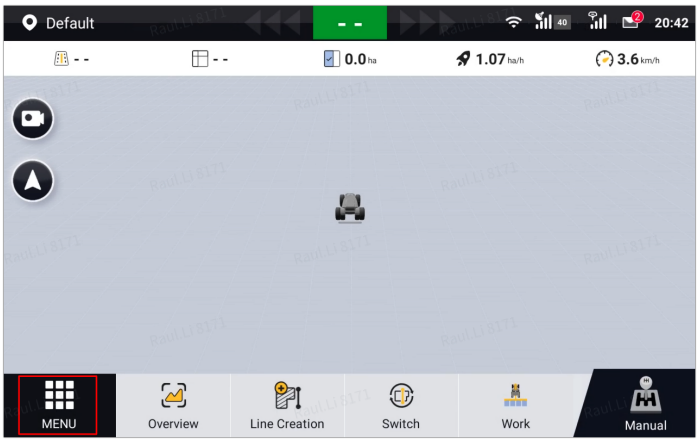
When a user logs in for the first time, the user will be taken to the Auto Steer System's home screen. In order to use the 3D Land Leveling System, the user will need to switch to the

application. The steps are as follows.

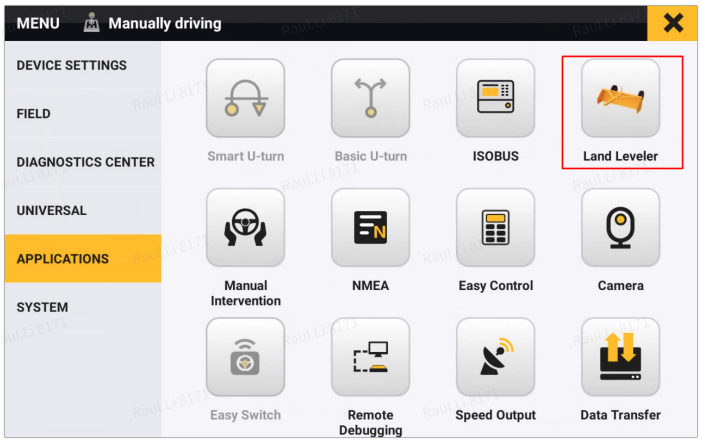
Step 1: Click the **"MENU"** button, and then click the **"Applications"** button on the left area of screen.

Step 2: Click the **"Land Leveler"** button, and then click the **"OK"** button on the pop-up dialog.

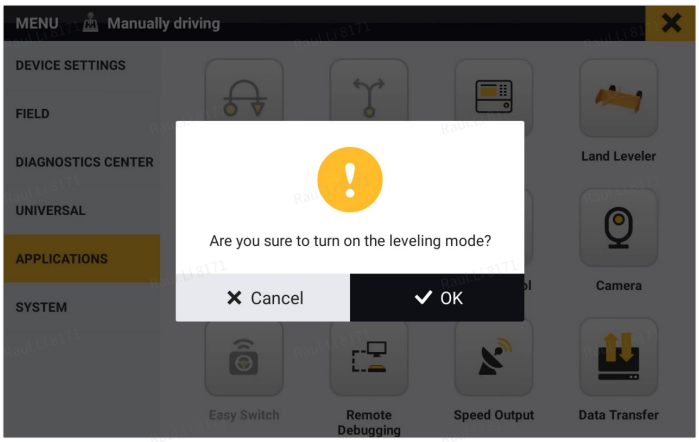
Step 3: Wait for a moment, and then the screen will switch to the home screen of the 3D Land Leveling System automatically.



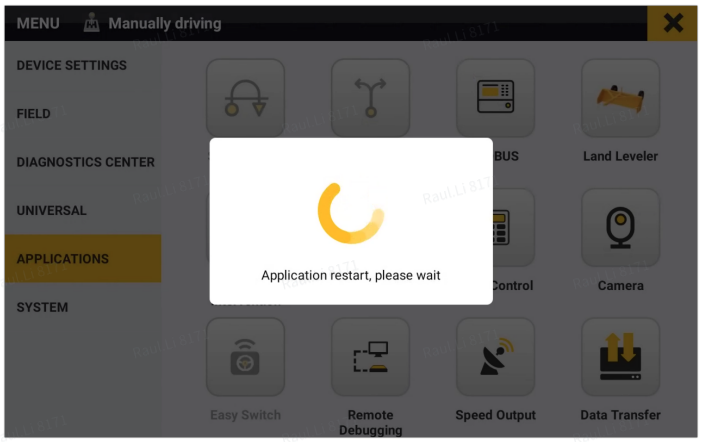
Home screen of the Auto Steering system



Switch the Land Leveliing system



Confirm the operation



Restart the application

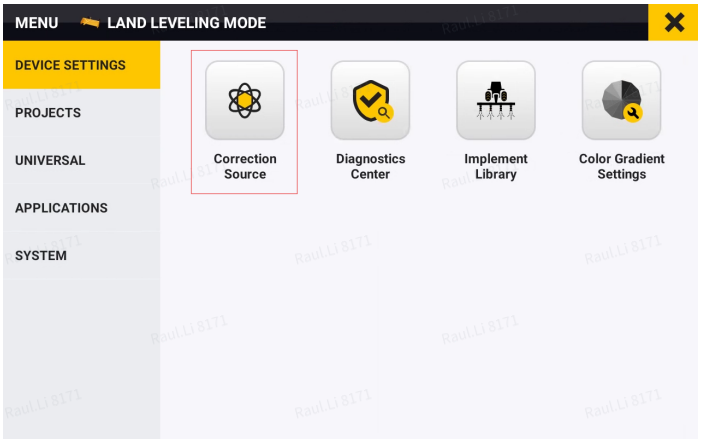
2.5 Connecting to a corrective signal source

After users enter the home screen successfully, they need to connect to a corrective signal source first. The steps are as follows.

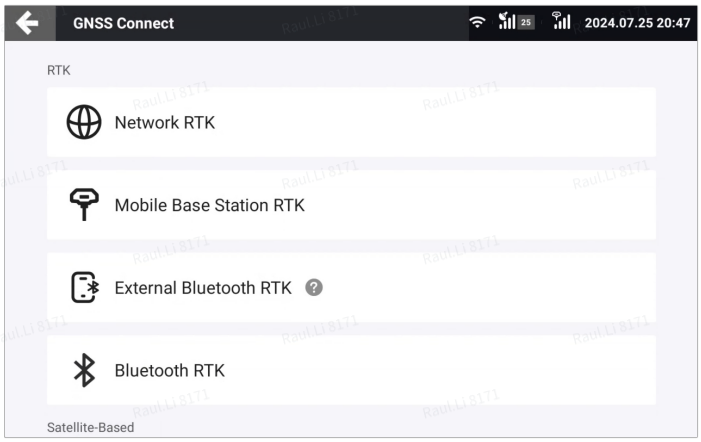
Step 1: Click the **"MENU"** button on the home screen, and then enter the menu view.

Step 2: Click the **"Correction Source"** button on the device configuration menu screen, and then enter the corrective signal source details view.

Step 3: Select the corrective signal source that you want to use. RTK, Star Station and PPP-RTX are available currently, depending on the country and area you are located, the corrective signal sources that you can use are different. The commonly used sources are network RTK and mobile station RTK, which will be described in detail below.



Correction Source Entrance



Correction sources list

2.5.1 Network RTK

If users need to connect to network RTK, they could click the **"Network RTK"** button to expand child functions. NRTK and NTRIP are available in the system currently.

NRTK

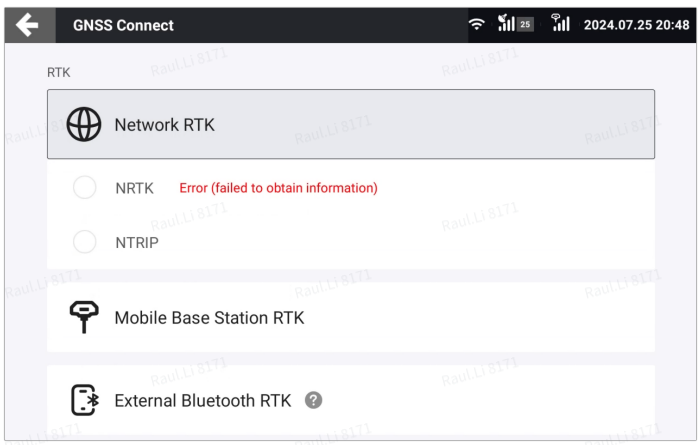
Tap the **"NRTK"** button, and the NRTK account bound is automatically logged in.

NTRIP

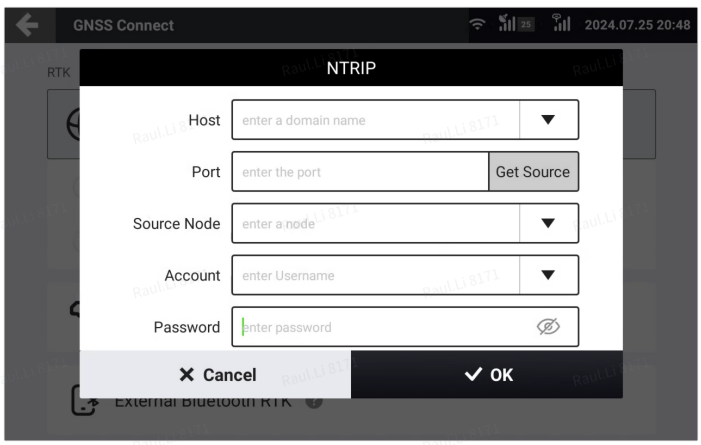
Tap the **"NTRIP"** button, and enter information in the pop-up dialog.

NTRIP host: Enter the host and port, and tap "**Get Source**". The node with the strongest signal strength is displayed automatically in the "**Source Node**" box.

NTRIP account: Enter your account and password, and tap "**OK**" to complete the connection.



Expand the Network RTK



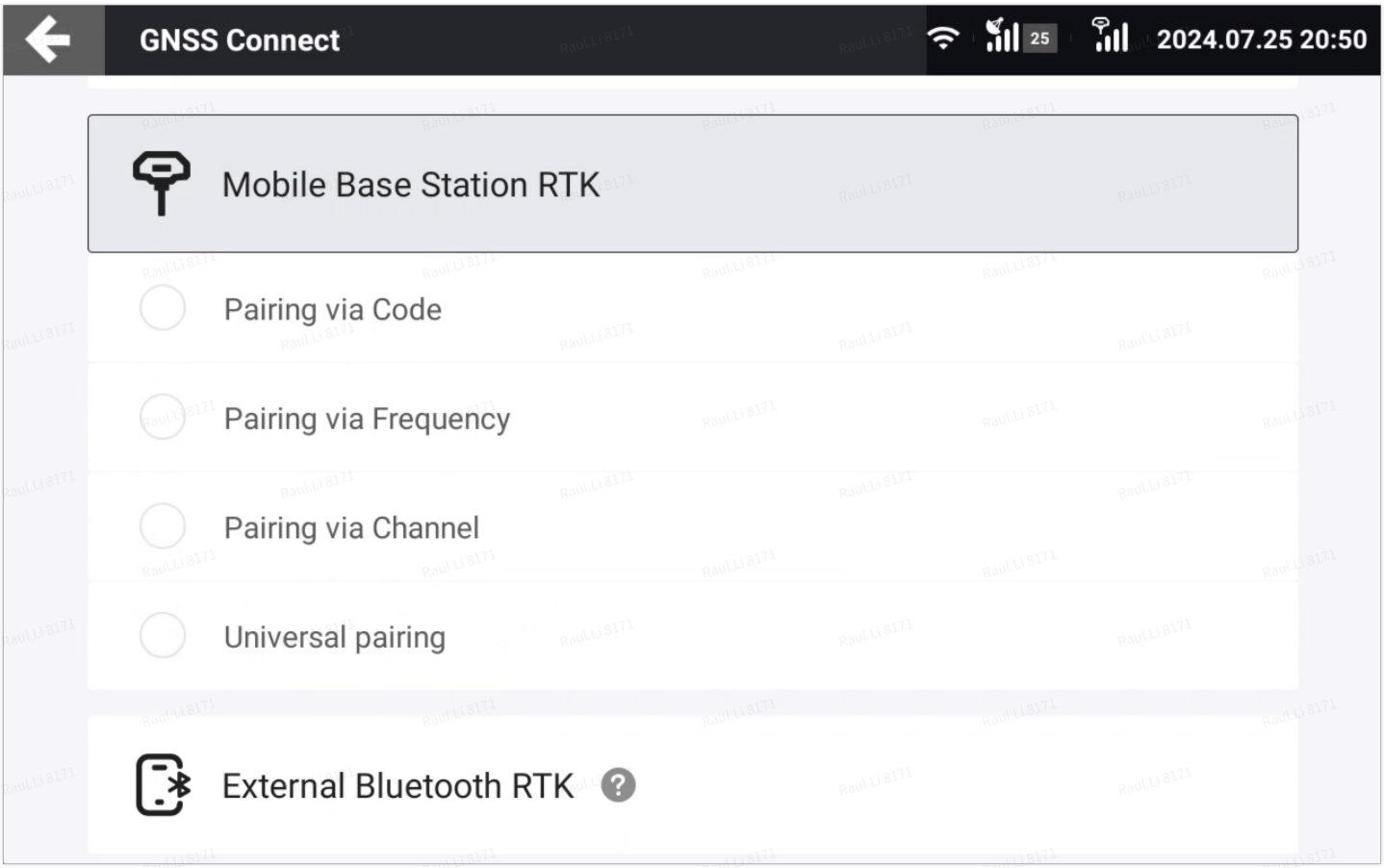
Enter the connect information of NTRIP

Note:

Check whether the mode is available in your region by contacting us as described in section **"Technical Support"** or contacting the local dealer.

2.5.2 Mobile Base Station RTK

For the mobile base station RTK mode, the connection method is selected depending on the base station type.



Expand the Mobile Base Station RTK

Pairing via Code

Tap **Mobile Base Station RTK**, and select **Pairing via Code**. In the popup dialog, enter the frequency code of the base station and tap **OK**. For details about the base station's frequency code, refer to its user manual.

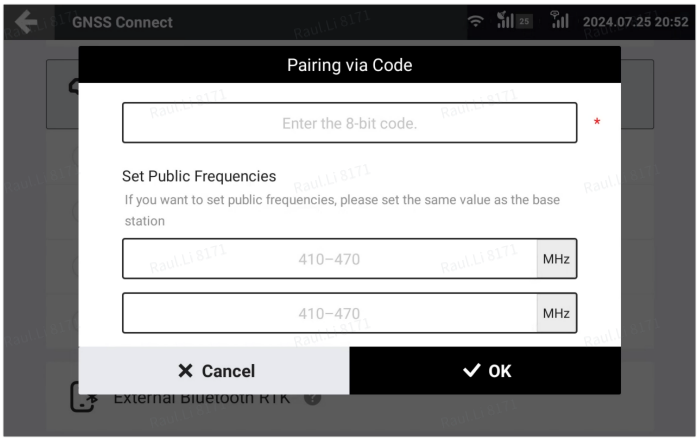
Applicable base stations: FJDynamics mobile base stations whose service codes start with BS or BSA.

You can also set public frequencies in the popup dialog. The frequencies must be 410 MHz to 470 MHz with a maximum of five decimal places. If the base station's service code starts with BSA, public frequency settings are not supported.

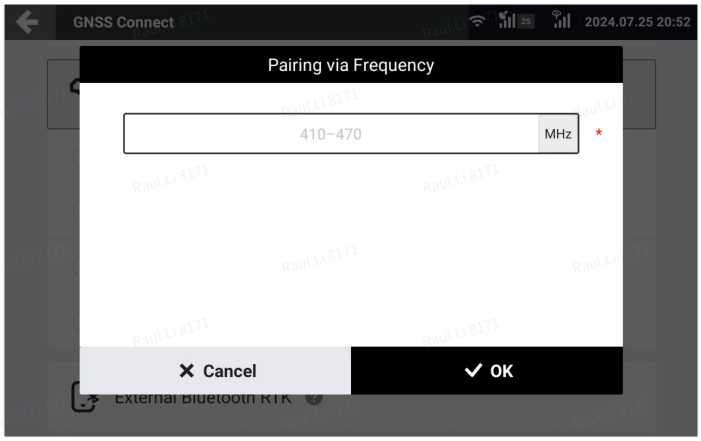
Pairing via Frequency

Tap **Mobile Base Station RTK**, and select **Pairing via Frequency**. In the popup dialog, enter the frequency of the base station and tap **OK**. The frequency must be 410 MHz to 470 MHz with a maximum of five decimal places. For details about the base station's frequency, refer to its user manual.

Applicable base stations: FJDynamics high-power base stations whose service codes start with FQ.



Pairing via Code



Pairing via Frequency

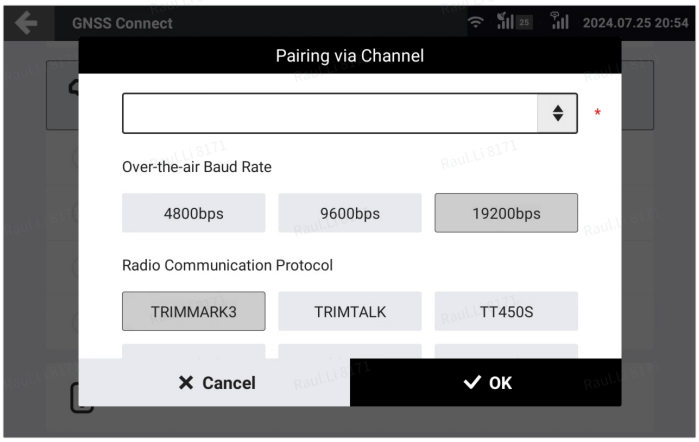
Pairing via Channel

Tap **Mobile Base Station RTK**, and select **Pairing via Frequency**. In the popup dialog, select the same channel, over-the-air baud rate, and radio communication protocol, and then tap **OK**. For details about the parameter settings of the base station, refer to its user manual.

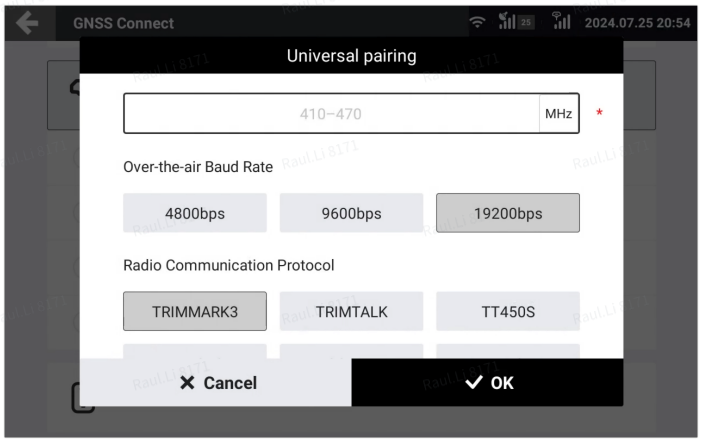
Applicable base stations: FJDynamics V1(T) mobile base stations.

Universal pairing

Power on the base station, and set its frequency, over-the-air baud rate, and radio communication protocol on the base station. Tap **Mobile Base Station RTK**, and select **Universal pairing**. In the popup dialog, set the same frequency, over-the-air baud rate, and radio communication protocol, and then tap **OK**. For details about the parameter settings of the base station, refer to its user manual.



Pairing via Channel



Universal pairing

Base stations of other brands must support the following features:

Frequency: 410–470 MHz

Baud rate: 4,800 bps/ 9,600 bps/ 19,200 bps

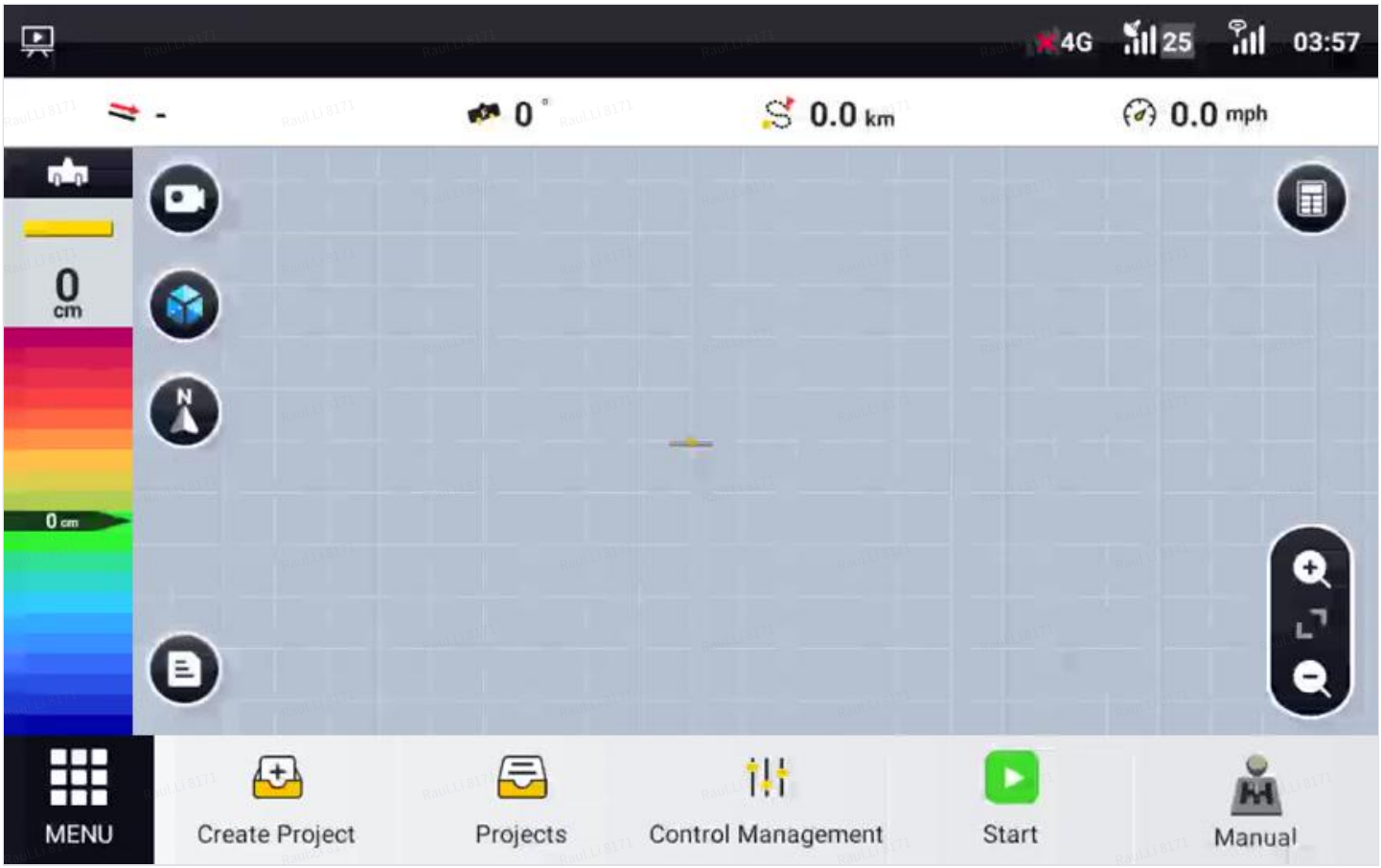
Radio communication protocol: TRIMMARK3/ TRIMTALK/ TT450S/ TRANSEOT/ SOUTH/ HUACE/ SATEL

Differential data format: RTCM 2.X / 3.X /CMR

Note:

1. Base station pairing may take up to 3 minutes.
2. When the radio communication protocol is set to SATEL, the FEC switch remains consistent with the base station settings.

2.6 Implement Library Setting



Video——Create an implement and configure electrical settings

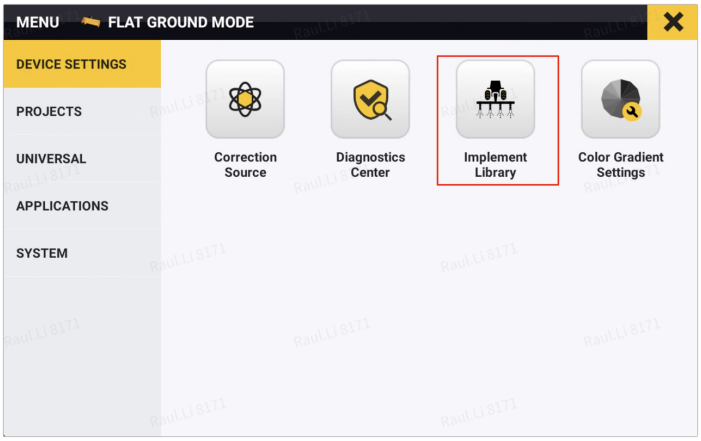
After connecting the corrective signal source successfully, users need to configure their implements. The steps are as follows.

Step 1: Click the **"MENU"** button on the home screen, and then users will be taken to the menu view.

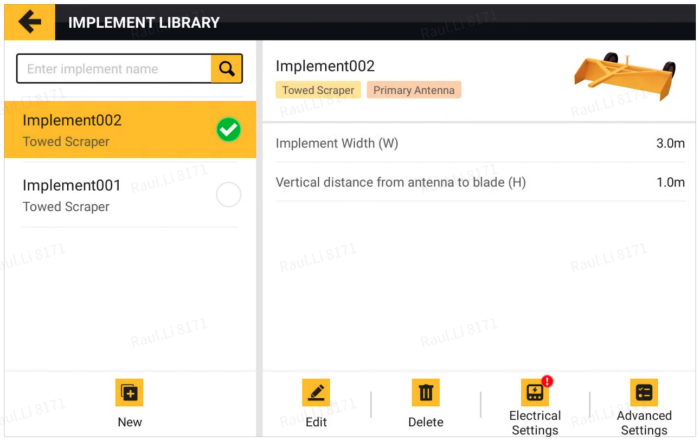
Step 2: Click the **"Implements Library"** button, and then enter the implements list view.

Step 3: Click the **"New"** button to create an implement.

Step 4: To configure the electrical settings of the new implement.



Implement Library entrance



Implement Library view

2.6.1 Create an implement

Users could create an implement through the steps as follows.

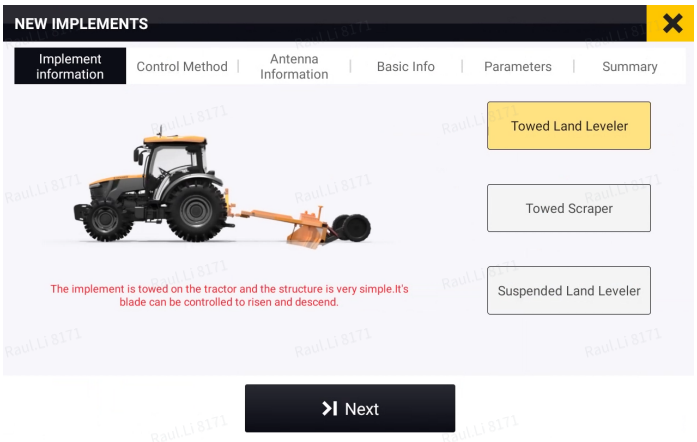
Step 1: Select the type of implement.

Step 2: Select the control method.

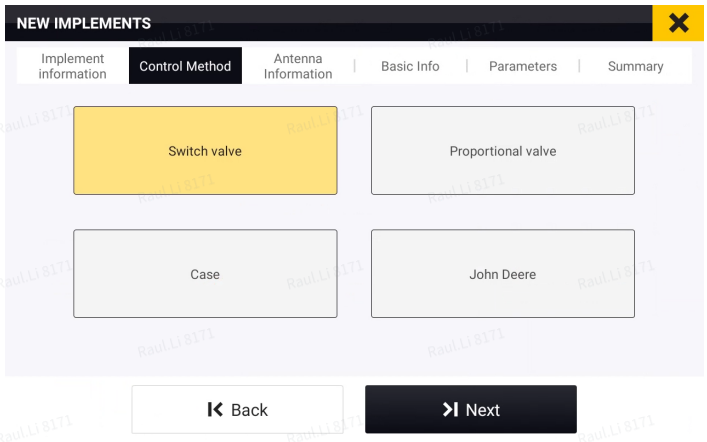
Step 3: Select the type of antenna that is placed on the implement.

Step 4: Enter the name, the brand, and the model of the implement.

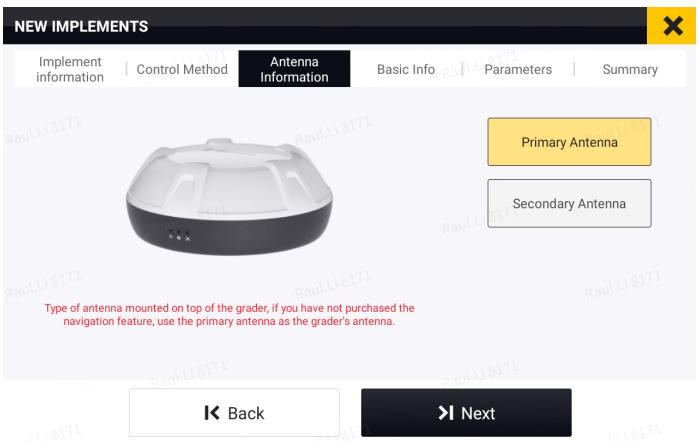
Step 5: Enter parameter information for the width of implement and the vertical distance from antenna to blade.



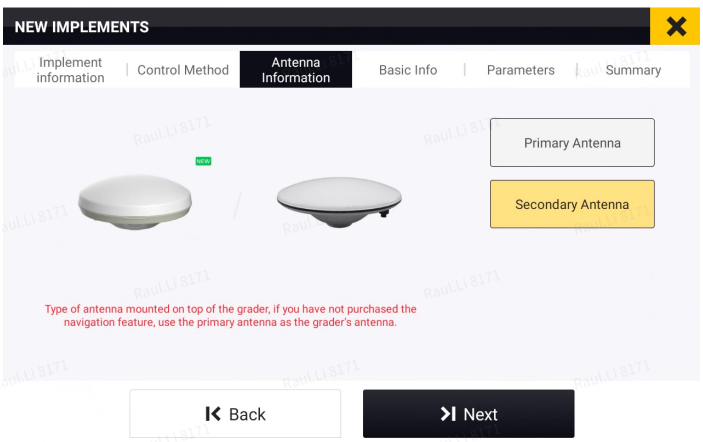
Select the type of implement



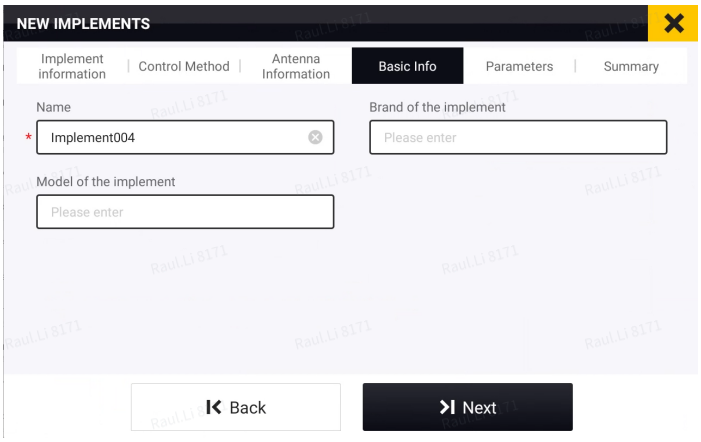
Select the type of control method



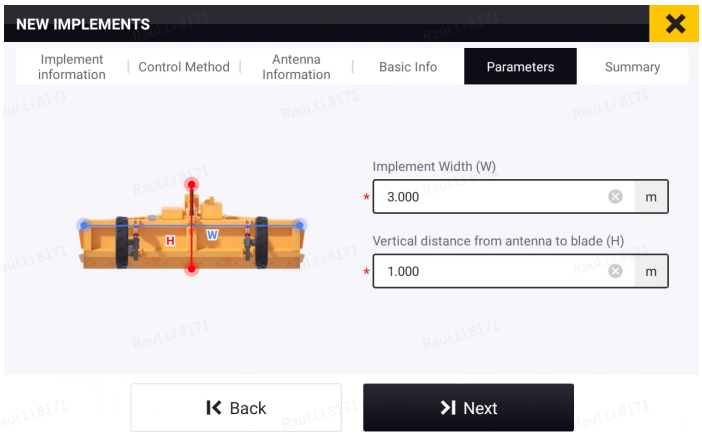
Select the type of antenna - Primary



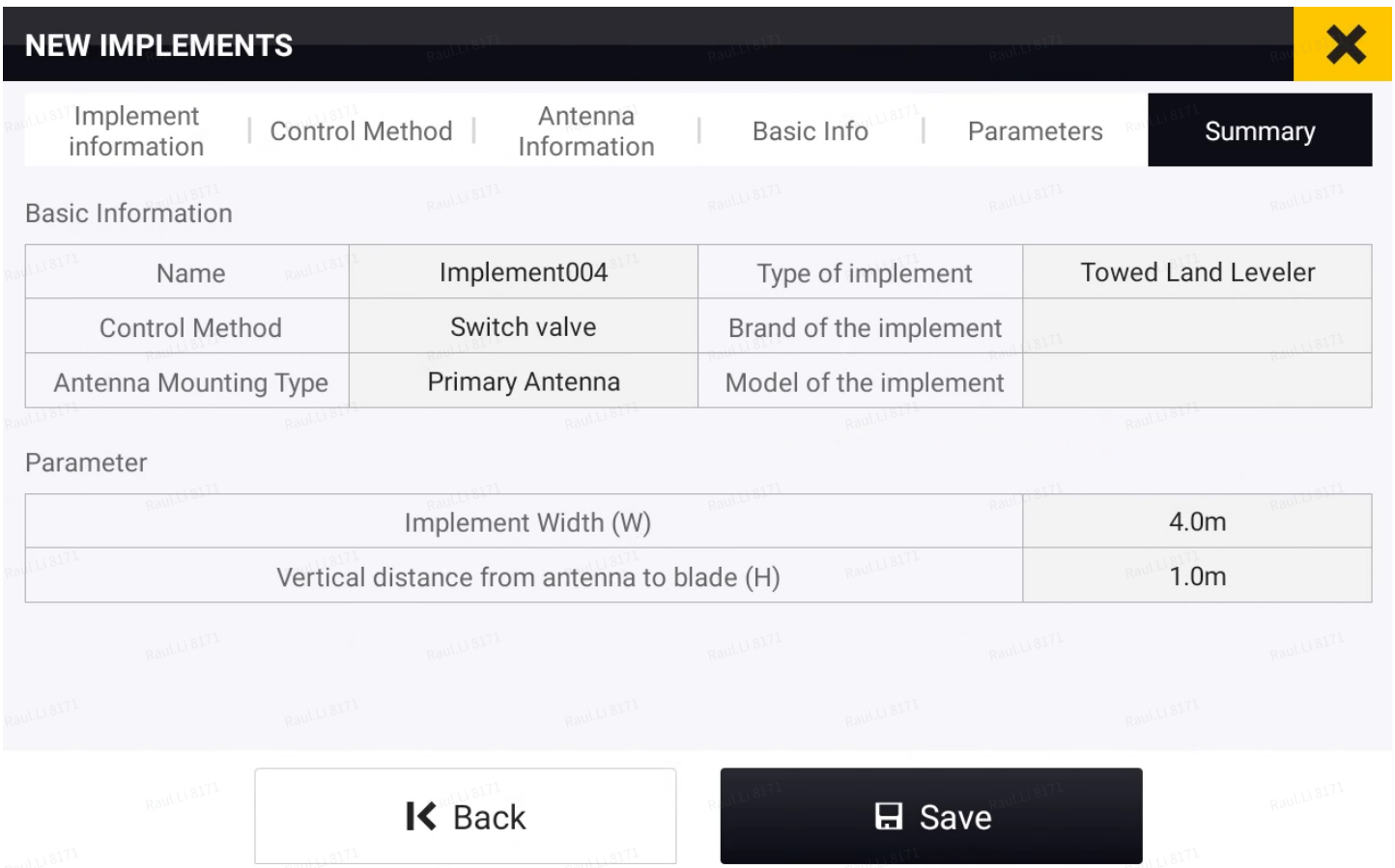
Select the type of antenna - Secondary



Enter basic information



Enter parameters of the implement



2.6.2 Electrical Settings

If the information of implement is correct, click the **"Save"** button, and the pop-up dialog that prompts users to set electrical configuration will appear. Users could click the **"Electrical Configuration"** button, and then go into the "Electrical Configuration" view.

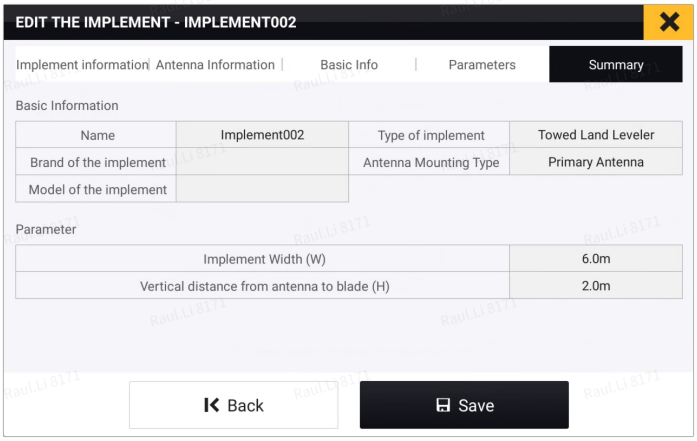
On the electrical configuration view, users should select the type of hydraulic valve according to the information provided by installation service personnel.

2.6.2.1 Switch Valve & Proportional Valve

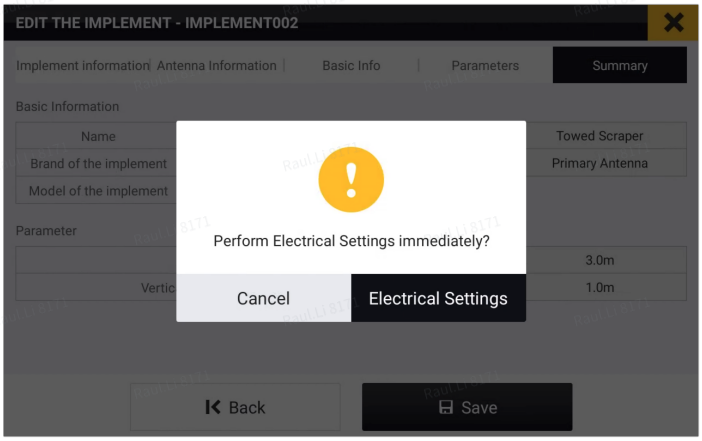
If your hydraulic valve is a **"Switch Valve"**, you need to select a control algorithm. The conventional algorithm is suitable for most scenarios, while the low-frequency algorithm and

the high-frequency algorithm are suitable for scenarios that require higher accuracy.

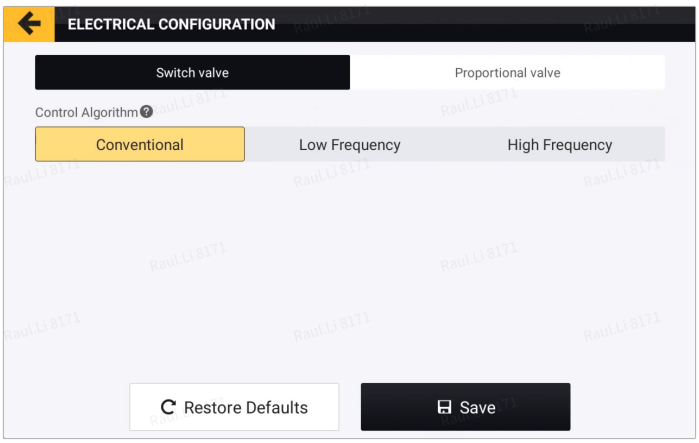
If your hydraulic valve is a **"Proportional Valve"**, you need to enter the values of the lift currents and the decrease currents. Use "Test" to check the performance. Please be cautious that the blade will raise up and down.



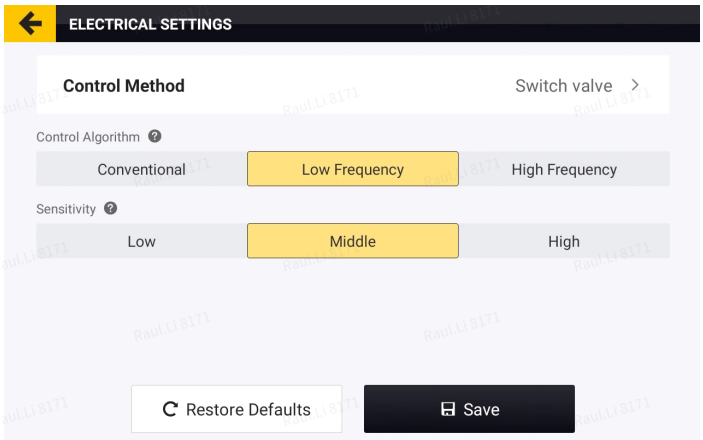
Confirm the informations of your implement



To perform Electrical Settings



Setup the PT valve - 1



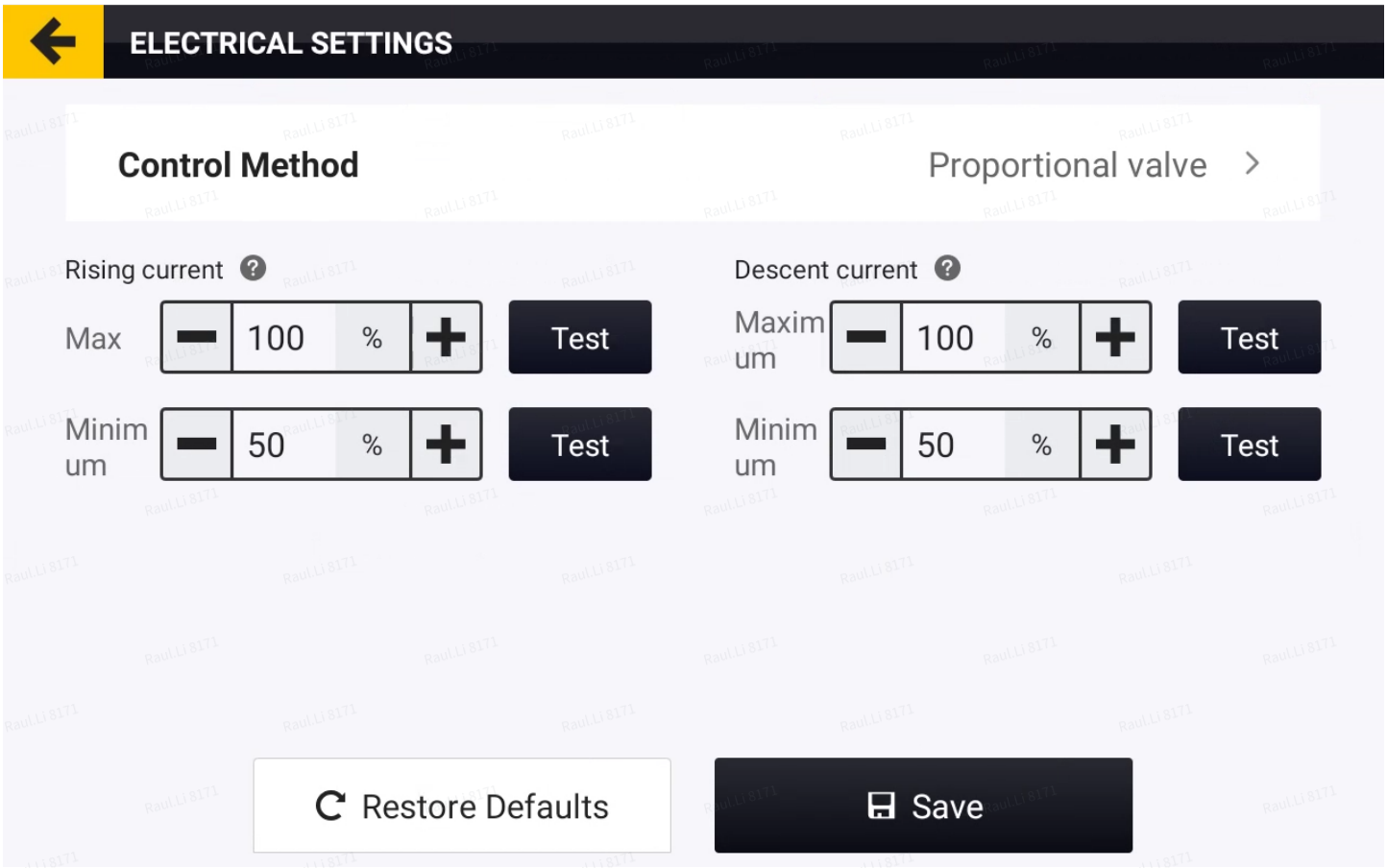
Setup the PT valve - 2

2.6.2.1.1 Switch Valve - Control Algorithm

Since switch valves cannot fine-tune flow like proportional valves, they rely on rapid on/off cycling to regulate speed. Adjusting the frequency of these switches allows for better adaptation to different machine behaviors, ensuring optimal control and smoother operation.

1. **Conventional (Traditional) Mode:**
    - Suitable for most standard use cases.
    - Balances responsiveness and stability for typical leveling operations.
    - Works well with low/standard blade movement speeds.
2. **Low-Frequency Mode:**
    - Recommended for equipment with slow blade movement.
    - Helps improve control stability by reducing the frequency of on/off switching.
    - Prevents excessive delays in blade response while maintaining smooth operation.

3. **High-Frequency Mode:**
    - Designed for highly responsive or overly sensitive blade movements.
    - Increases the switching frequency to achieve smoother control.
    - Reduces abrupt blade movements caused by rapid switching.



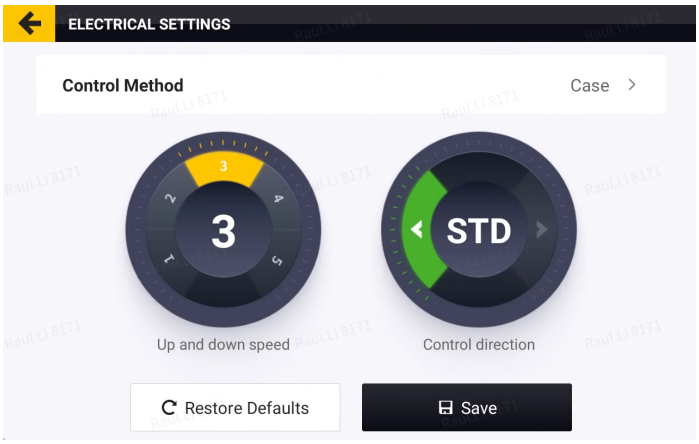
Setup the proportional valve

2.6.2.2 Case & John Deere

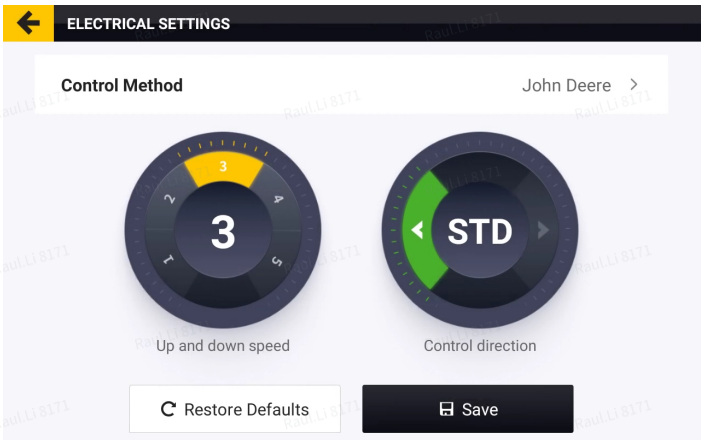
Currently, we support two brands of electronically controlled tractors: Case and John Deere.

Speed Control: The control speed corresponds to different numerical values and hydraulic valve flow rates. The larger the value, the greater the flow rate, which affects the blade’ s control speed.

Direction Control: When using the kit or the Bluetooth button panel to control the blade’ s up and down movement, if the button’ s operation does not match the blade’ s movement direction, you can adjust it by switching the hydraulic hoses or modifying the STD settings in the software. Ensure that when the “up” button is pressed, the blade moves upward.



Case



John Deere

Advanced Settings

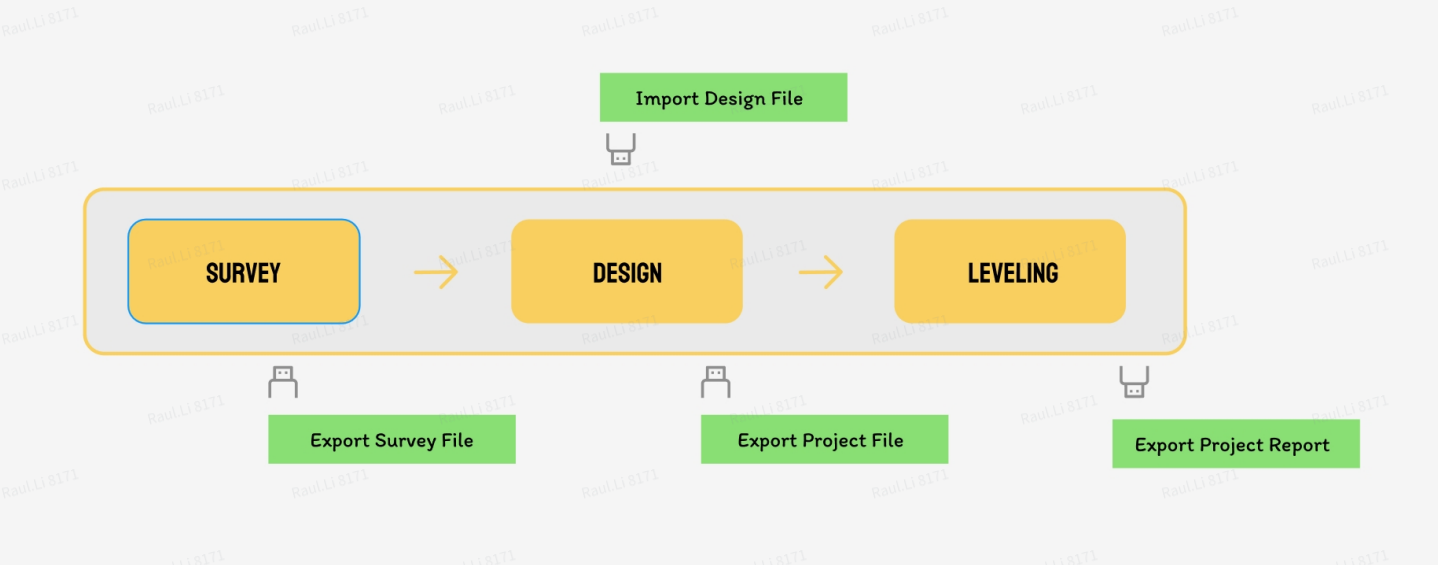
Deadband	Blade Movement	Suitable Scenarios
Large	Moves less often	- Coarse leveling at high speed. - Large-scale leveling where high precision is not critical.
Small/Standard	Moves more often	- Fine leveling or finishing stages at low speeds. - Leveling on flat ground requiring high precision.

*To choose the type of deadband (low/standard/high), load a project and go to the home page, click the [Control Management] button.

3. Survey and Design

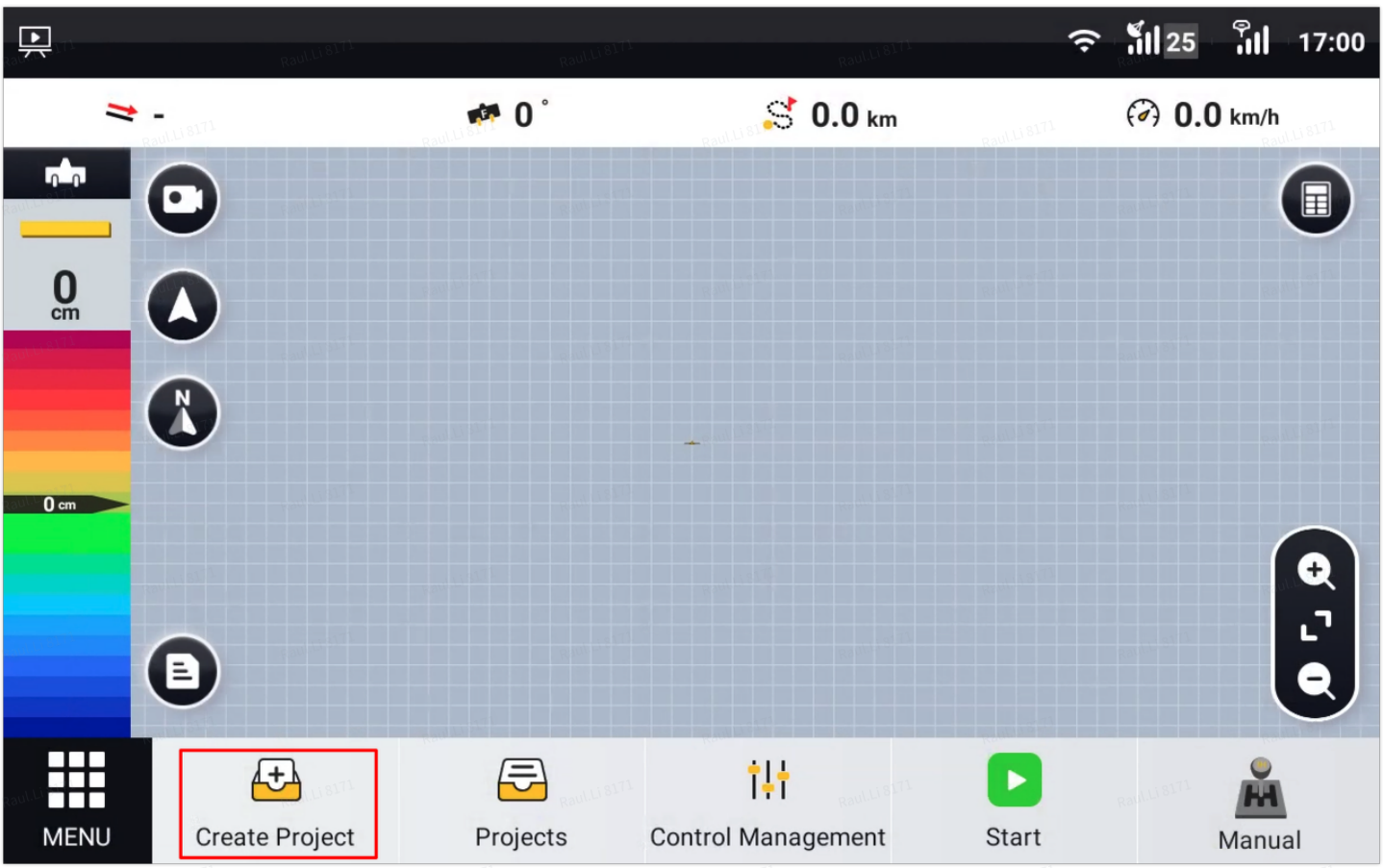
There are multiple ways to create a project:

1. **Standard Project**:
   - Survey and design directly on-site using the tractor.
2. **Quick Project**:
   - Rapidly design based on some marks and complete the design.
3. **Import**:
   - Users can import the following file types:
     - An **AGS survey file** created by V1 or V1T.
     - An **AGD design file** generated by third-party software.
     - A **project file** exported from another AL02 device.



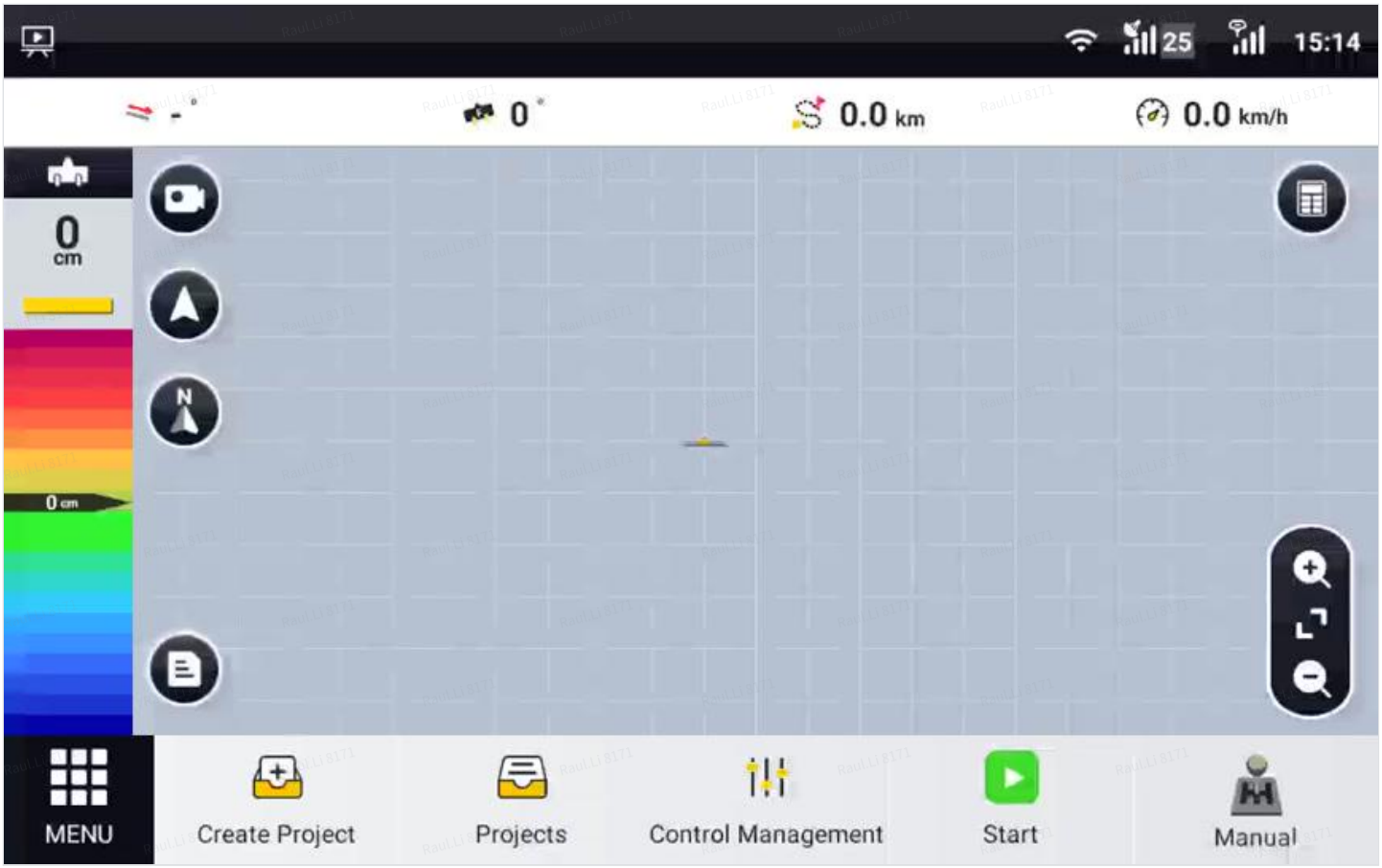
Workflow

Click the **"Create Project"** button on the home screen → Select the type of project (There are three types of projects available, including Standard Project, Quickly Project and USB Project, the default type is Standard Project) → Create a project (Depending on the type of project, the exact process are varies. It will be described in more detail below) → Start operate.



Create project entrance

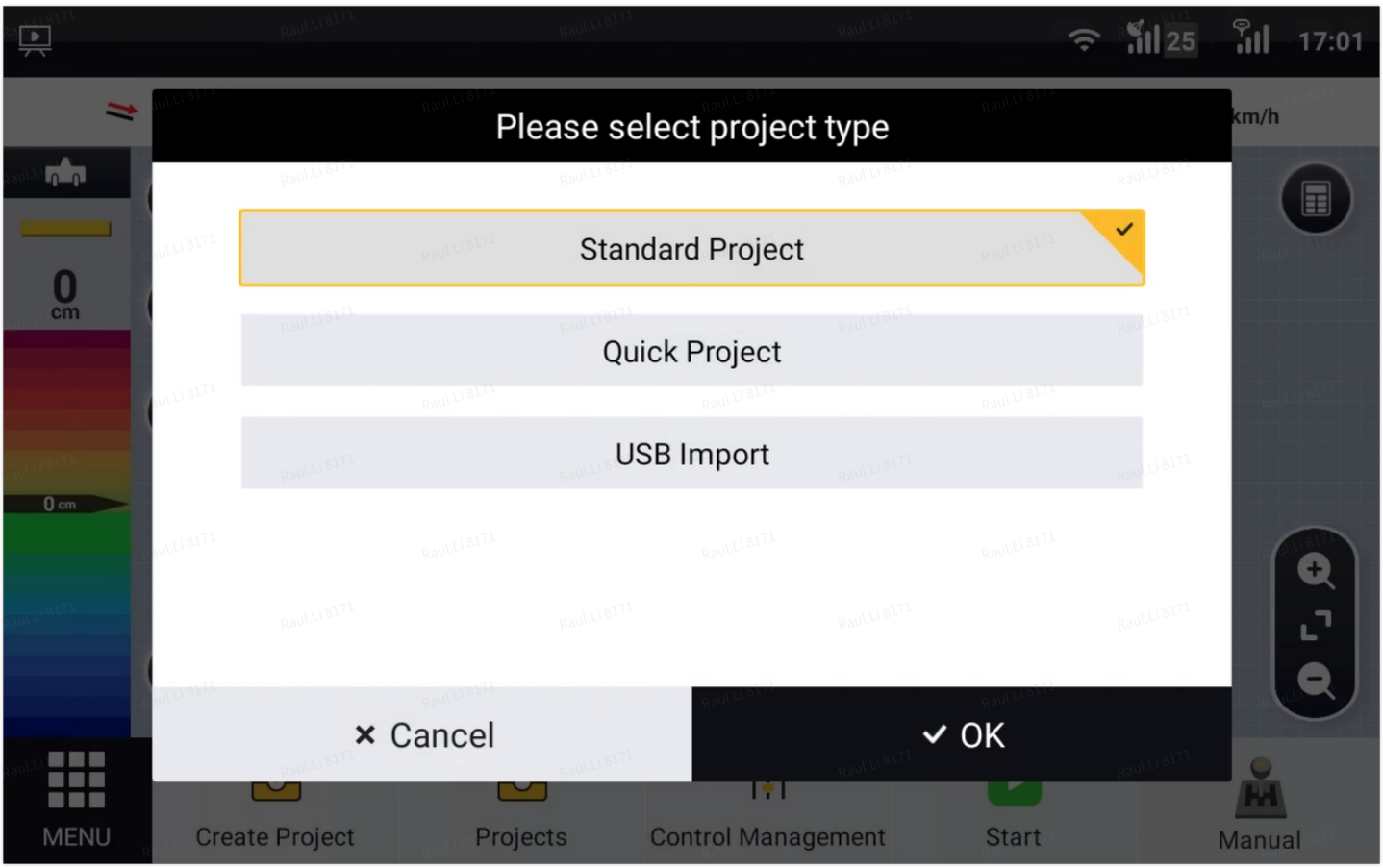
3.1 Create a standard project



Video——Create a standard project

The standard project can provide a precise way to design the work surfaces. The process of creating it is as follows.

Set the master benchmark → Set the secondary benchmark → Create the boundary of field → Collect interior points of the field → Enter design parameters → Review design surfaces → Create successfully.



The entrance of create a standard project

3.1.1 Set the master benchmark

The master benchmark is the key reference point that provides reference coordinates for project applications. If coordinates seem misaligned, recalibrate using this benchmark. Hence, it is crucial to remember the exact location of the master benchmark. **Ensure its exact location is well-remembered.**

The master benchmark should be set at a cleared place, e.g. next to a well or an immoved stone, and make sure the place won't be leveled.

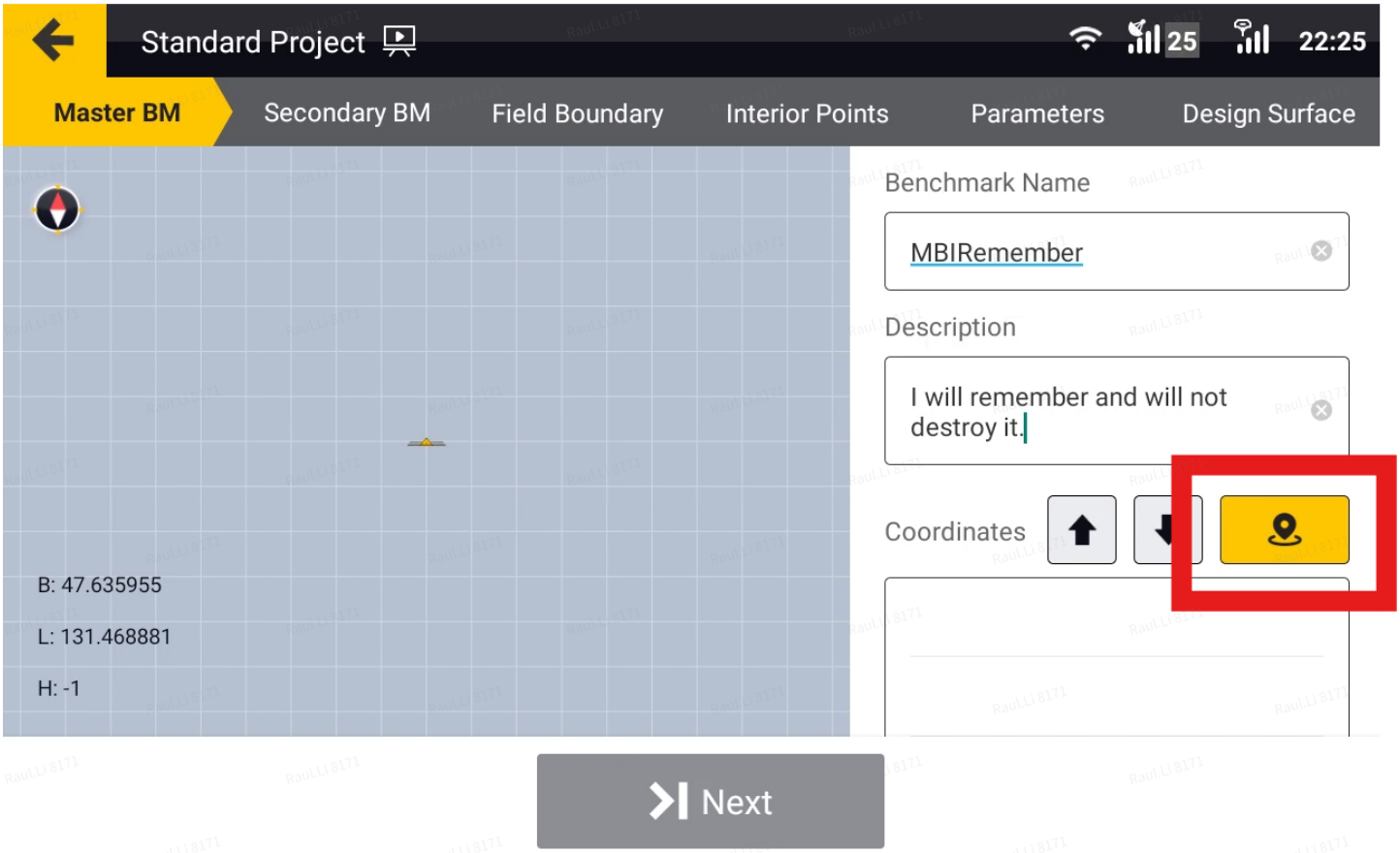
The process of setting a master benchmark is as follows.

First, users should drive their vehicles to the place they want to use.

Second, they should operate the blade down to the horizontal ground.

And then, click the **"Collection"** button, the system will collect the positionning data of blade automatically.

Lastly, click the **"Next"** button, users will be taken to the view of set secondary benchmark.



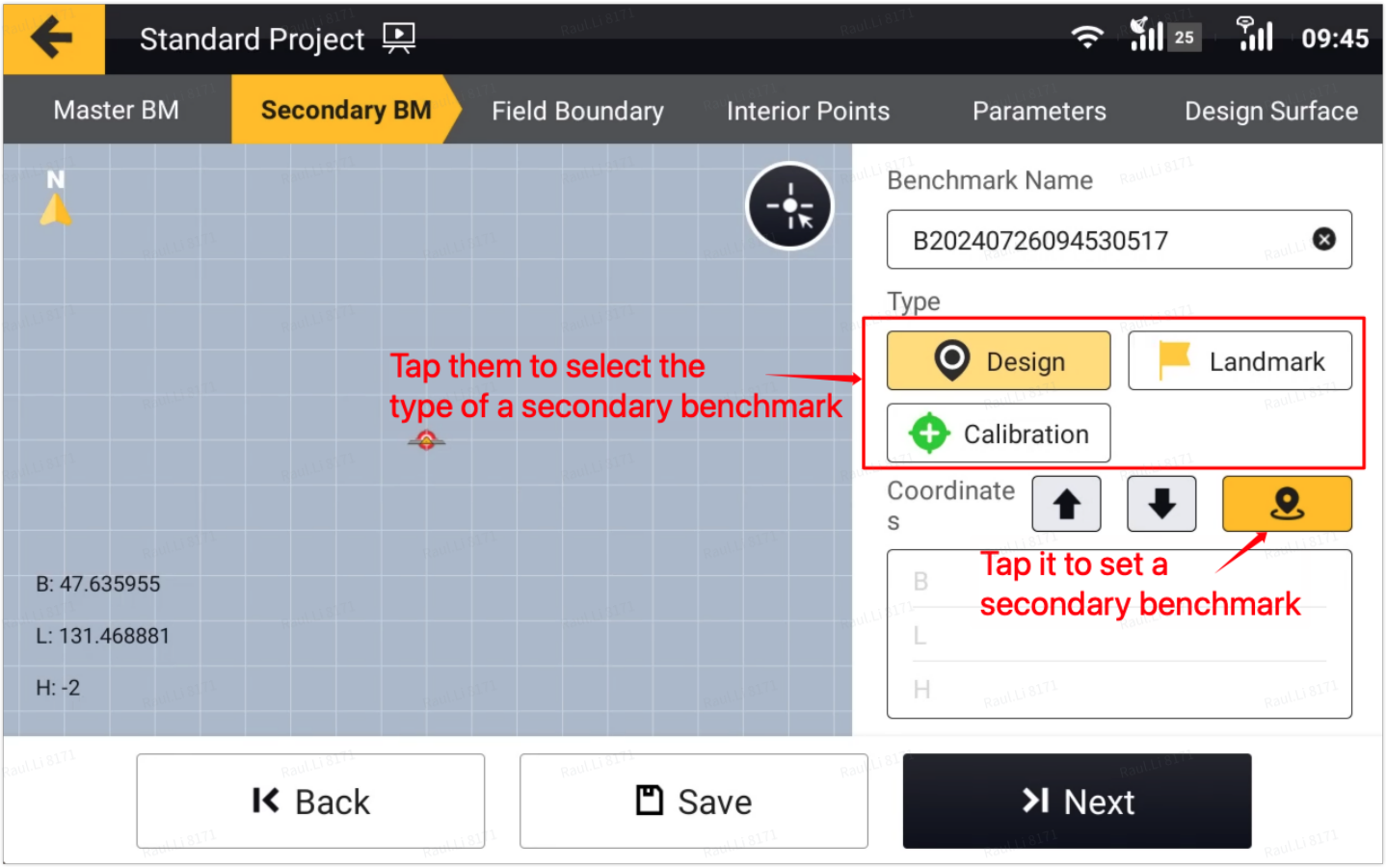
Operate the blade down to set the master benchmark

3.1.2 Set the secondary benchmark

There are three types of secondary benchmarks available. Users can set different types of secondary benchmarks for various uses.

1. For assist design: Two secondary benchmarks will be connected to a line. They can be used to tag the direction of slope and water flow. Notice that the distance between a secondary benchmark and another must be over 10 m in this case.
2. For mark: This type of secondary benchmark can be used to mark obstacles.
3. For calibrate: This type of secondary benchmark can be set as the master benchmark when the master benchmark has been destroyed. Notice that the distance between this type of secondary benchmark and the master benchmark must be over 100 m.

The process of setting a secondary benchmark is as follows. First, users should drive their vehicles to the place they want to use. Second, they should operate the blade down to the horizontal ground. And then, click the **"Collection"** button, and the system will collect the positioning data of the blade automatically. Lastly, click the **"Next"** button, users will be taken to the view to create the boundary of the field.



Set a secondary benchmark

3.1.3 Set The Field Boundary

The field boundary consists of many boundary points. Users should drive their vehicles along the edge of the field, and collect the boundary points of the field. Click the Record button, and follow the process of this operation below.

Step 1: Settings for collecting boundary points

The boundary consists of many boundary points. A pop-up dialog will allow you to set the frequency for marking points while driving along the boundary, which can be based on Distance or Time. The usual setting is by distance, and the default is the width of the blade. If the field area exceeds 60ha, it's recommended to set the auto-collection point spacing to no less than 5 meters.

Step 2: Set the Boundary Position to the Blade

This parameter helps determine whether you will be driving within or beyond the worksite's boundary. To set it accurately, align yourself so that you're facing the same direction as the tractor. Then, observe the location of the field boundary relative to your position. If the boundary lies to your right, select **"right"**.

Step 3: Set the distance from Blade Center to Boundary Distance

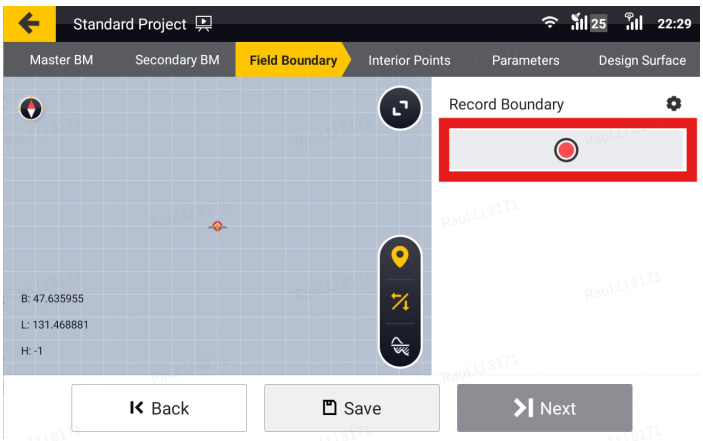
This value specifies the extent to which the field boundary will be expanded or contracted. The term **"blade center"** corresponds to the position of the GNSS receiver. If you don't install the

GNSS receiver above the middle of the blade, please use the distance from the GNSS receiver to the boundary.

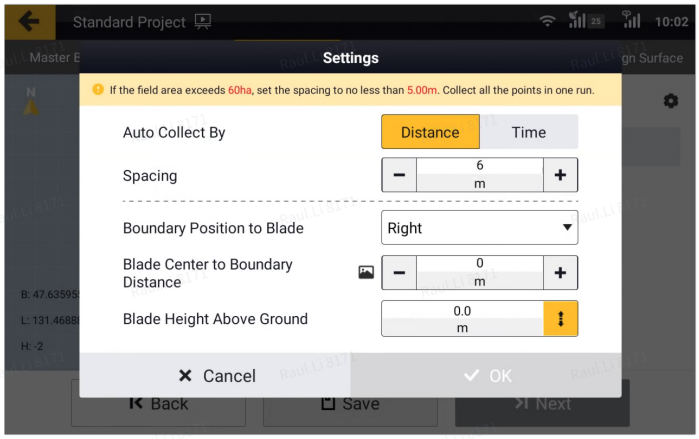
Step 4: Blade Height Above Ground

Click on the yellow button, and following the prompt, place the blade on the ground. Then raise it to a height where it won't touch any obstacles within the working area.

Note: Some tools may exhibit a wobble when the blade is raised to its highest position; there's no need to raise it to the very top.



To set the configuration of record a boundary



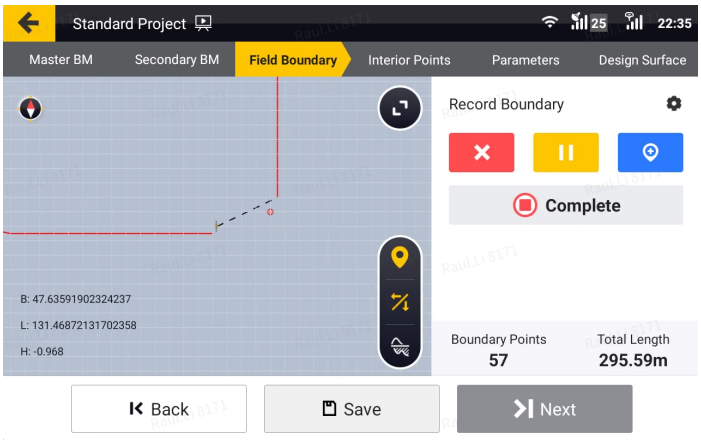
Settings of record a boundary

After clicking **"OK"**, the boundary point collection will start. You can click the blue button to manually add Boundary Points.

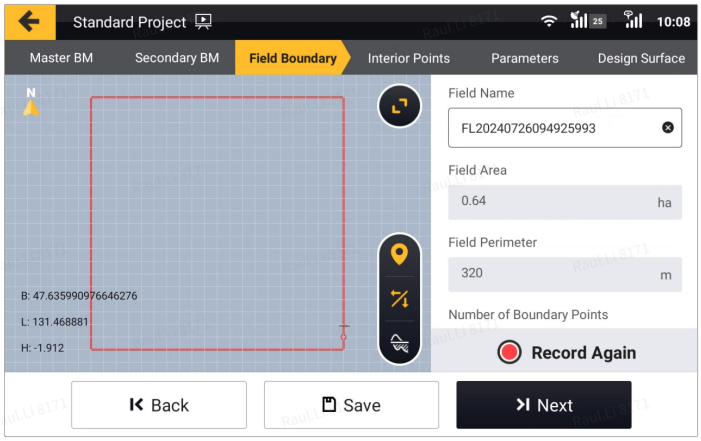
Note: As you near the completion of boundary point collection, try to get the endpoint as close to the starting point as possible. If the distance between the endpoint and the starting point exceeds 5 meters, the algorithm may not be able to close the polygon of the working area. If unsatisfied, you can click Record Again to redraw.

After completing the boundary drawing, the following details will be displayed:

- Default Boundary Name (can be renamed)
- Field Area
- Field Perimeter
- Collected Boundary Points



Auto Closure of Boundary; Tap the Complete button to end the record



Confirm the recorded boundary

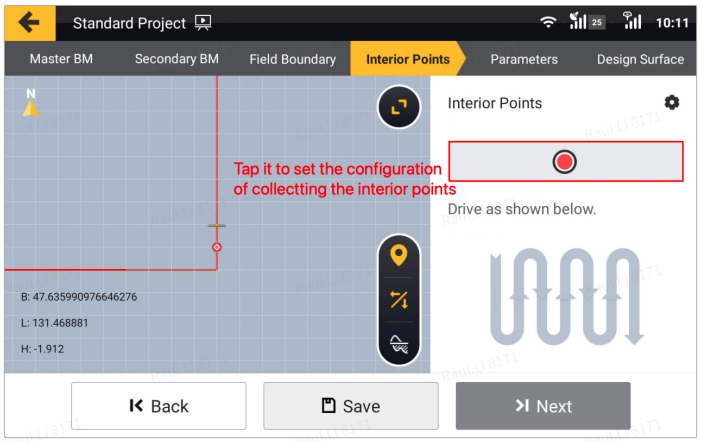
3.1.4 Collect Interior Points

Press [Record] to enter the settings for collecting interior points within the work area.

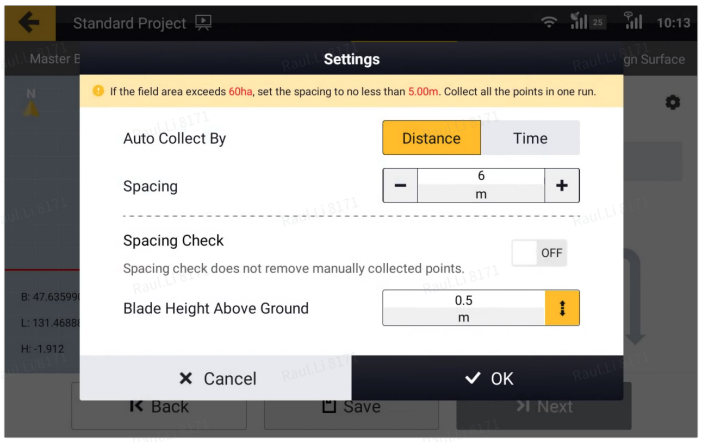
Settings: Choose an automatic collection interval for these points, based on either distance or time. Typically, we recommend distance, defaulting to your boundary settings. For work areas exceeding 60 hectares, set an interval greater than 5 meters.

Spacing Check: If enabled, manually marked interior points won't be disregarded due to close proximity.

Blade Height Above Ground: If no adjustments were made to the blade in the previous **"Field Boundary"** step, there's no need to reset its height. Otherwise, please re-enter its height.



To set the configuration of collecting interior points



Settings of collecting interior points

Once **"OK"** is clicked, the collection of interior points begins.

For optimal results, adopt a U-shaped path around the plot. Aim to complete this in one go; interruptions require a restart.

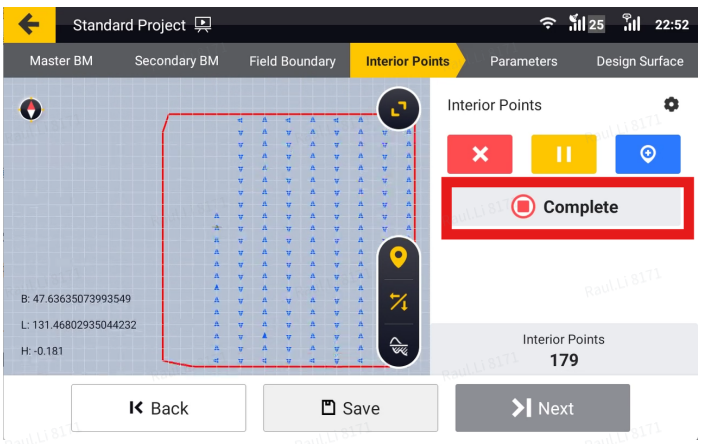
Button functions

Icon	Name	Function

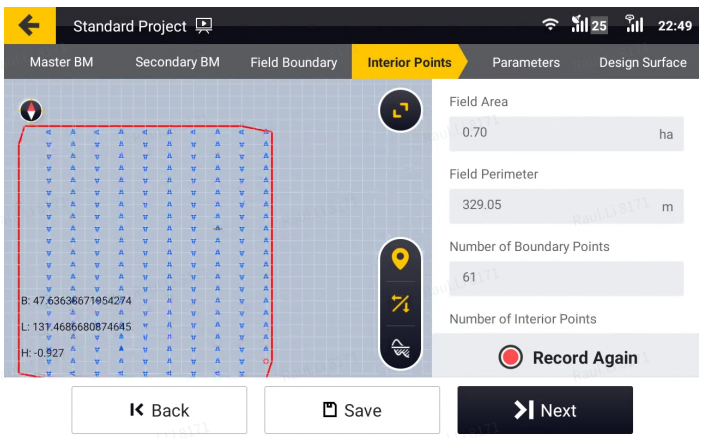
	Exit Interior Point Collection	Exits the interior point collection mode.
	Pause/Resume Collection	Pauses or resumes the collection process.
	Manually Mark Points	Allows for manually marking points during collection.

Using the map on the left, ensure the collected interior points cover a significant portion of the work area. Ideally, they should cover more than 50% of the area. If the coverage is below 25%, continue collecting.

Click [Complete] to finish collecting interior points and proceed to the next step.



Tap the Complete button to end collect

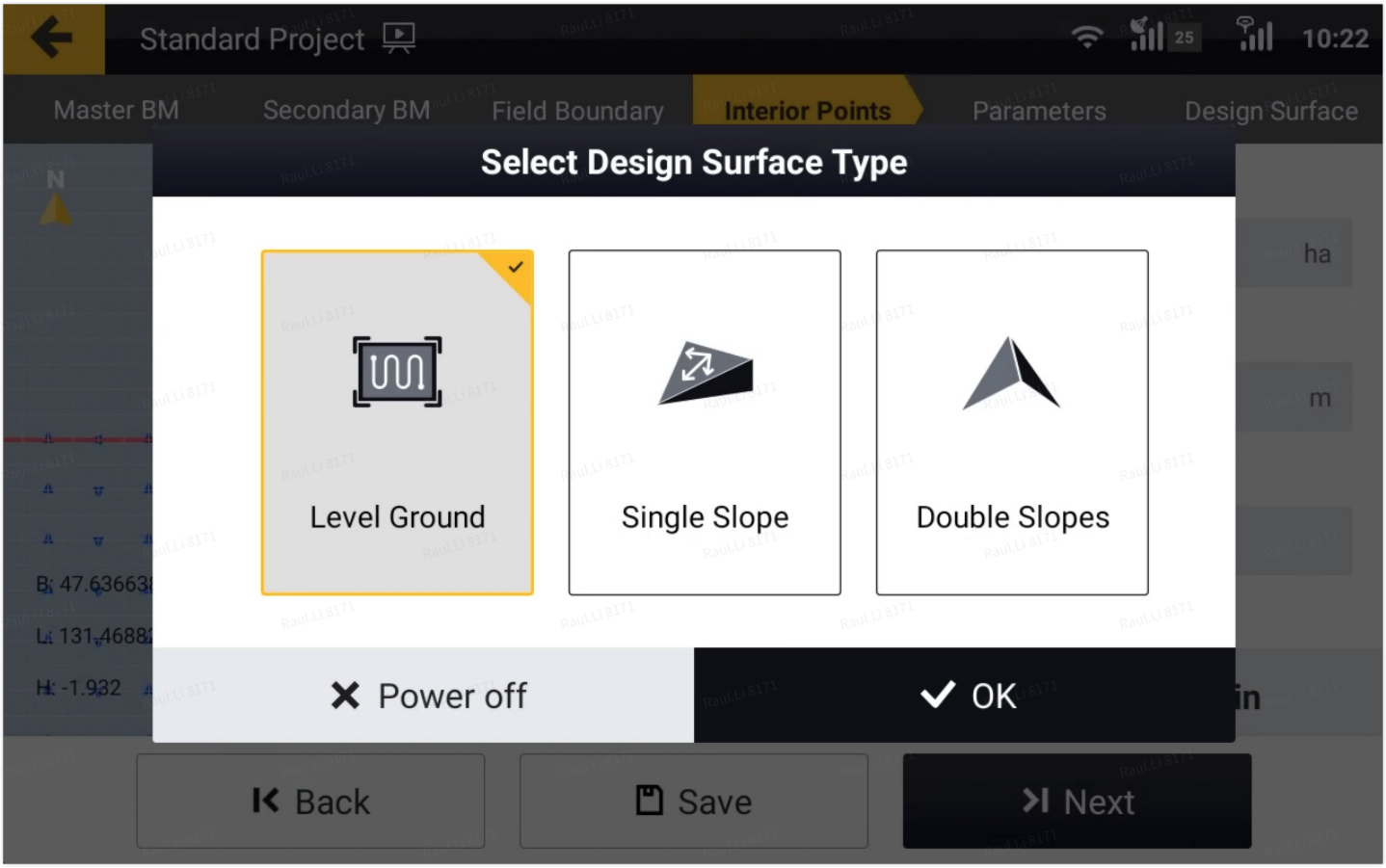


Confirm the interior points

3.1.5 Parameters-Choose type of the design surface

There are three types of planes available to serve your project. Please choose the type of design plane based on your needs:

- Level Ground
- Single Sloped Surface
- Double Sloped Surface



Select Design surface type

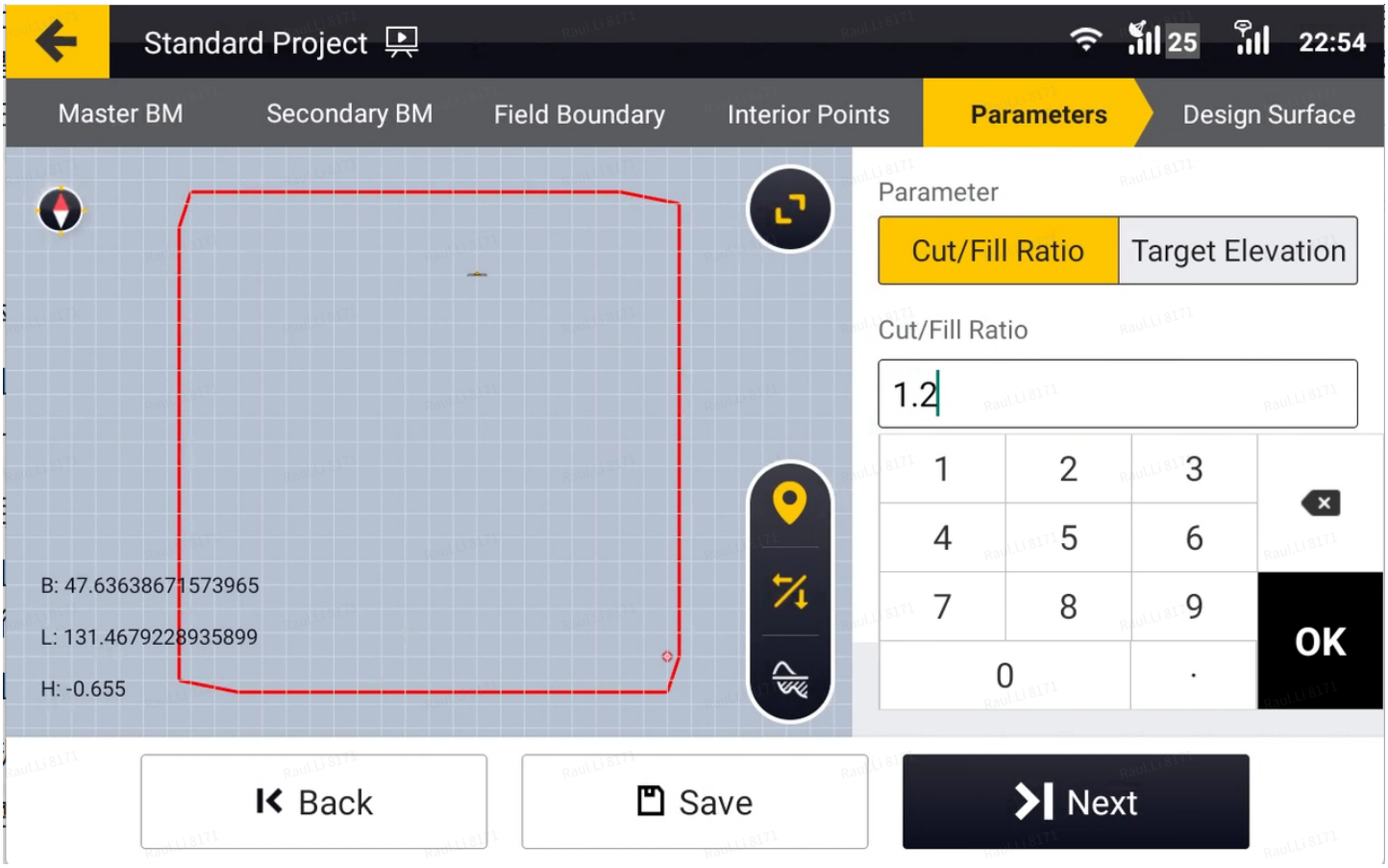
Level Ground

In this design type of Level Ground, You can modify the cut/fill ratio or the target elevation to create the design surface.

Cut/Fill Ratio = Volume of Soil Excavated / Volume of Soil Filled

The cut/fill ratio largely depends on the condition of the soil. Please enter the appropriate cut/fill ratio based on the soil's compactness in the actual working area:

1. If the soil in the work area is compact, it will undergo less additional compaction when excavated and filled elsewhere. Therefore, use a lower cut/fill ratio, such as 1.
2. On the other hand, if the soil in the work area is loose, please enter a higher cut/fill ratio, like 1.2.



Enter Cut/Fill Ratio value of the Level Ground type

If you don't make any changes, we'll use our default values to calculate the plan with the minimum amount of earthwork.

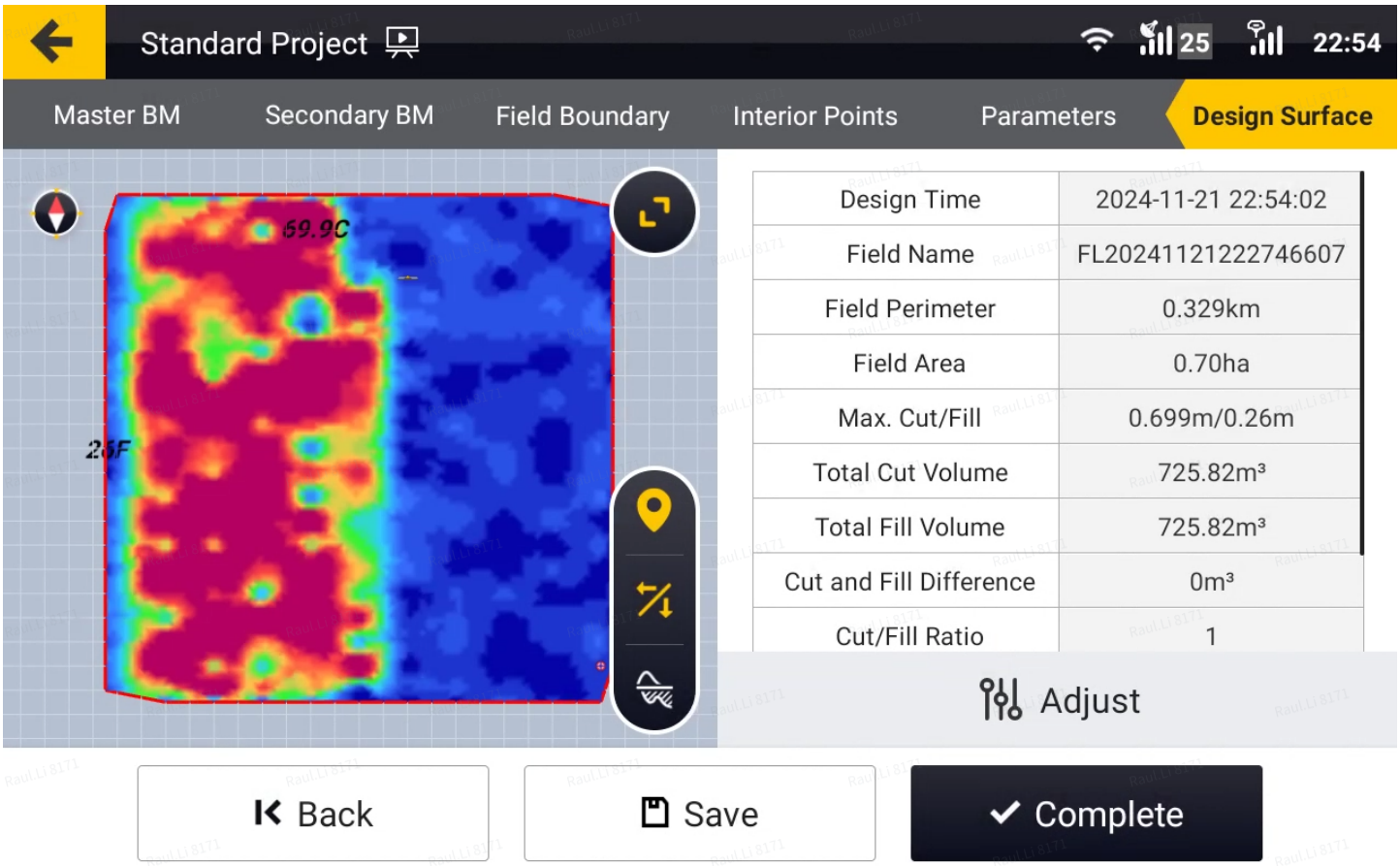
If you find the map display too cluttered, you can use the three buttons on the side of the map to show/hide corresponding information: benchmarks, boundaries, and interior points.

Click **"Reset to Default"** to revert to the default parameters designed by the algorithm.

If you want to modify the design surface type, you can click **"Back"** to return to **"Interior Points"** and make a new selection.

Click **"Save"** to exit the project creation and return to the homepage. To re-enter, click **"Projects"** -> **"Creating"**.

Click **"Next"** to generate the design surface.

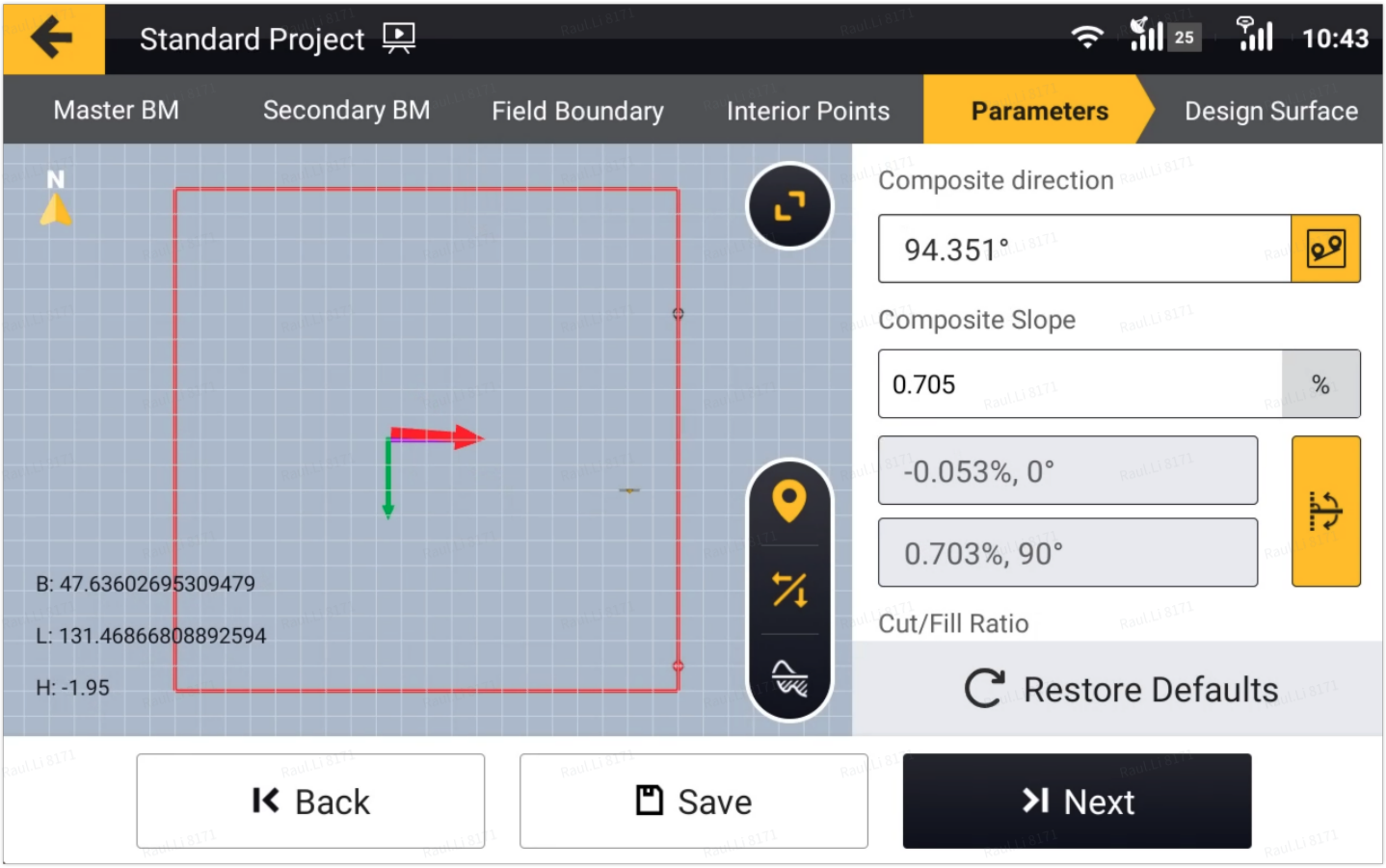


Details of the surface you designed with Level Ground

Single Sloped Surface

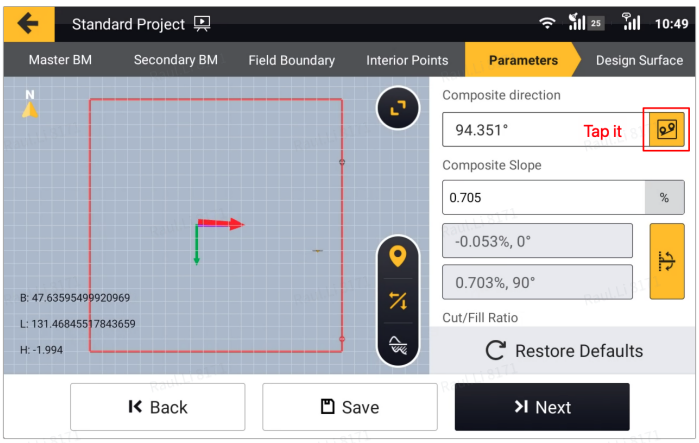
In this design type of Single Sloped Surface, you can set the direction and slope value of water flow by several methods.

When you don't make any changes, we'll use our default values to calculate the plan with the minimum amount of earthwork.

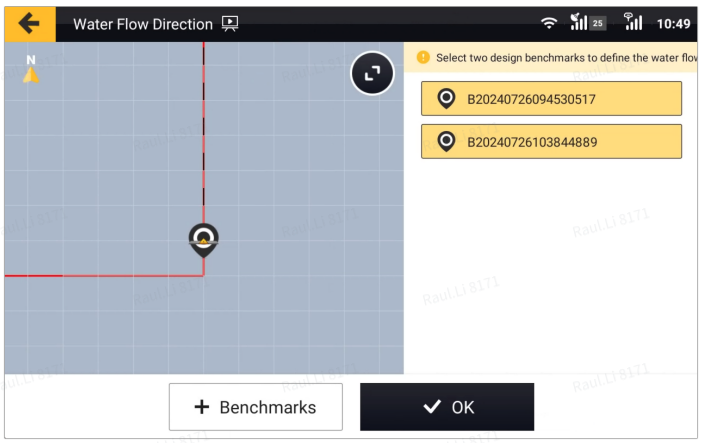


Default parameters of Single surface

If you want to reset the direction of water flow, we provide a method to select two secondary benchmarks-design.

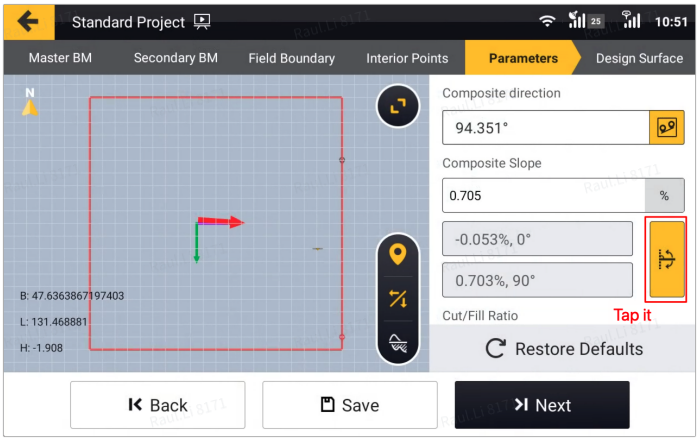


To select two secondary benchmarks

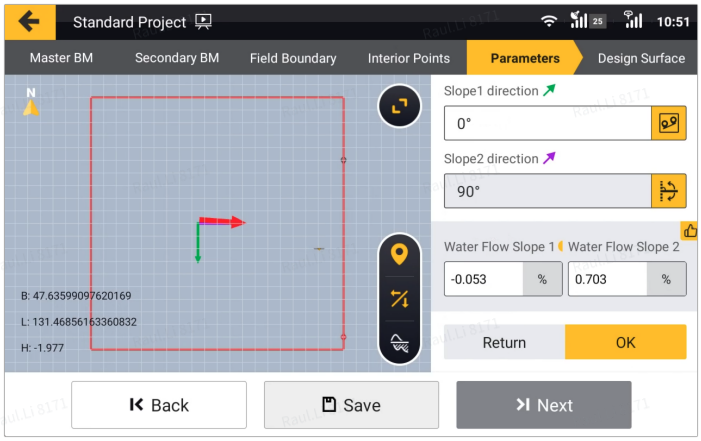


Select the benchmarks you want to use

For laser leveler users who are used to having two slopes to note the composite slope, we also provide the options to enter the direction and value of Slope1 and Slope2 to adjust it.



To enter the value and direction of Slope1 and Slope2

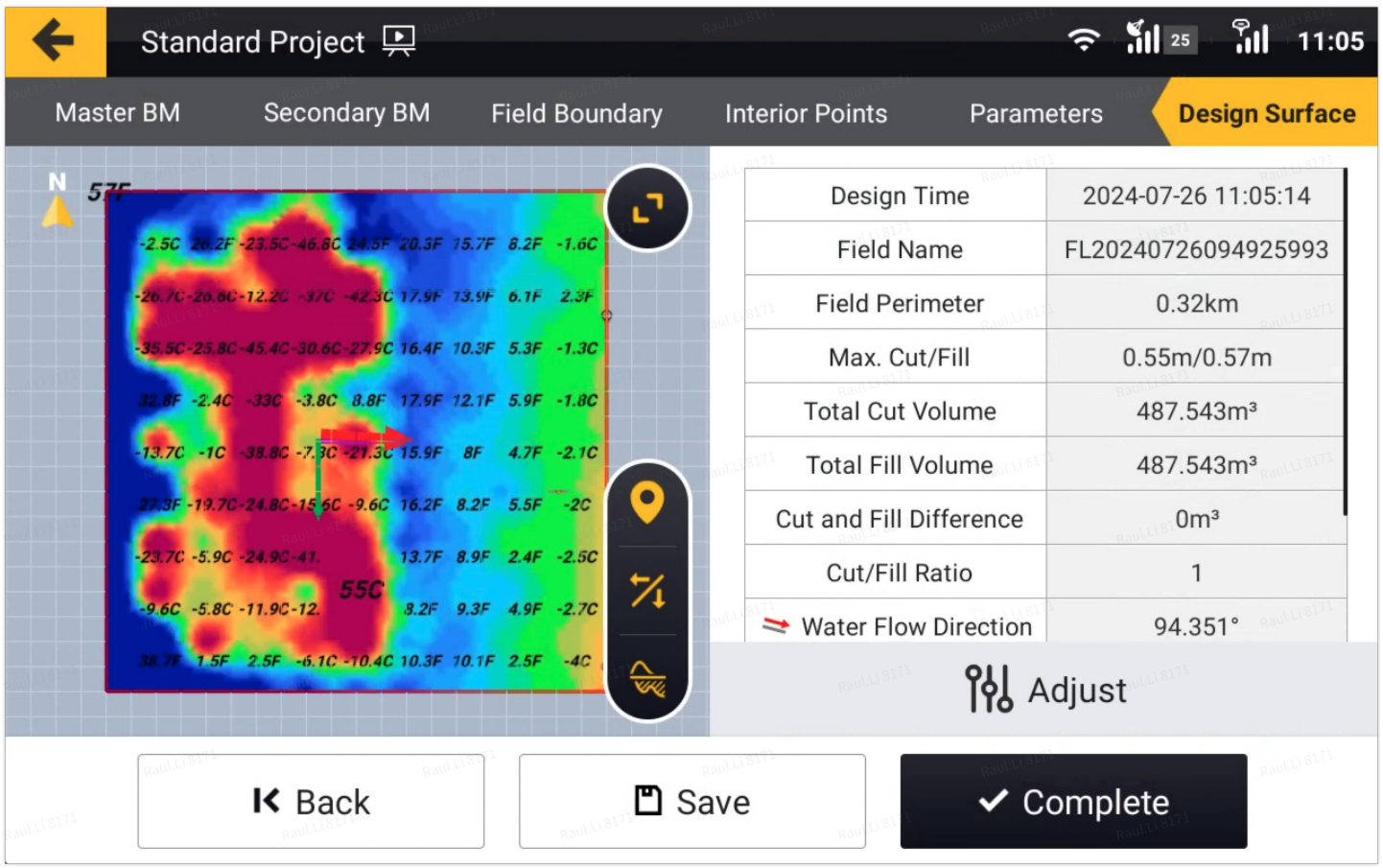


Adjust Slope1 and Slope2

If you want to modify the design surface type, you can click **"Back"** to return to **"Interior Points"** and make a new selection.

Click **"Save"** to exit the project creation and return to the homepage. To re-enter, click **"Projects"** -> **"Creating"**.

Click **"Next"** to generate the design surface.

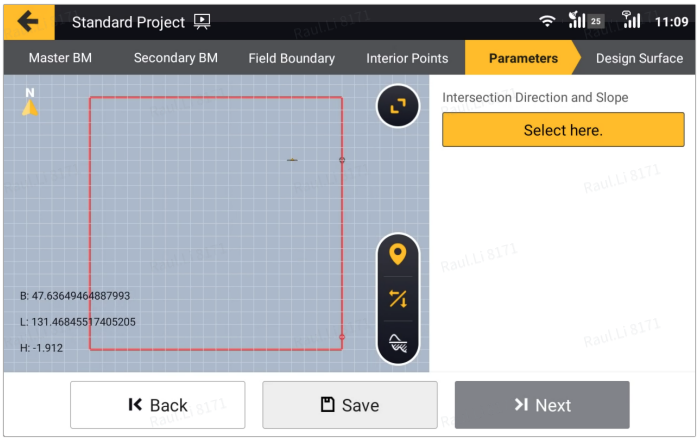


Details of Single Sloped Surface type

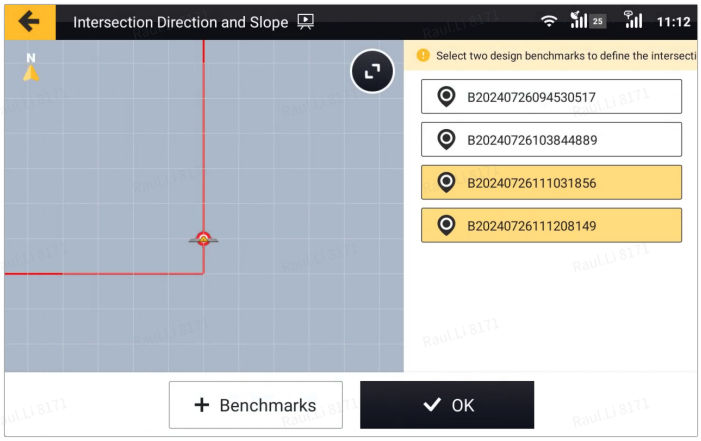
Double Surface

This design type is applicable when you need to operate on both sides of a ridge.

To create the slope intersection, two secondary benchmarks - design are required. Click on [Select here.] to choose two secondary benchmarks. Only design points can be used.



The entrance of selecting benchmarks

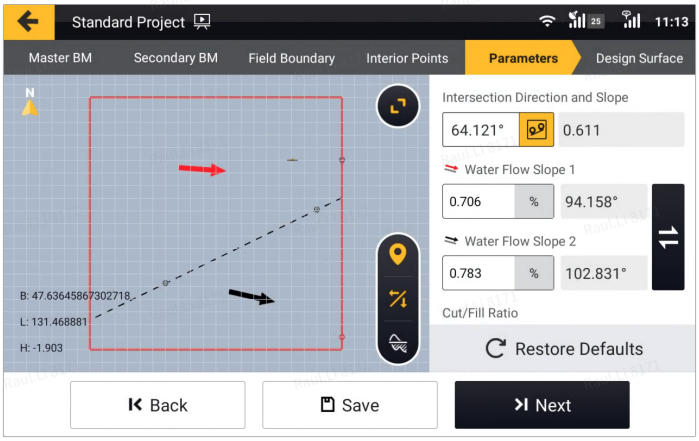


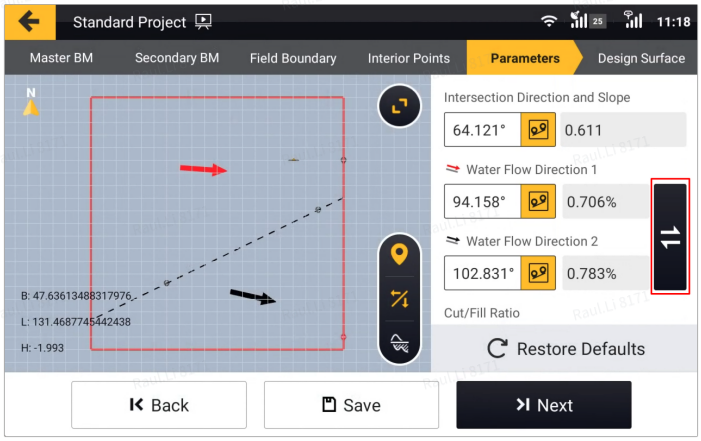
Select two benchmarks to design

Click **"OK"**, and the algorithm will generate the design for the double slope surface.

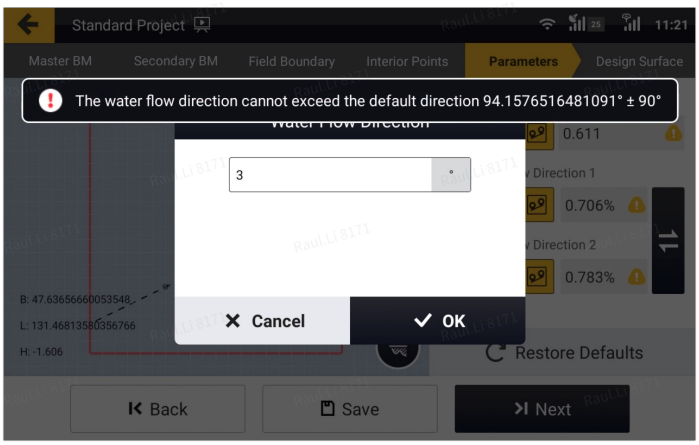
If you still wish to modify the direction of water flow, please click on the yellow button and select two secondary benchmarks - design to mark. Please note that you cannot manually input the slope angle.

You can also input the respective cut/fill ratio to influence the design surface generated afterward.

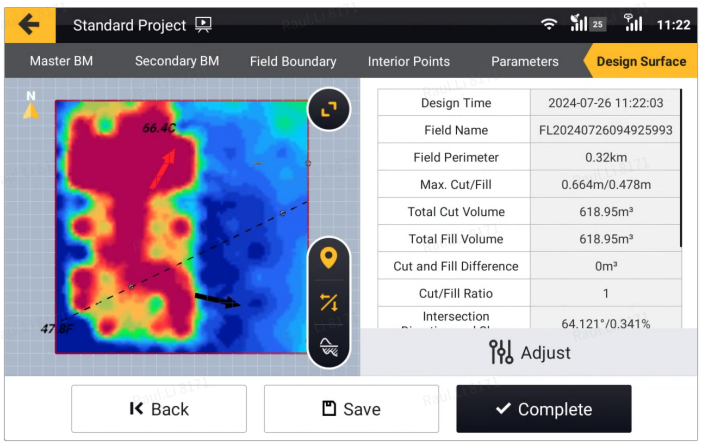




The algorithm limits the users to change the water flow direction too much since it doesn't make sense to move too much earth.



The water flow direction is limited



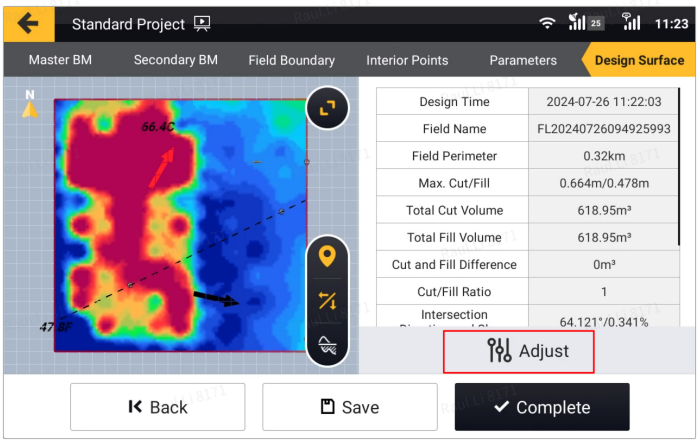
Details of Double Surface type

3.1.6 Generating design surface

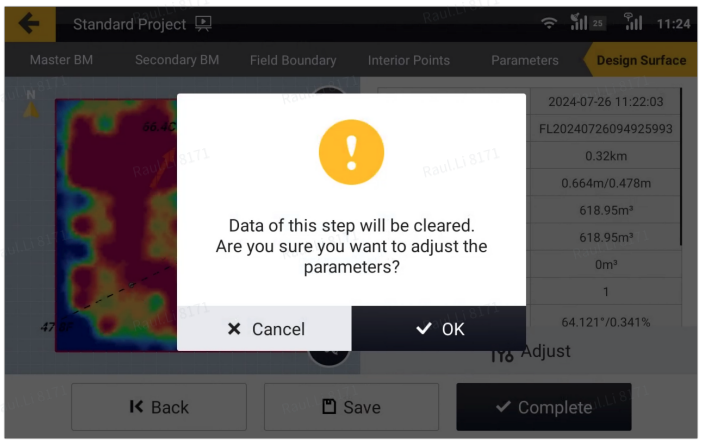
You can view various information about the design surface on this view. If you still want to make modifications, please click **"Adjust"**. It will take you back to the parameters page for adjustments.

Click **"Complete"** to generate the design surface.

If you still want to modify the design surface later, you can go to **"Project Management"**, find your project under **"Ongoing",** enter the project details, go to the last step **"Design Surface"**, and click **"Adjust"** to make changes. Projects that are **"Completed"** or **"Terminated"** cannot be modified.



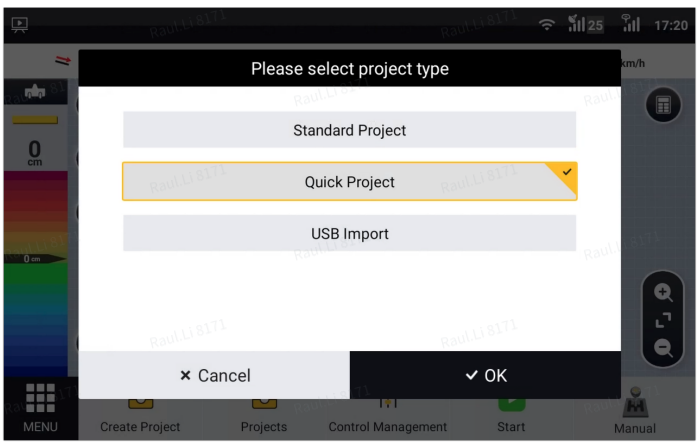
Tap the Adjust button to modify designed surface



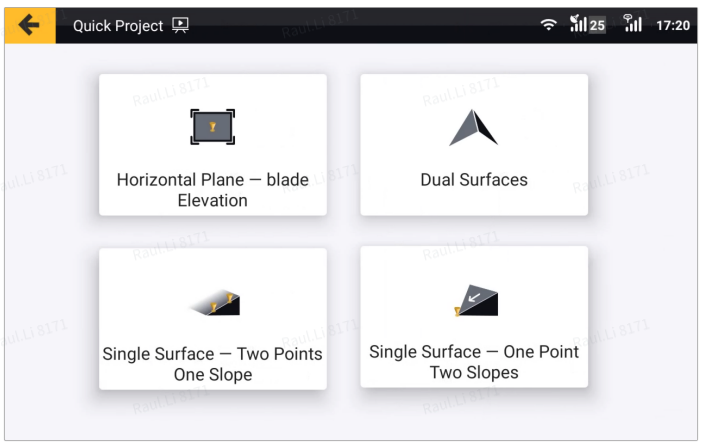
Confirm the modify operation

3.2 Create a quick project

The quick project can provide a variety of methods to create a design surface quickly, including **"Horizontal Plane - Blade Elevation"**, **"Single Surface - One Point Two Slopes"**, **"Single Surface - Two Points One Slope"** and **"Dual surface"**. Users can select the best method to create a design surface according to the scenario of the field. The detail is as follows.

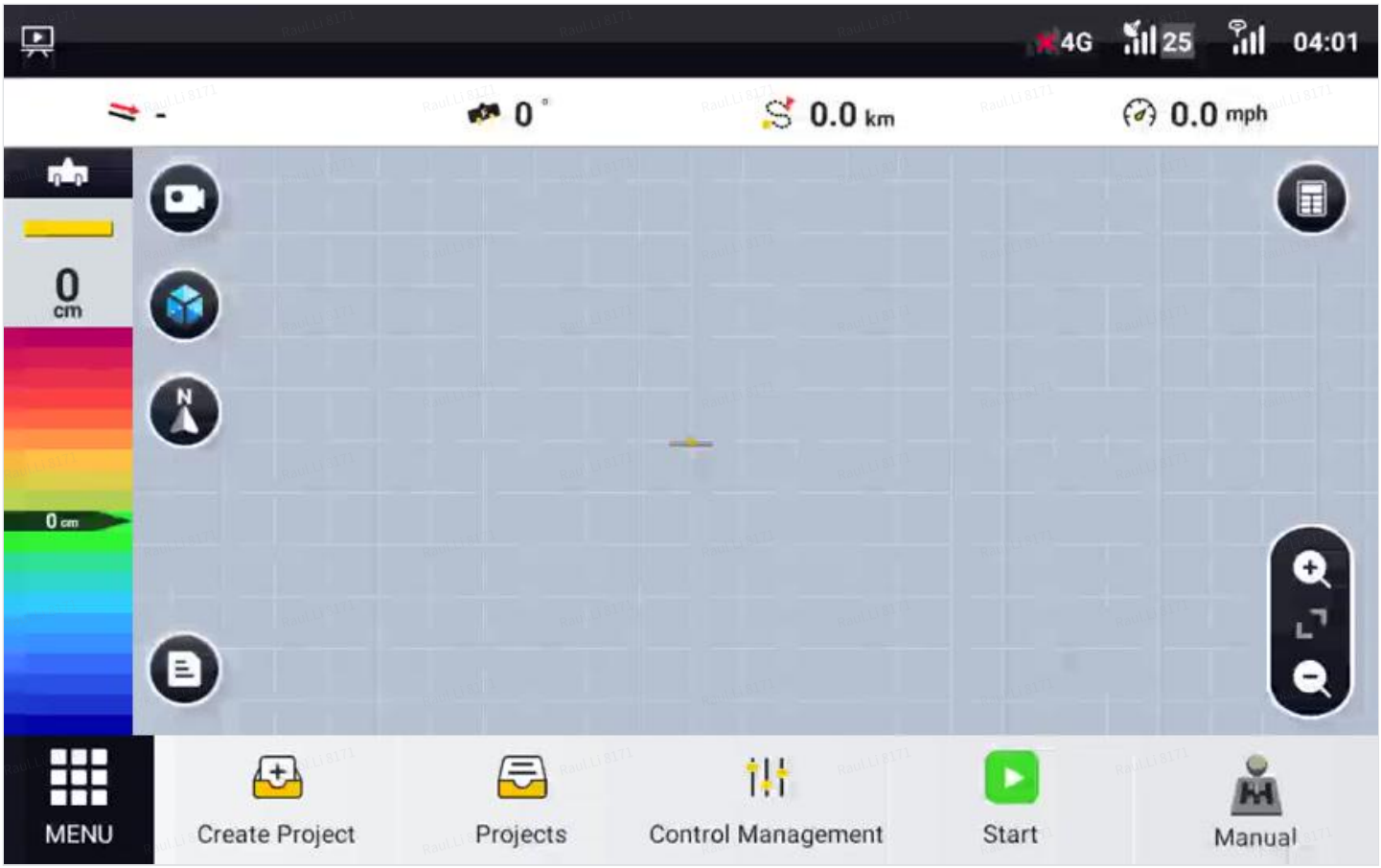


The entrance of create a quick project



Types of Quick project

3.2.1 Horizontal Plane - Blade Elevation

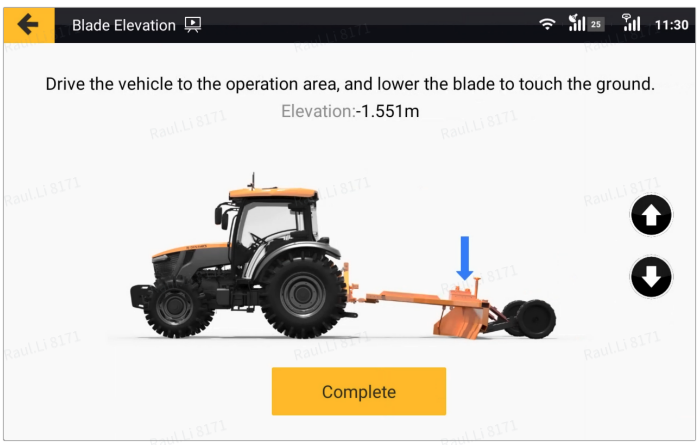


Video——Create a quick project through blade elevation

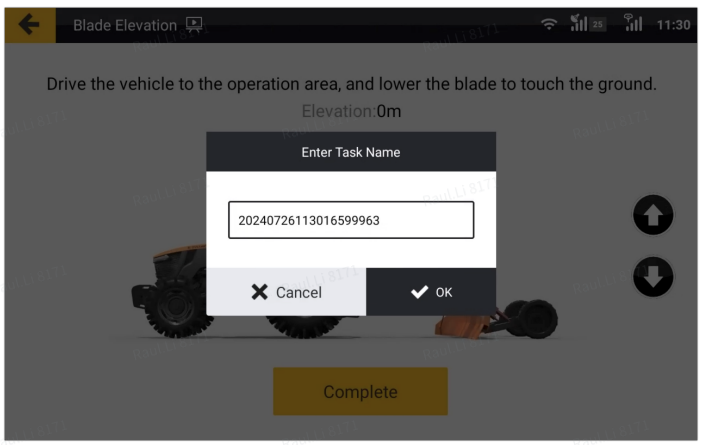
The following two steps are required to create a quick project with the **"Horizontal Plane - Blade Elevation"** method.

Step 1: Click the **"Horizontal Plane - Blade Elevation"** button, and then click the **"UP"** and **"DOWN"** arrow button to control the blade move. Users should click the **"COMPLETE"** button when the blade is moved to the ground, the collected elevation is the elevation of design surface.

Step 2: Name the project file, and click the **"OK"** button when finished.



Collect the elevation of blade



Save the project

3.2.2 Dual Surfaces

Video——Create a quick project through dual surfaces

This method is applicable when you need to operate on both sides of a ridge. The operation is as follows.

Step 1: Tap **"Double Sloped Slopes"**, and the collection screen appears. Drive the vehicle to the higher end of the ridgeline, lower the blade to the ground to collect the higher point A, and tap **"Next"**.

Step 2: Select the collection mode of point B according to the actual conditions, and then tap **"OK"**. You can collect point B with the blade or by entering a value.

- **Collect with the blade**

Drive the vehicle to the lower end of the ridgeline, press and hold the down arrow to lower the blade to the ground to collect the lower point B, and tap **"Next"**.

- **Enter a value**

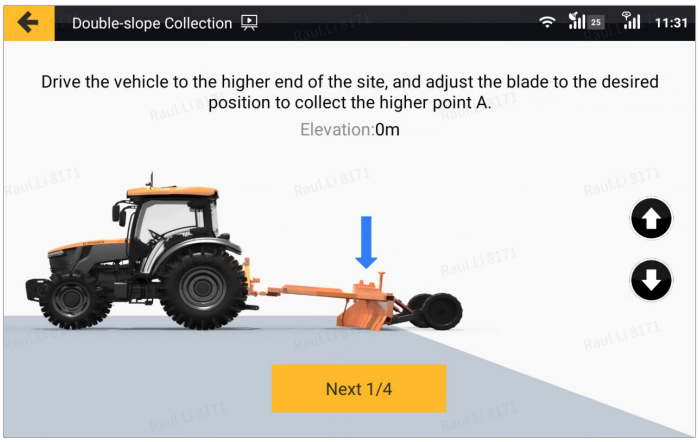
Drive the vehicle to the lower point B of the ridgeline, lower the blade to the ground, enter either of the following values according to the illustration, and then tap **"Next"**.

Step 3: Drive the vehicle to the lower end of one side of the ridgeline AB, lower the blade to the ground to collect point C, and tap **"Next"**. Ensure that point C is not on the extension line of ridgeline AB and that the vertical distance between them is more than 4 m.

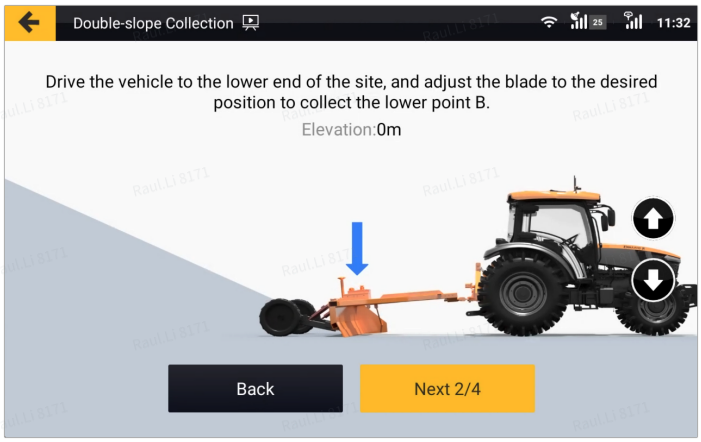
Step 4: Drive the vehicle to the lower end of the other side of the ridgeline AB, lower the blade to the ground to collect point D, and tap **"Next"**. Ensure that point D is not on the extension line of

ridgeline AB and that the vertical distance between them is more than 4 m.

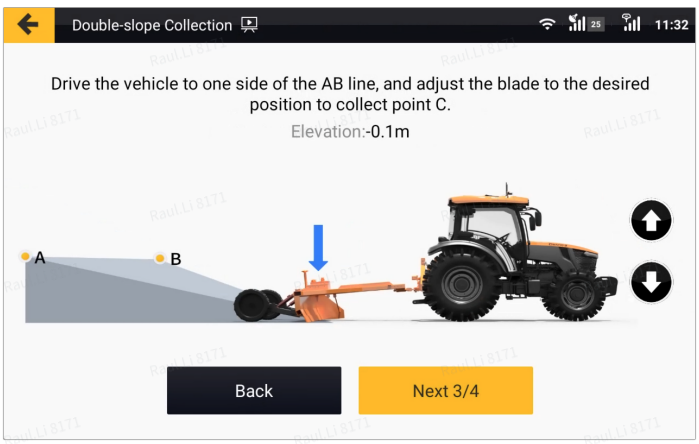
Step 5: Enter the task name, and then tap **"OK"**.



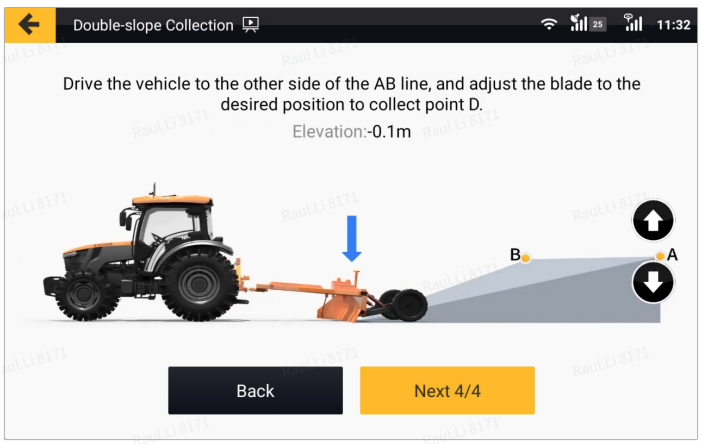
Collect point A



Collect point B(collect with the blade)

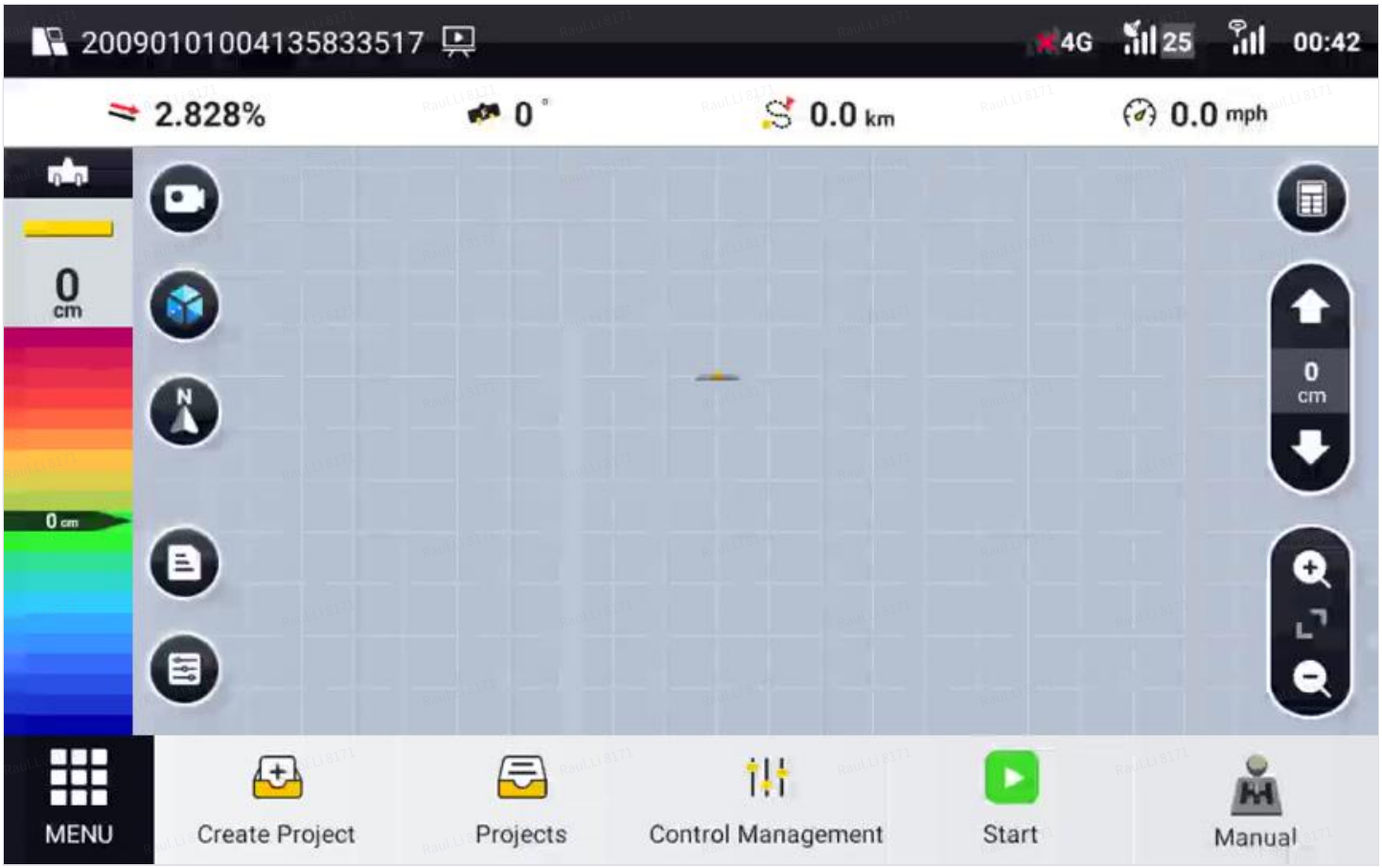


Collect point C



Collect point D

3.2.3 Single Surface - One Point Two Slopes



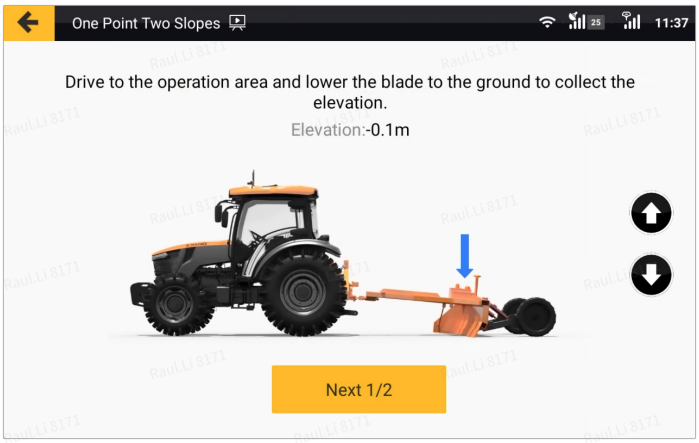
Video——Create a quick project through one point two slopes

The Single Surface - One Point Two Slopes design method is suitable for stepped fields and gently undulating fields. The operation is as follows.

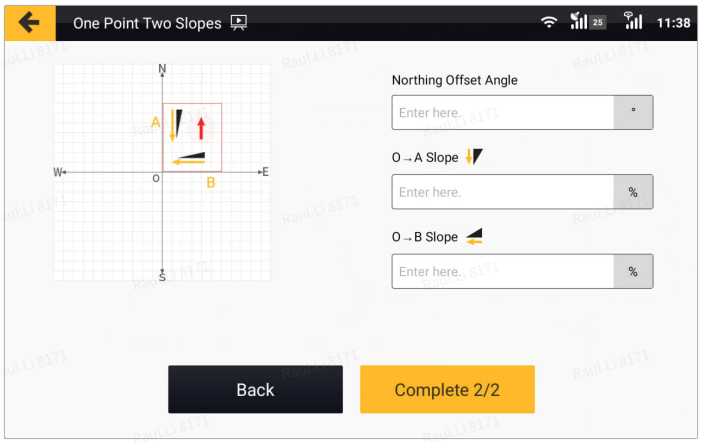
Step 1: Drive their vehicles to the operation area, and then click the **"Collection"** button after controlling the blade descent to the ground.

Step 2: Edit the Northing offset angle, O->A Slope and O->B Slope to adjust the water flow direction and water flow slope.

Step 3: Click the **"Complete"** button, and then name the project file.



Collect the positon of the blade



Enter parameters of the water flow

3.2.4 Single Surface - Two Points One Slope

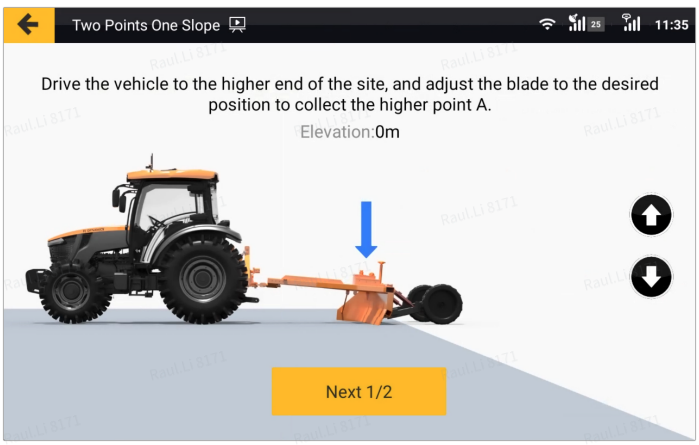
Video——Create a quick project through two points one slope

The Single Surface - Two Points One Slope method is suitable for fields with obvious terrain. The operation is as follows.

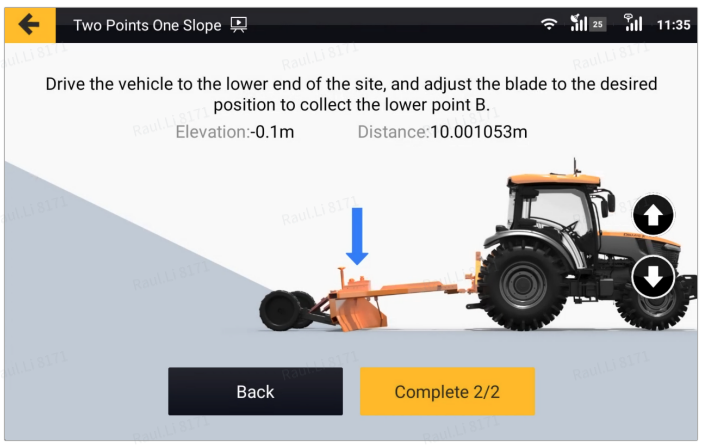
Step 1: Drive the vehicle to the high area of the field, and then click the **"Collection"** button after the blade is controlled to the ground by clicking the **"DOWN"** arrow button. The place where the vehicle is located will be named Point A.

Step 2: Drive the vehicle to the lower area of the field, the place where the vehicle is located will be named Point B. Users can collect the position data by **"Collect with the blade"** and **"Enter a value"**. In the case of **"Collect with the blade"**, users should click the **"Complete"** button after controlling the blade to the ground.

Step 3: Name the project file after clicking the **"Complete"** button.



Collect point A



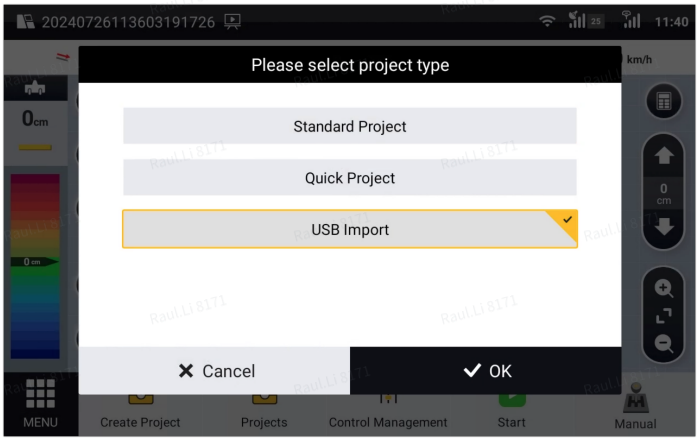
Collect point B(collect with blade)

3.3 Create a project via USB import

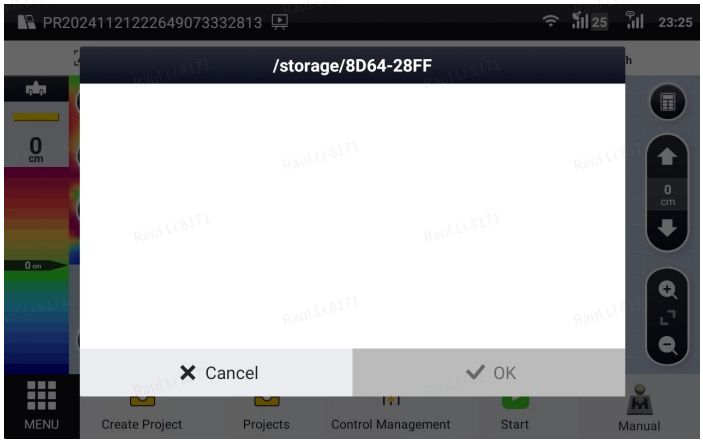
Users can create a project by importing standard project files (.json) and design surface files (.agd) via USB flash drive. The work flow is as follows.

Insect USB flash drive → Click the **"Create Project"** button on the home screen → Click the **"USB Project"** button → Select the file you want to use → Confirm to import → Project creation successed.

Note-The method can only support the design surface file (.agd) and FJDynamics's standard project file (.json) currently.



The entrance of creating a project via USB flash drive



USB flash drive is not mounted

3.4 Project Managenment

Before introducing project management, I will summarize some concepts and key processes of a standard project.

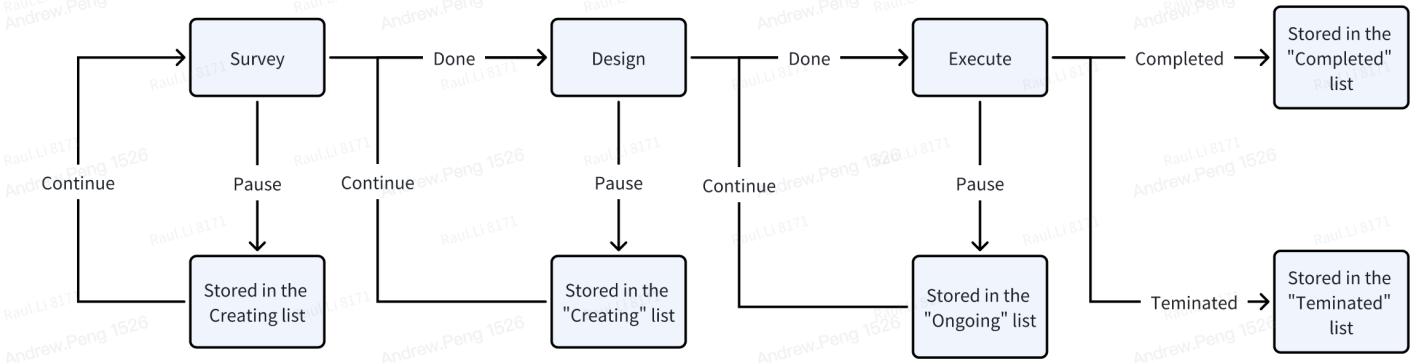
A project: The highest level of structure. A project contains a field survey and their associated designs and operation tasks; From creation to completion, it takes three simple steps.

Survey: Map your fields with precision RTK measurements to create benchmark, boundaries, interior points, and surfaces with ease.

Design: Analyze topographic data to create a best-fit surface based on your survey, prescribed slopes, and cut and fill balance requirements.

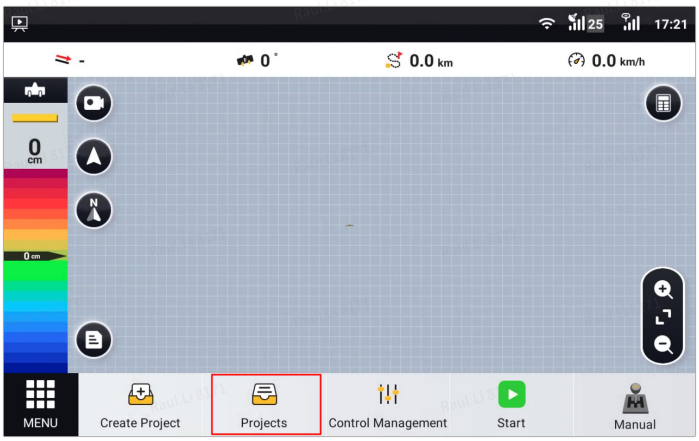
Execute: Grade the field using the field design as a machine control model.

The system saves all the projects and their related surveys, designs, jobs in the Projects module, which gives you another chance to view, edit, continue or delete the projects. From the end to end process, the system will display the projects into 4 tabs based on their state. The state flow diagram is as follows.

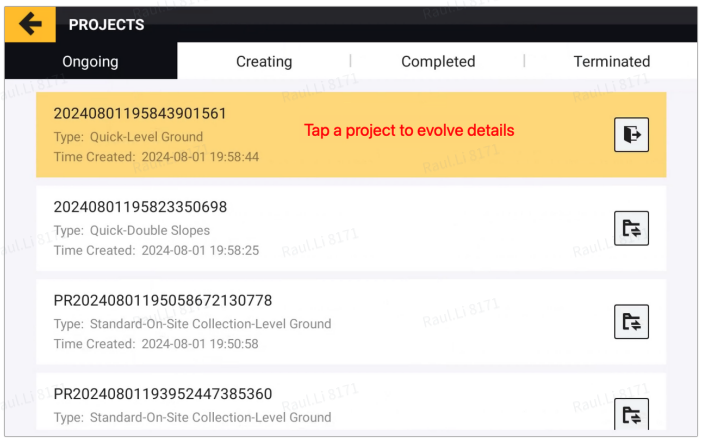


The state flow diagram of the standard project

Tab the project, users are provided with an in-depth view of each project's specific details. This view facilitates not only the examination of comprehensive project information but also allows for the modification and customization of project parameters as required. This feature ensures that users can seamlessly update and tailor project details to align with evolving requirements and objectives.



Projects management entrance



To evolve project details

3.4.1 Query projects by state

Video——Query projects by tapping four tabs

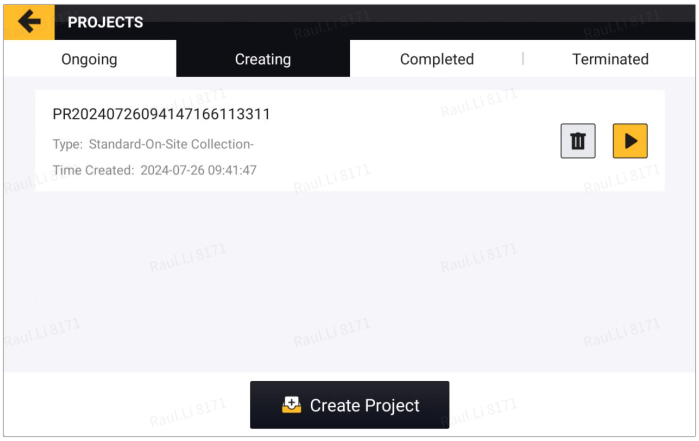
From the end to end process, the system will display the projects into 4 tabs based on their state, including Ongoing, Creating, Terminated and completed. You can query the corresponding projects by clicking the tab on the project view.

The **"Ongoing"** tab displays the projects that have not yet completed the field leveling.

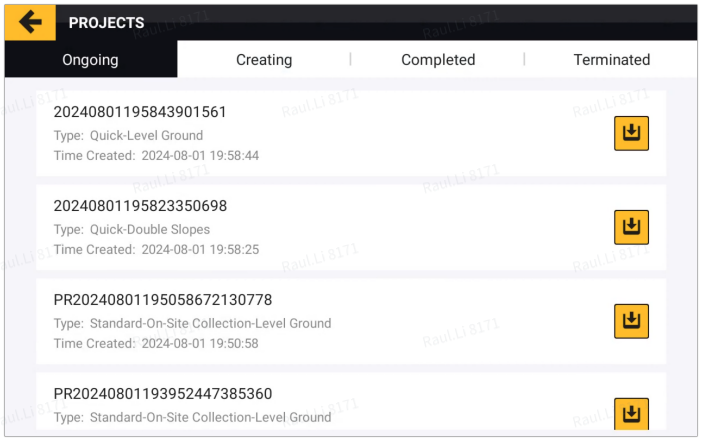
The **"Creating"** tab displays the projects that have been created, but not yet finished generating the design surface.

The **"Completed"** tab displays listing the recent projects that have completed the field leveling.

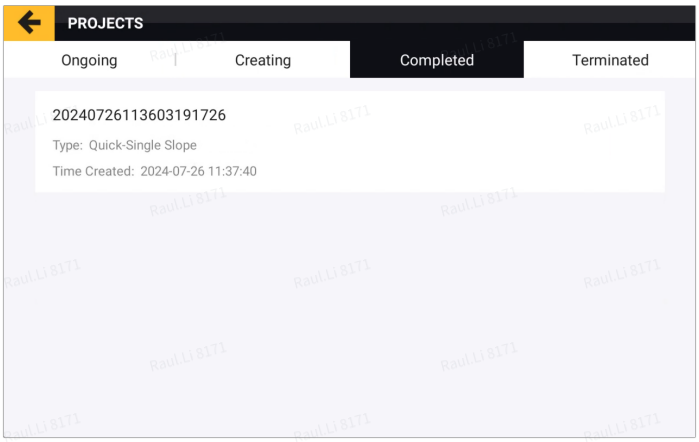
The **"Teminated"** tab displays listing the recent projects that have been terminated; Be very careful that if you mark the project terminated, all the data will become view only.



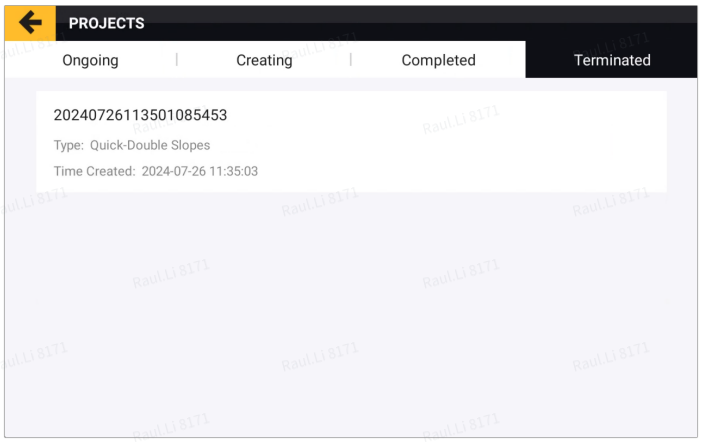
The Creating projects



The Ongoing projects



The Completed projects



The Terminated projects

3.4.2 View details of a specific project

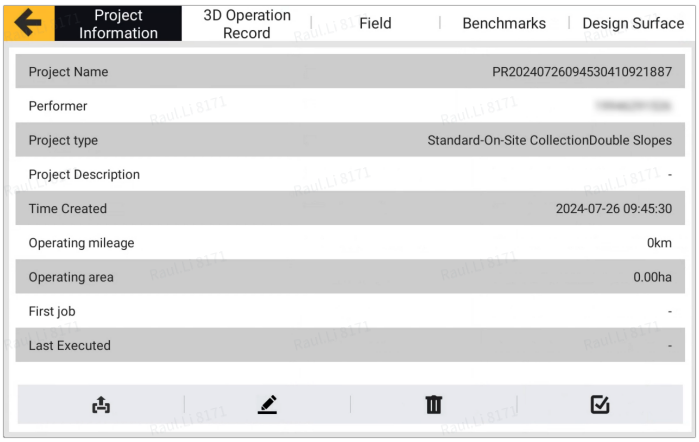
Video——View details of a standard project

Tap a specific project in the project management list to select it to view or edit the project information. The project details view consists of several tabs, and the specific tabs are determined by the type of project. Here is an example of the standard project as follows.

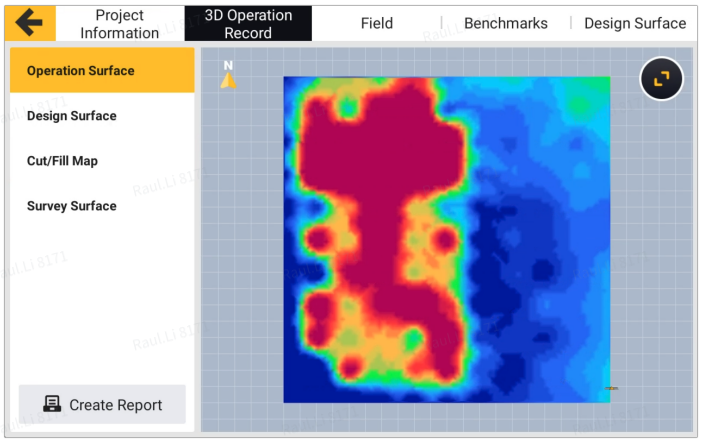
Project Information: It shows the basic information of the project.

3D Operation Record: It shows 4 topografic drawings as follows.

- Design Surface: The three-dimensional data shows the target surface topography of the land.
- Cut/Fill Map: The three-dimensional data shows the cut and fill value on the survey surface.
- Operation Surface: The three-dimensional data shows the actual surface topography of the land after granding.
- Survey surface: The three-dimensional data shows the original surface topography of the land.



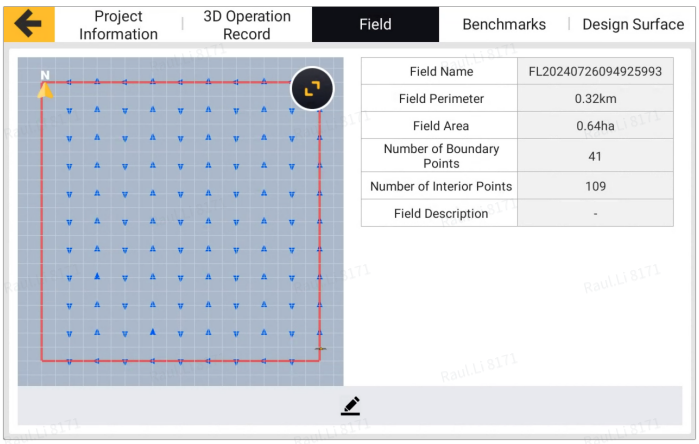
The project information



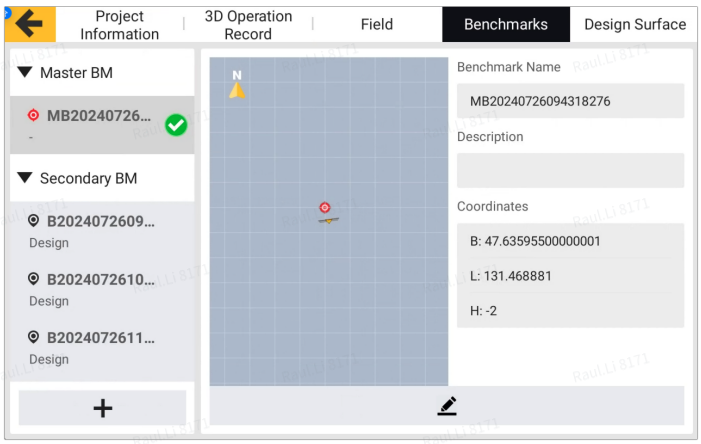
Topografic drawing of operation surface

Field: It shows the detailed information of the field.

Benchmarks: It shows the coordinates of the master BM and secondary BM.

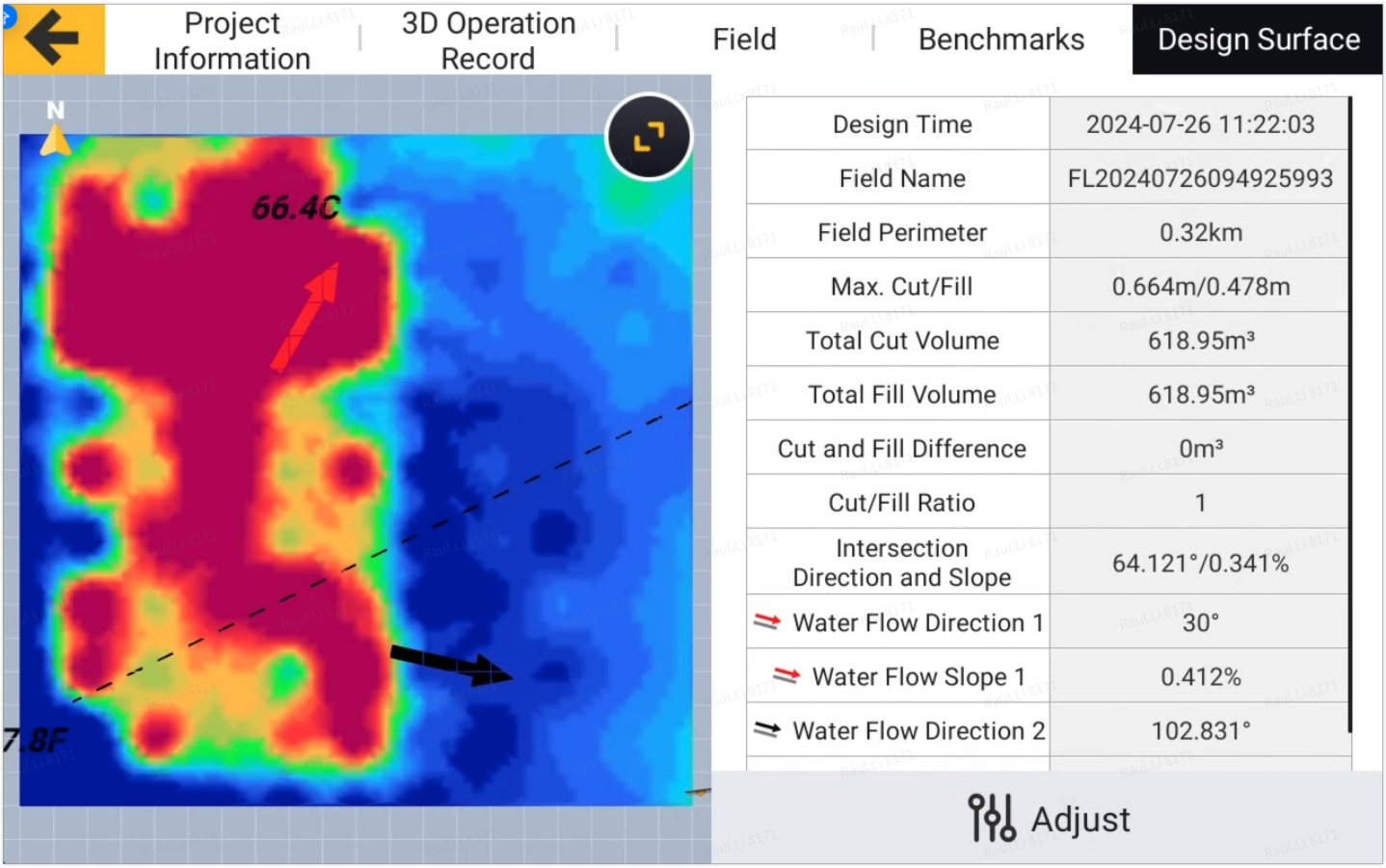


The field information



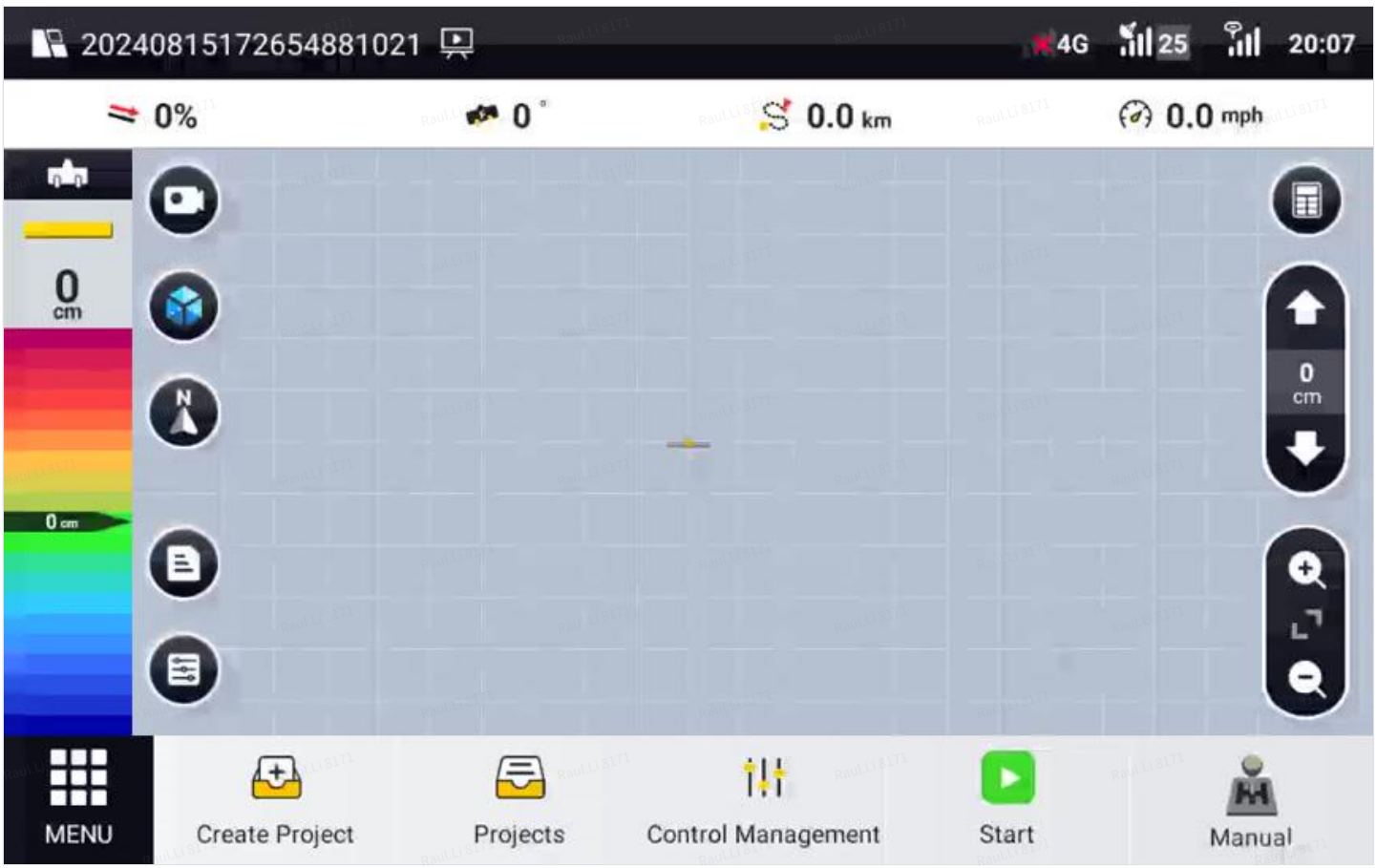
Benchmarks information

Design Surface: It shows design statistics and design surface after you have calculated any changes to the design.



Design surface information

3.4.3 Switch the operating project

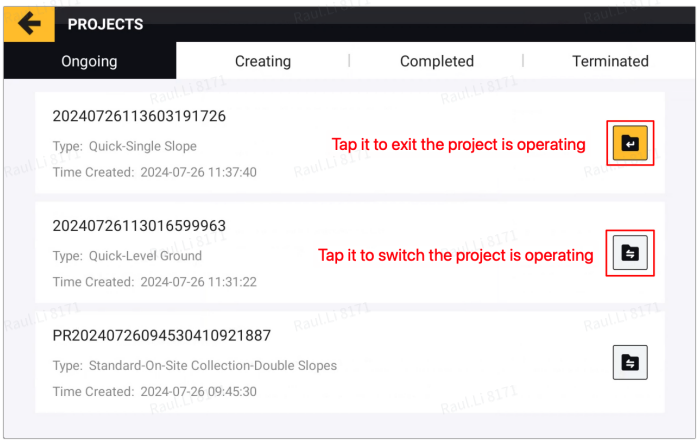


Video——Switch the operating project and mark a project

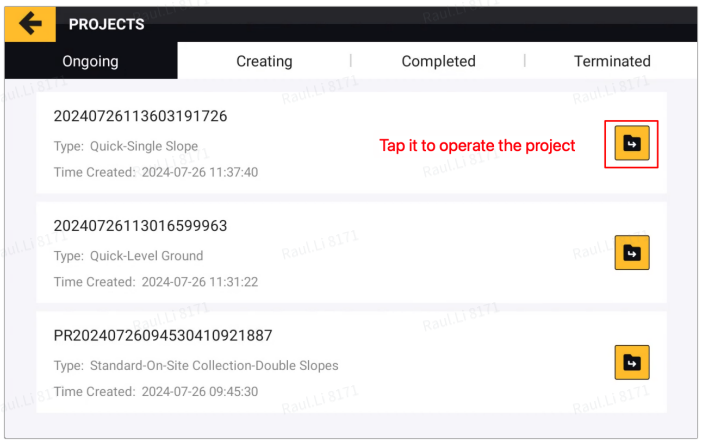
Tap the **"Ongoing"** tab, and then you will see all the projects which are ongoing.

If the system has a project that is operating, you can see the **"Exit"** icon on the operating project, and see the **"Switch"** icon on the other project. Tap the **"Exit"** icon, you will not be able to operate it on the home screen and you can import other projects. Tap the **"Switch"** icon, the project you selected will be able to operate on the home screen.

In another situation, the system may not have any project operating yet, and then you can see the **"Import"** icon in every project. Tap the **"Import"** icon, and then the project you selected will be able to operate on the home screen.



To exit or switch the project is operating



To operate a project when there is no project operating

3.4.4 Mark a project as Terminated or Completed

When you have completed the field leveling, you can mark the project completed.

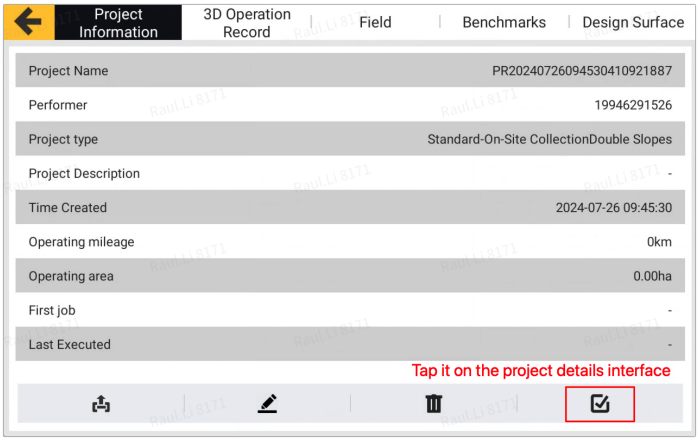
When you have created a project for leveling a field, but you want to terminate the project because of various causes, you can mark the project terminated.Be very careful that if you mark the project terminated, all the data will become view only.

The operations of marking the project terminated and completed is very similiar, so I will introduced them together as follows.

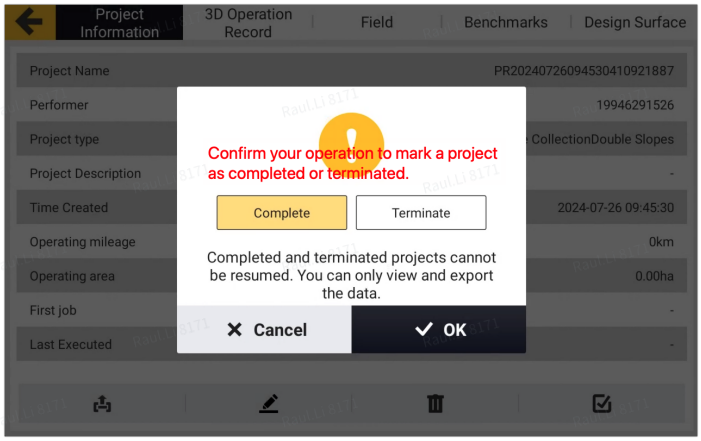
Step 1: Tap the **"Ongoing"** tab, and then tap the project you want to mark.

Step 2: Tap the **"Operate"** icon, and a pop-up dialog will appear on the screen.

Step 3: Tap the **"Complete"** or **"Terminate"** button, and confirm your operation.



To mark a Ongoing project



Confirm the tag of you operation

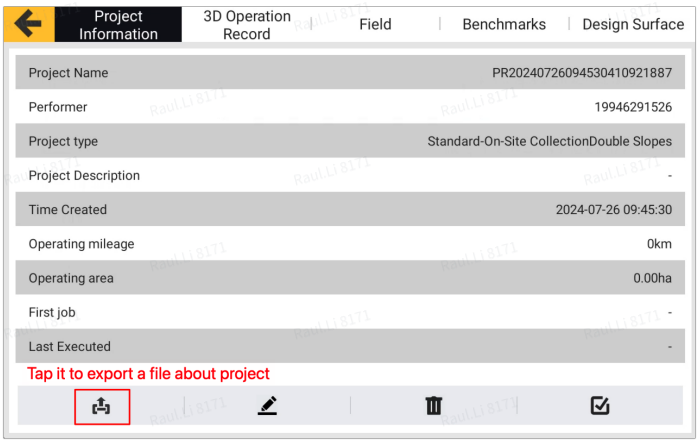
3.4.5 Export the standard project file

The standard project file can be export to a USB flash drive, and the system can also create a project by importing a standard project file via USB flash drive. The feature can be used for the scenario where one person surveyed the field and the other users can copy the project data instead of creating a project duplicately. The operation is as follows.

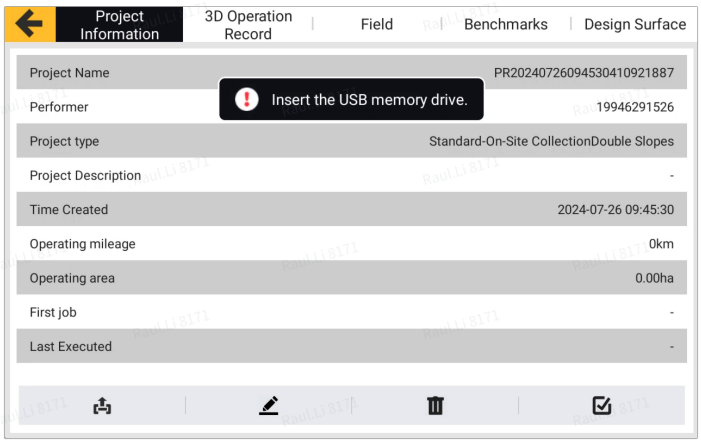
Step 1: You need to mount the USB flash drive to the contorl terminal.

Step 2: tap the project you want to export, and then tap the **"Export"** icon on the project details view.

Step 3: Follow the prompts on the screen, and confirm your operation.



To export a file about project



The prompt when the USB flash drive was not mounted

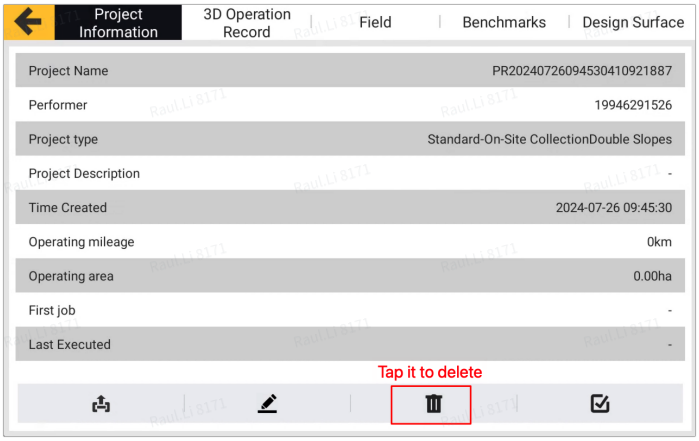
3.4.6 Delete a project

The operation of deleting a project is as follows.

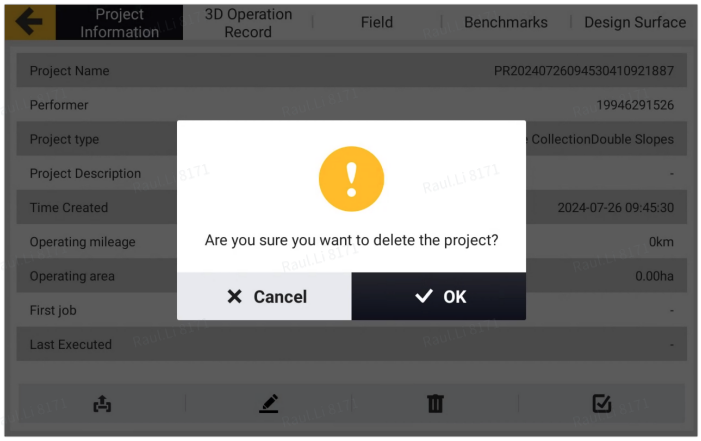
Step 1: Tap the project you want to delete.

Step 2: Tap the **"Delete"** icon on the project details view.

Step 3: Follow the prompts on the screen, and confirm your operation.



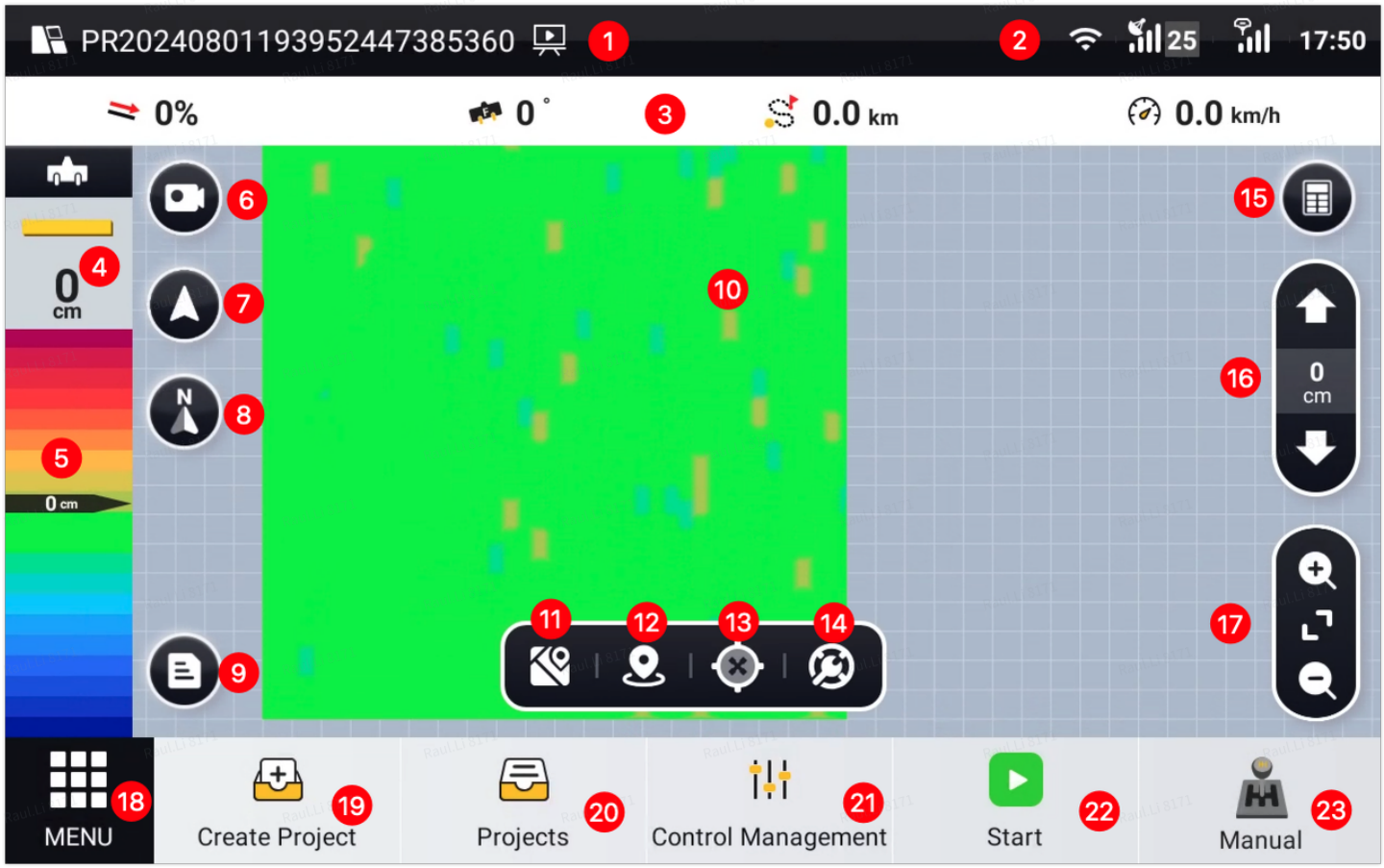
To delete a project



Confirm your operation

4. Start leveling

4.1 The elements of the operation screen



The elements of the operation screen

1. **The name of the operating project:** Shows the project's name that you are operating on the home screen.
2. **Signal strength icons:** Shows the strength of the satellite signal (satellite tracking), RTK correction signal, or other correction source signals.

3. **Real-time job operation data:** Shows the current job operation data, including the slope value of the design surface, the tilt value of the blade, the total distance of the current job and the real-time speed of the vehicle.
4. **Elevation offset indicator:** Value shown = (benchmark elevation + offset) – blade elevation; When the value is a negative number, the down arrow lights up and cut is needed. When the value is a positive number, the up arrow lights up and fills is needed.
5. **Color indicator:** Shows the color in the map of the area that the blade worked on.
6. **Camera button:** Tap to turn on the Wi-Fi camera.
7. **View switch button:** Tap to switch between the 2D view and the 3D view.
8. **Compass:** Tap to return to the northward position.
9. **Job and device information button:** Tap to view the detailed information of job and device.
10. **The cut and fill map of the field:** If leveling has not started, the map can be regarded as the cut and fill map of the design surface; If leveling has started, the leveling path will be rendered on the map with related color depend on the elevation of the blade. On the map, red means the area needs to be dug, blue means the area needs to be filled, and green means the area is on the crrecte elevation.
11. **Map display setting button:** If you don't start a job, you can tap the map area on the screen, and then the button will appear on the screen. You can tap the button , and set the elements such as benchmarks and boundary whether display on the screen.
12. **Set the secondary benchmarks:** If you don't start a job, you can tap the map area on the screen, and then the button will appear on the screen. You can tap the button, and set the position of the vehicle located on as a secondary benchmark.
13. **Re-bench button:** If you don't start a job, you can tap the map area on the screen, and then the button will appear on the screen. When the base station is moved, or when starting work the next day, begin with benchmark calibration. Click to enter calibration, the map will display your current location and the calibration benchmark's location. Follow the guide to locate this point and determine its position using special markers, lower the blade to the ground, click to complete calibration, and wait for data to refresh.
14. **Adjust master benchmark button:** If you don't start a job, you can tap the map area on the screen, and then the button will appear. If you didn't control the blade to the ground when you set the master benchmark, a unfortunately situation will appear. When your field can't be leveled in one day, and you are ready to level it on the next day. You will find the blade is still on a uncorrect elevation even if you have tried using the Re-bench feature several times. In the scenario, you can tap the button and adjust the master benchmark to the correct elevation.

15. **Control implement button:** Tap it and the keyboard will expand. You can control your implement on the keyboard.
16. **Adjust Elevation Offset:** If the cut/fill is large, making it difficult to reach the designed surface in one round, adjust the offset and level the area in a few rounds to make it easier to obtain the desired result gradually.
17. **Map Zoom Out | Reset | Zoom In:** You can zoom out or zoom in the map, or return the default size.
18. **MENU:** After tapping it, the menu view will appear, and you can set up the system.
19. **New:** Tap it to create a project.
20. **Projects:** Tap it to manage all projects.
21. **Control management:** Tap it to set the gear of control's deadband.
22. **Start | Stop:** If you don't start a job, you can see the **"Start"** button on the position of the button, you can tap it to start a job , and the data of the job will be recorded consistently. Oppositely, if you have start a job, you can see the **"Stop"** button on there, tap it to complete the job.
23. **Auto | Manual:** Tap it to switch the mode of control the blade. If the mode is Automatic, the blade will be controlled to the correct elevation by system. If the mode is manual, the blade should be controlled to a correct elevation by human in real time.

4.2 Common Operations

Users can start level the land after completing installation and commission and creating a project. On the home screen, users can do some common operations, such as re-bench, switch control mode, adjust offset value, control the elevation of blade, turn on the camera, adjust the control deadband and switch the view of map.

Video——Re-bench, start a job and other operations

4.2.1 Re-bench

There are two ways to conduct adjusting the master benchmark and manually adjust the elevation of master benchmark to correct the error of elevation.

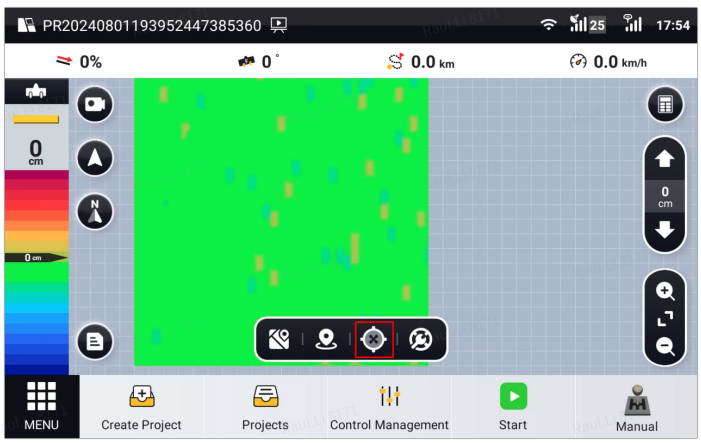
Re-bench by the master benchmark:

Step 1: Tap the map display area without starting the job.

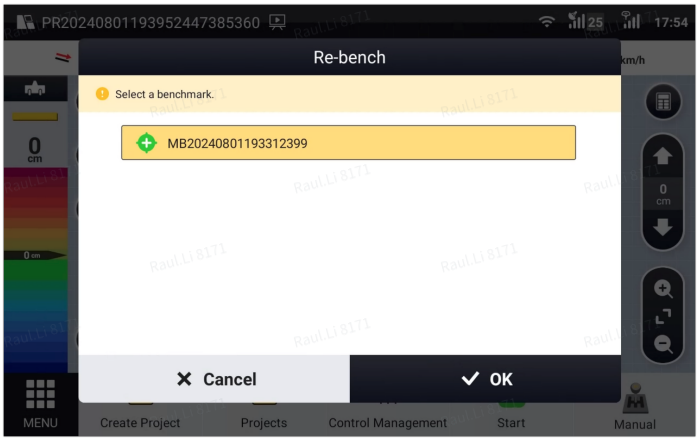
Step 2: Tap the **"Re-bench"** button and select the benchmark you want to use.

Step 3: Drive the vehicle to the location of the benchmark you selected, and click the **"OK"** icon after the blade is controlled to the ground.

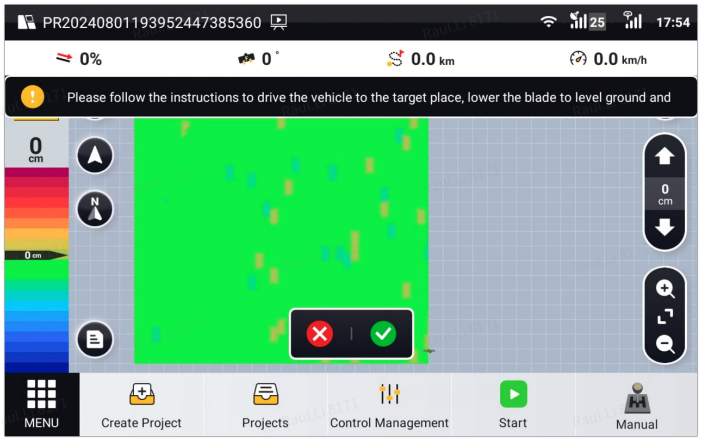
Tap the map display area



Tap the Re-bench button



Select the benchmark



Confirm the Re-bench operation

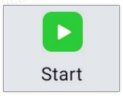
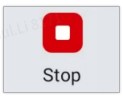
Manual Adjustment:

Note: There’ s a method prevent the moving of the elevation, assuming the base station remains in a fixed location: enable the "Known Point Startup" option in the base station settings. However, proceed with caution—be sure to disable this setting if you plan to move the base station to a different location.

4.2.2 Start | Stop a job

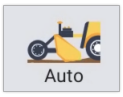
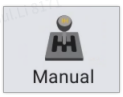
Users can start a job after setting a project as the operating project. When users don't start a job, they can see the **"Start"** button. Tap it and the data of the job will be recorded consistently.

Oppositely, when there is a job had been started, the **"Stop"** button can be seen on the screen, tap it to complete the job.

	Start: Tap it to record the job data of leveling the field.
	Stop: Tap it to end of recording the job data.

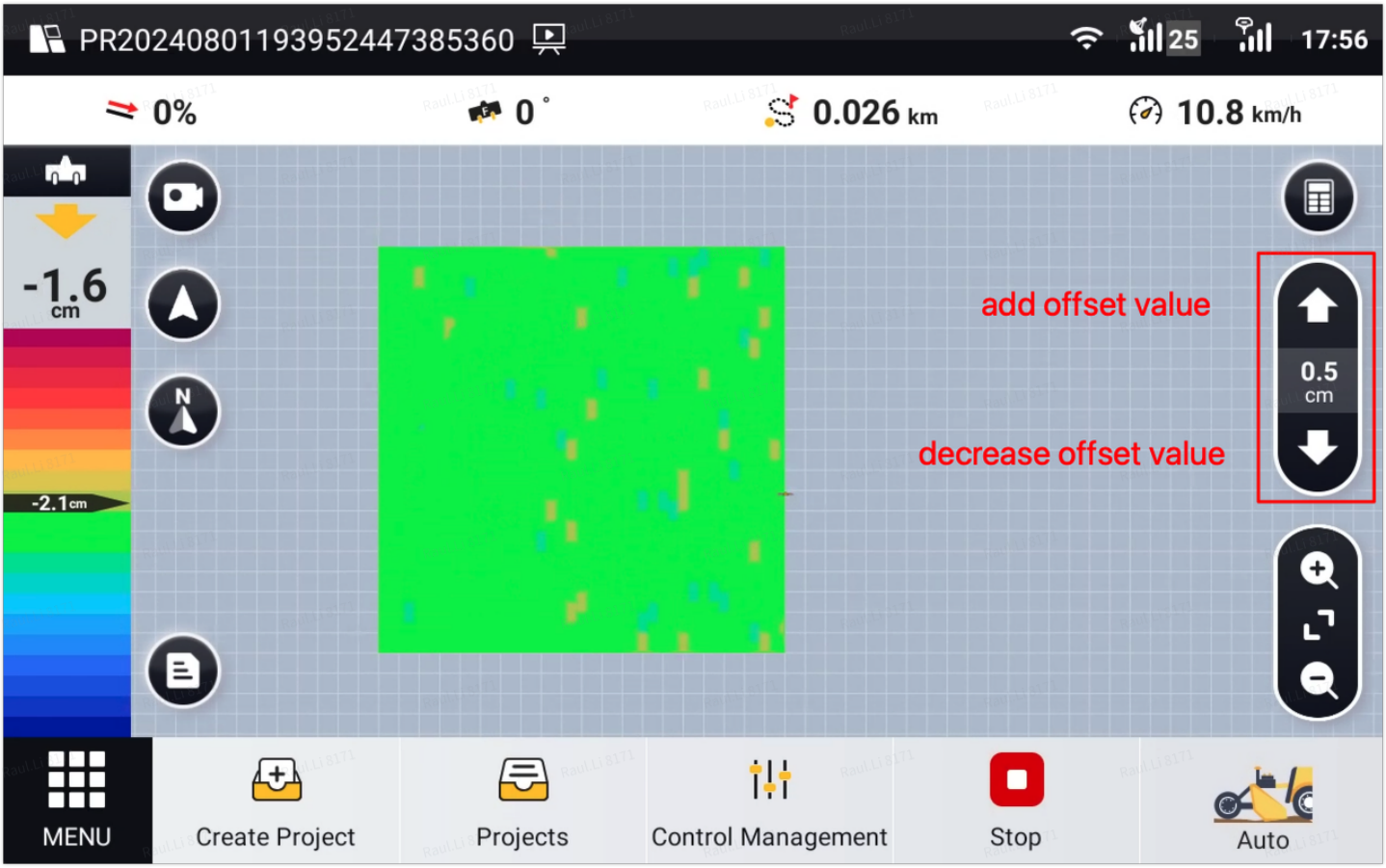
4.2.3 Switch control mode

Users can click the button to switch control mode between Auto and Manual.

	Auto: The blade will be controlled to the correct elevation by system.
	Manual: The blade should be controlled to a correct elevation by human in real time.

4.2.4 Adjust the offset value

If the cut/fill is large, making it difficult to reach the designed surface in one round, adjust the offset and level the area in a few rounds to make it easier to obtain the desired result gradually.

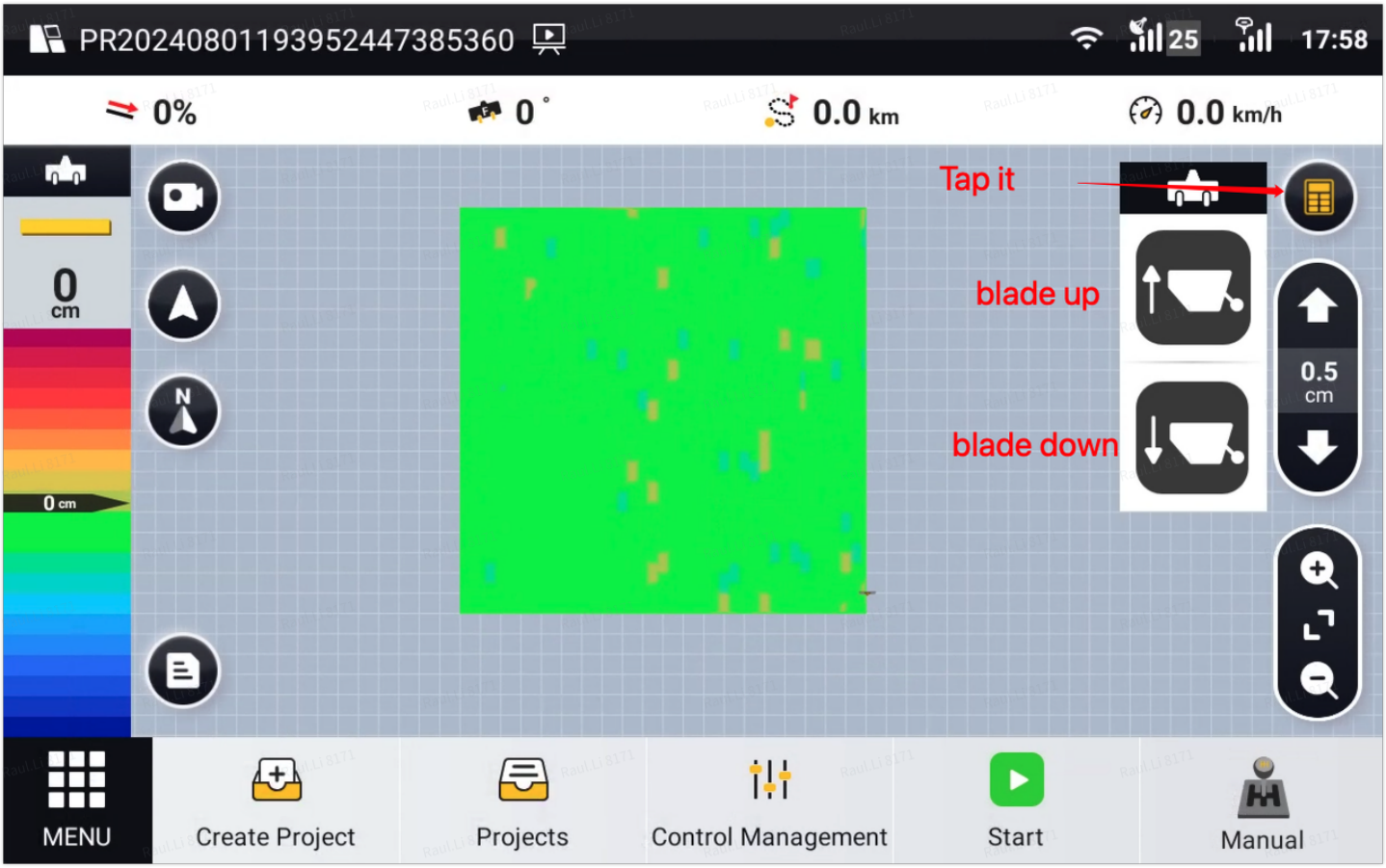


Adjust the offset value

4.2.5 Control the implement

The keyboard will expand after tapping the **"Control implement"** button, and then you can control your implement on the keyboard. The keyboard is different depending on the type of your implement.

In the case of the towed grader, you can control the blade of the towed grader rise and descent. If the control mode is manual and users click the **"UP"** or **"DOWN"** icon, the blade will keep on a specific elevation after rising or descending for a distance. If the control mode is automatic and users click the the **"UP"** or **"DOWN"** icon, the blade will return to the original elevation after rising or descending for a distance.



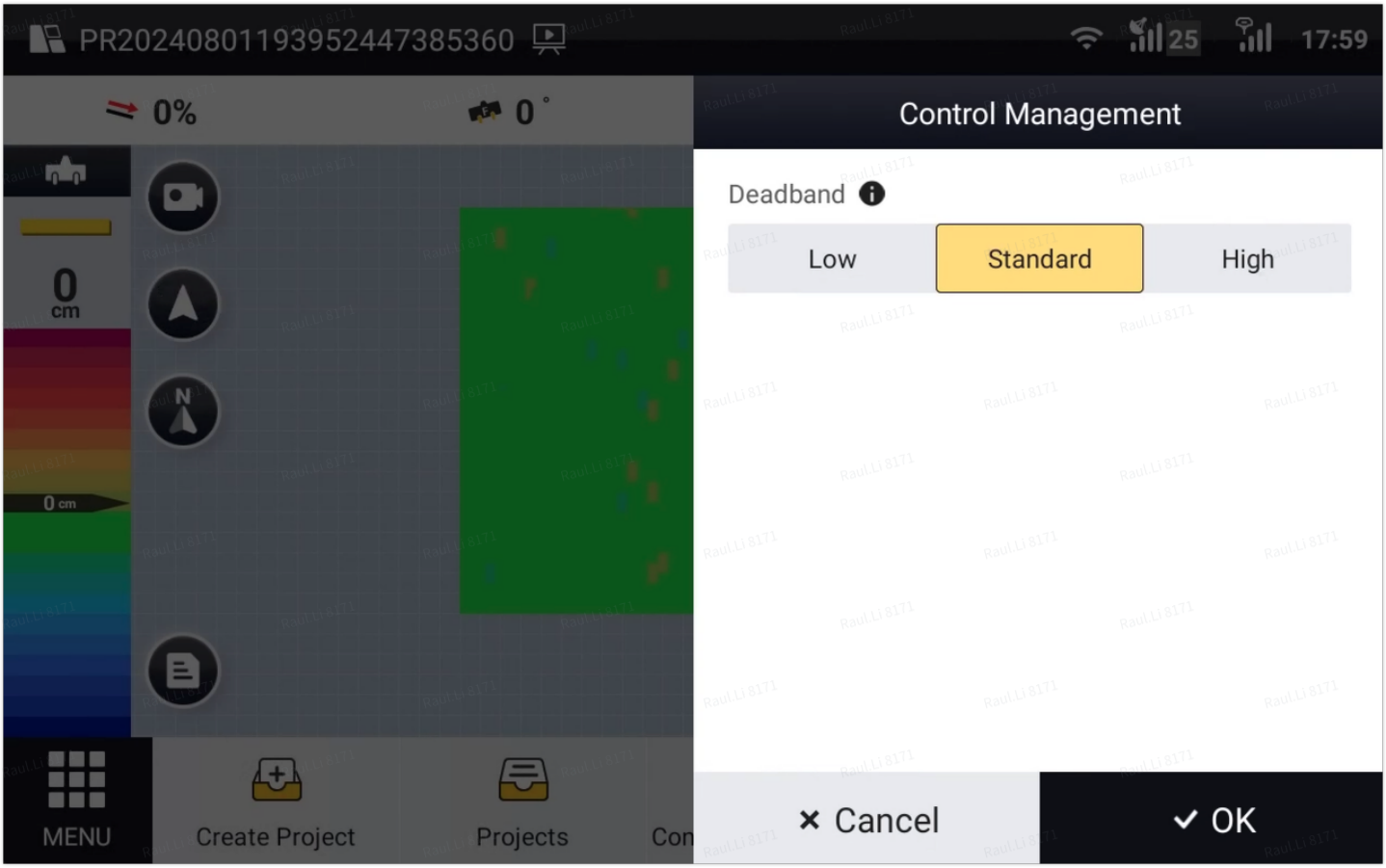
Control the implement on the home screen

4.2.6 Adjust the control deadband

You can set the gear of the control deadband at your current job after clicking the "**Control Management**" button. The setting will take effect after clicking the **"Confirm"** button.

The bigger gear level is, the lower accuracy of the job is. The smaller gear level is, the higher accuracy of the job is.

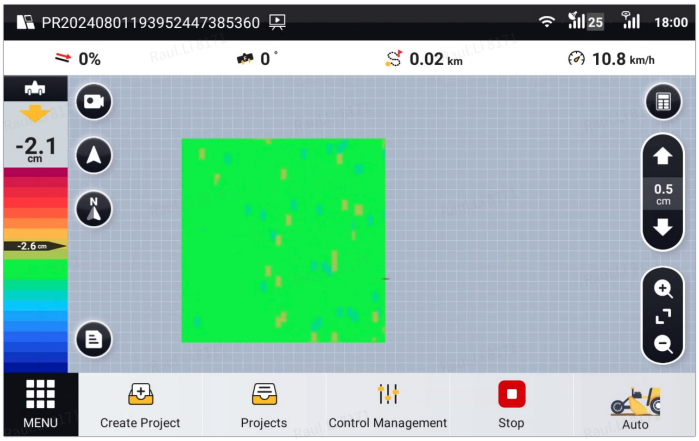
Note - If the gear level is too small, the blade may shake frequently while it is controlled by the system, and prolonged operation may cause the temperature of the hydraulic system too hot.



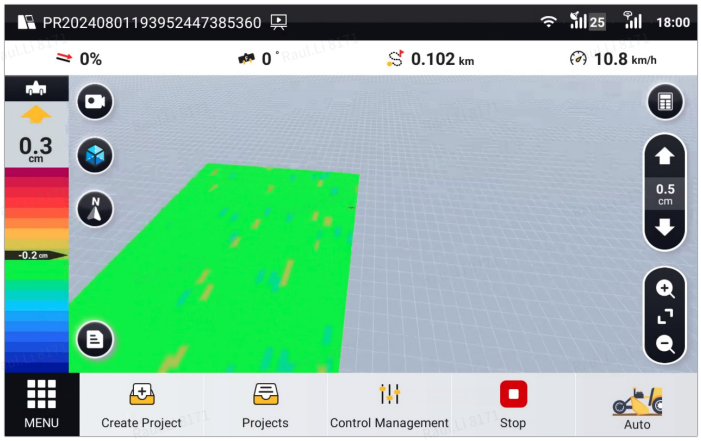
Control Management view

4.2.7 Switch view of the map

You can tap the button to switch between the 2D view and the 3D view.



The 2D View



The 3D View

4.2.8 Turn on Camera

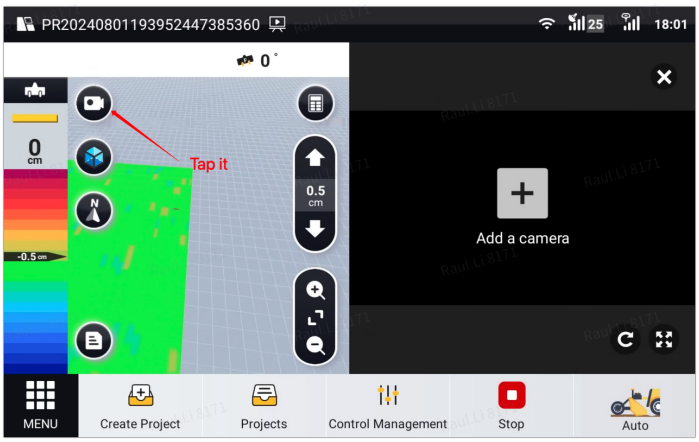
Video——Install and turn on a camera

A camera installed on the vehicle body helps to monitor the real view of the operation site, and assists with reversing if installed on the back of the vehicle. When a camera is turned on, the system splits the screen to show the mapping guidance panel and the camera image.

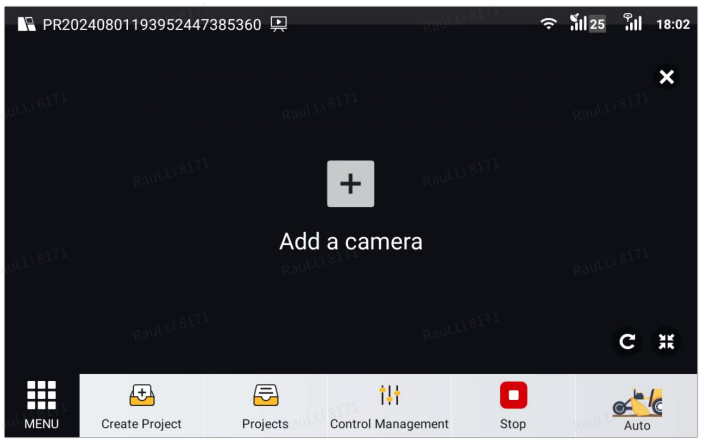
When no camera is connected, tap the **"Add a camera"** button on the camera panel.

When two cameras are connected, you can tap the number at the bottom of the camera image panel to switch to another camera image.

Tap the **"Full"** icon to expand the camera image to the full screen. Tap the **"Fold"** icon to collapse the camera image onto the semi screen. Tap the **"Close"** button to close the camera image on the screen.



Turn on camera



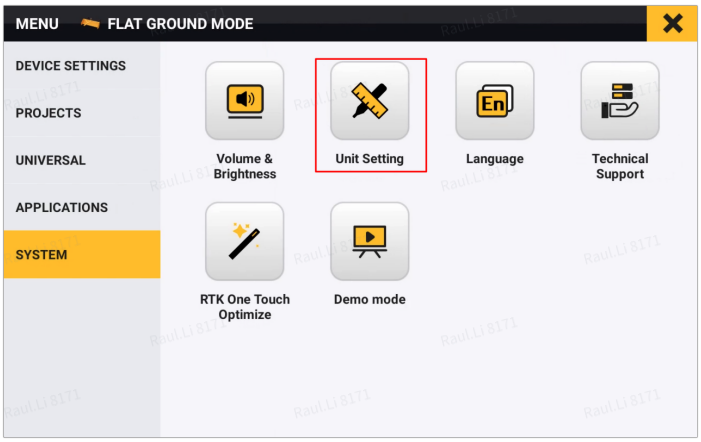
Expand the camera image

5. Common features

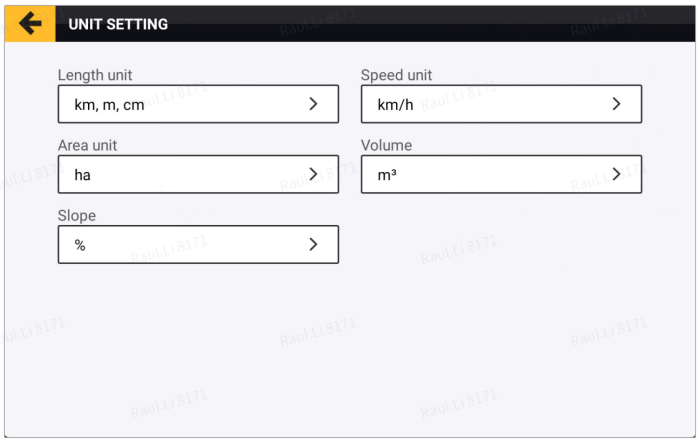
5.1 Unit Setting

Tap **"MENU"** → **"SYSTEM"** → **"Unit Setting"**.

You can Select **Metric Unit** or **British Unit**, or customize according to your preferences on the view.



Unit Setting entrance

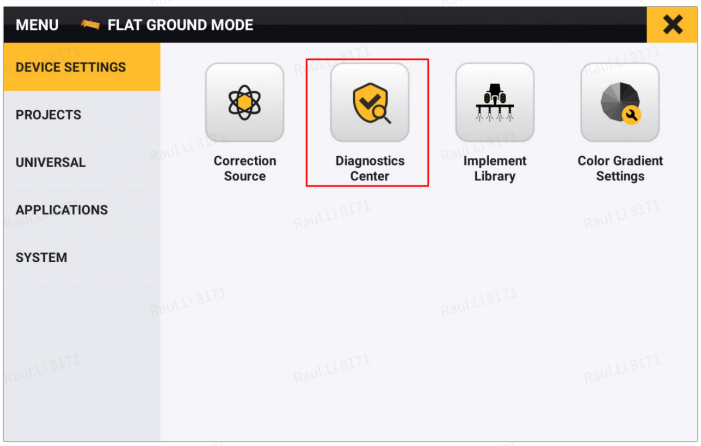


Unit Setting view

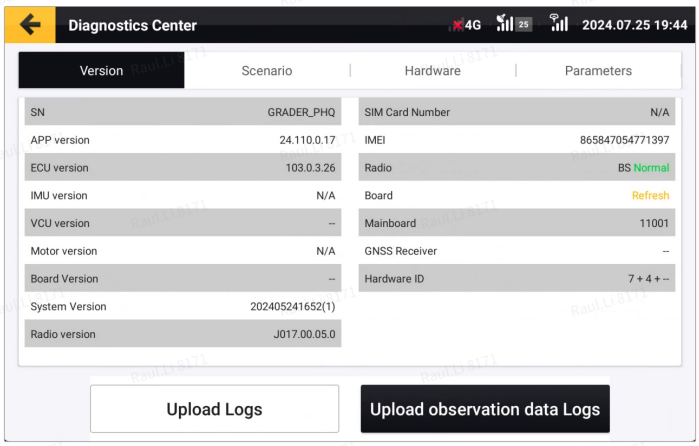
5.2 Diagnostics Center

Tap **"MENU"** → **"DEVICE SETTINGS"** → **"Diagnostics Center"**.

You can check the version information, scenario information, hardware status, and parameter information on the view.

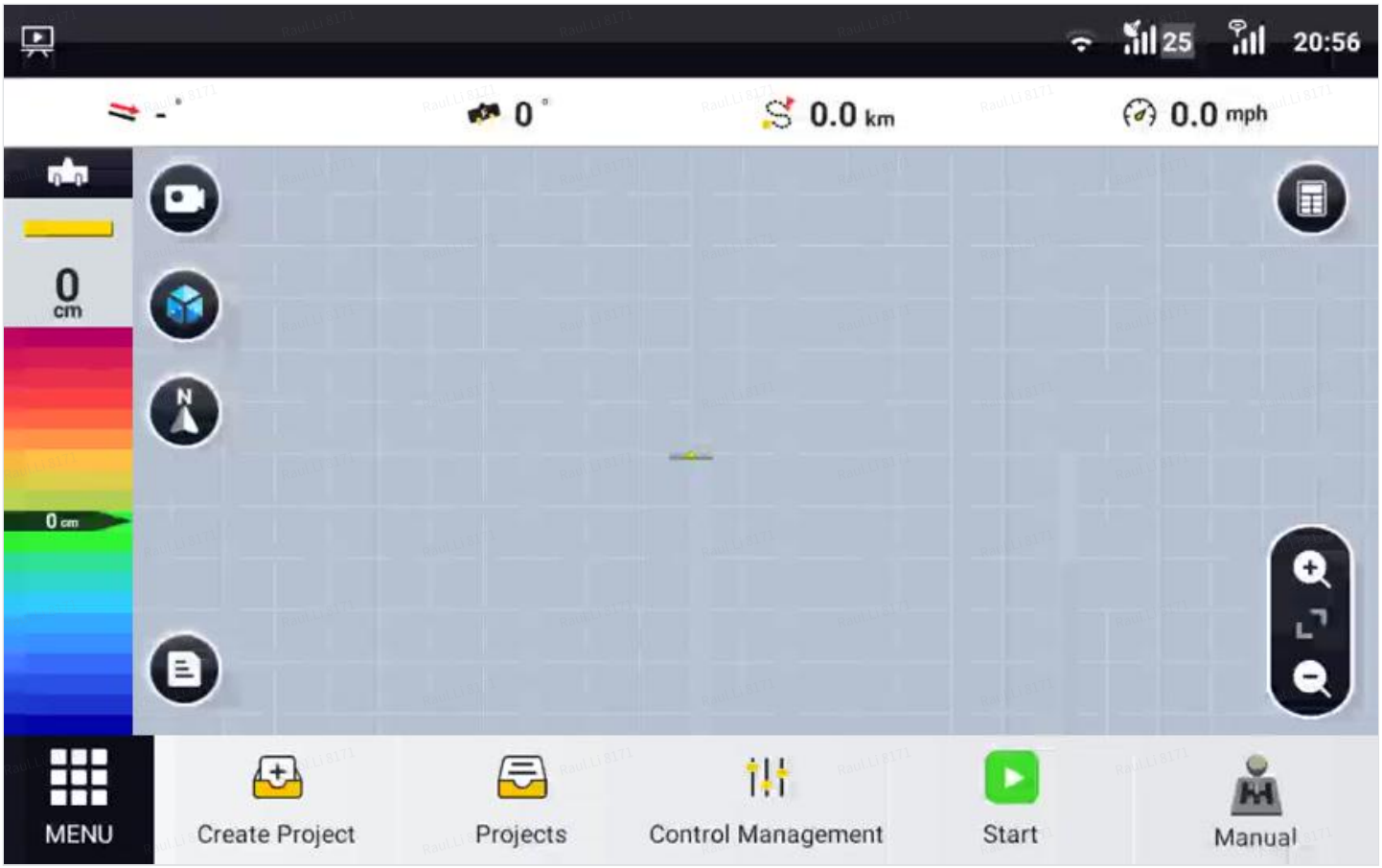


Diagnostics Center entrance



Diagnostics Center view

5.3 System Upgrade



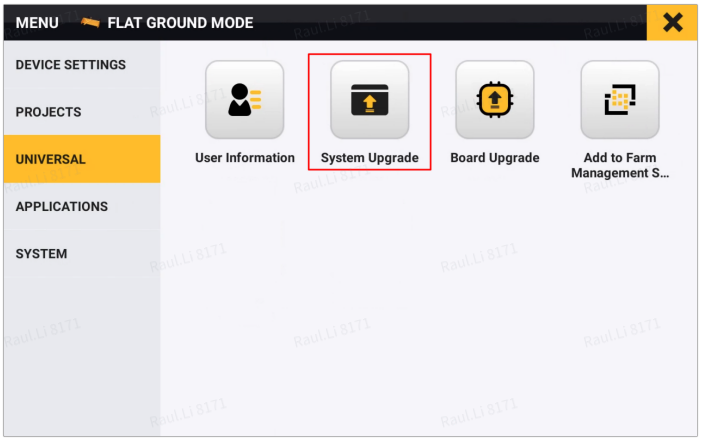
Video——Upgrade the system

Tap **"MENU"** → **"UNIVERSAL"** → **"System Upgrade"**.

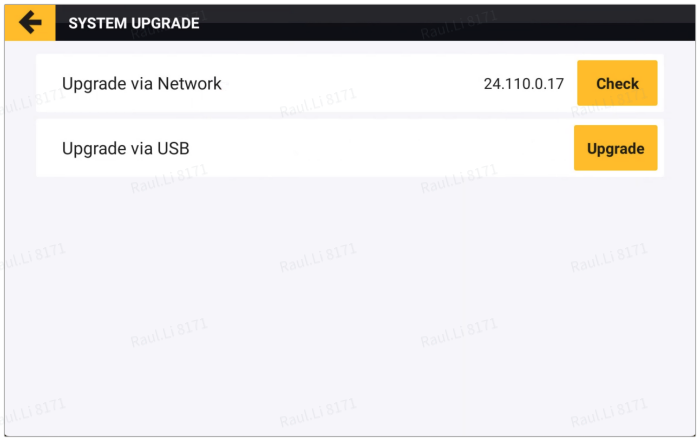
When a new version is available and the control terminal is connected to the Internet, the system automatically displays a popup for upgrade. If no popup is displayed, tap the **"Check"** button to check whether a new version is available. You can also upgrade the system via USB.

Note:

1. Ensure stable network connection throughout the upgrade process.
2. Before the upgrade, ensure that all the components are connected properly and there is stabilized voltage supply throughout the upgrade process.
3. If any problem occurs during the upgrade process, contact us as described in section "Technical Support", or contact the local dealer.



System Upgrade entrance



System Upgrade view

5.4 Easy Control

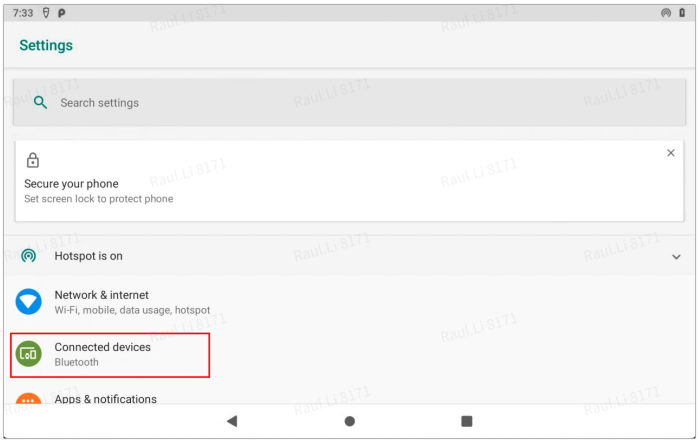
Video——Connect EasyControl

Easy Control is a bluebooth keyboard that works with the FJDynamics Land Level System, you can use it to control the implement remotely. The keys will have different effects depending on the type of your implement.

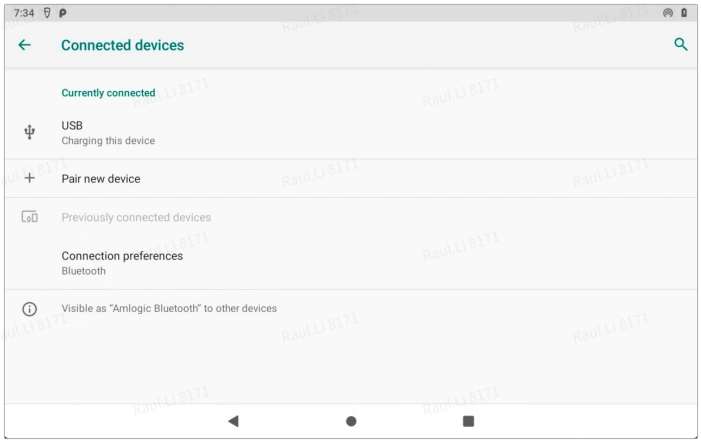
Easy Control must pair with the control terminal before using it.

To pair with the control terminal, you should do several operations on Easy Control as follows. Install two AAA batteries, press and hold the two buttons at the bottom until the indicator in the upper left corner turns solid for 3 seconds and then blinks rapidly for 60 seconds, indicating that Easy Control is ready for pairing.

You will be required to do some corresponding operations on the control terminal as follows after completing on Easy Control. Go to the system settings on the control terminal to turn on Bluetooth connection and pair with Easy Control. After the successful pairing, the system remembers Easy Control and connects to it automatically in future operations.



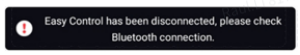
Bluetooth entrance



Bluetooth pair view

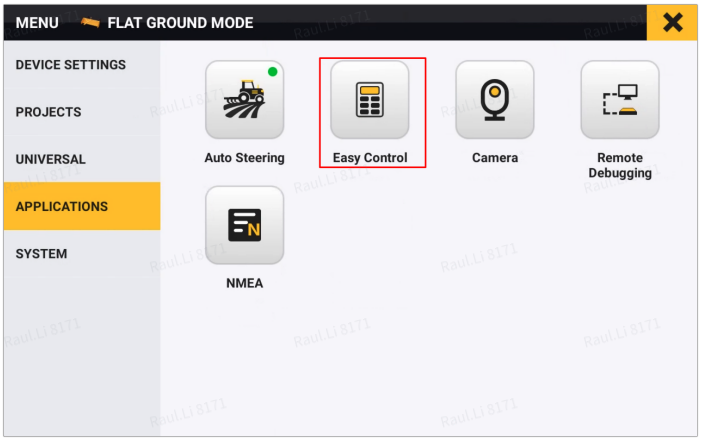
You can check whether Easy Control is connected through the icons in the upper left corner. See the following for details.

Easy Control Connection Status

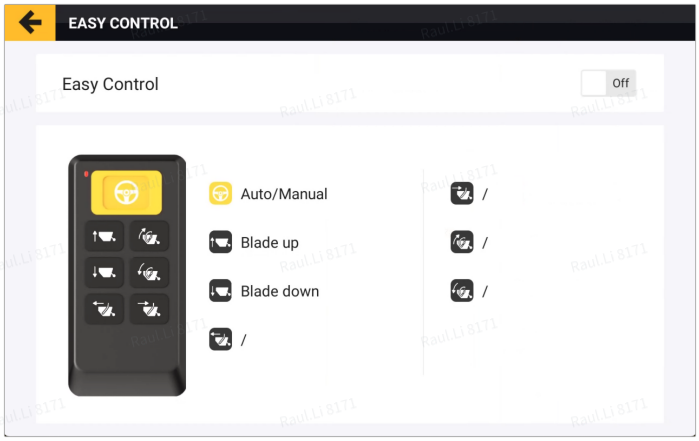
Status	Description	Illustration
Not connected	The Bluetooth is turned off, which means Easy Control is not connected.	
Not connected	The Bluetooth is turned on, which means Easy Control is not connected or disconnected. When Easy Control is disconnected, a message appears on the mapping guidance panel. To connect again, press any button on Easy Control.	 
Connected	The Bluetooth is turned on, which means Easy Control is connected.	

When Easy Control is connected, tap **"MENU"** → **"APPLICATIONS"** → **"Easy Control"**. You can press the keys on Easy Control to control the implement after turning on the switch button on the view.

The function of every key on Easy Control is described on the screen.



Easy Control entrance

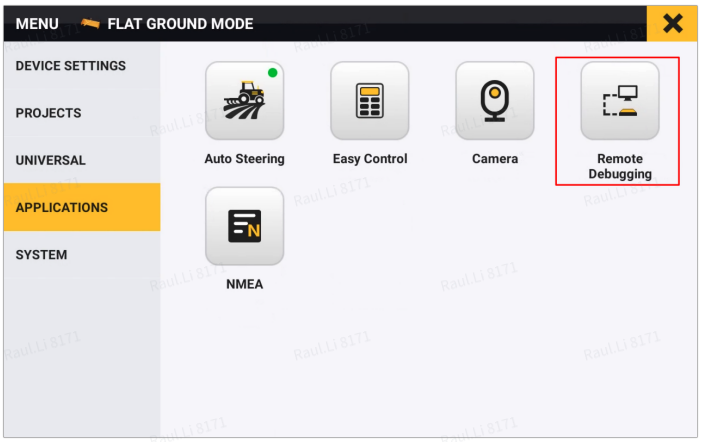


Easy Control view

5.5 Remote Debugging

Remote debugging, supported by the background control program, enables the service personnel to remotely control the screen to perform debugging.

Turn on the **"Remote Debugging"** switch, and the following popup appears when the service person initiates a debugging request remotely. Tap the **"Agree"** button before the countdown ends, and then tap the **"START NOW"** button to start remote debugging.

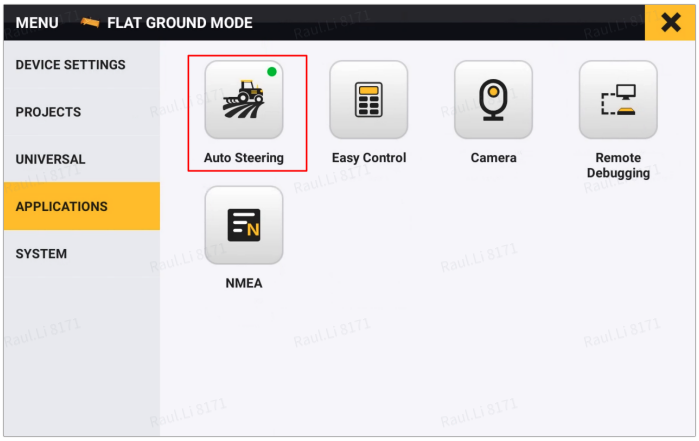


Remote Debugging entrance

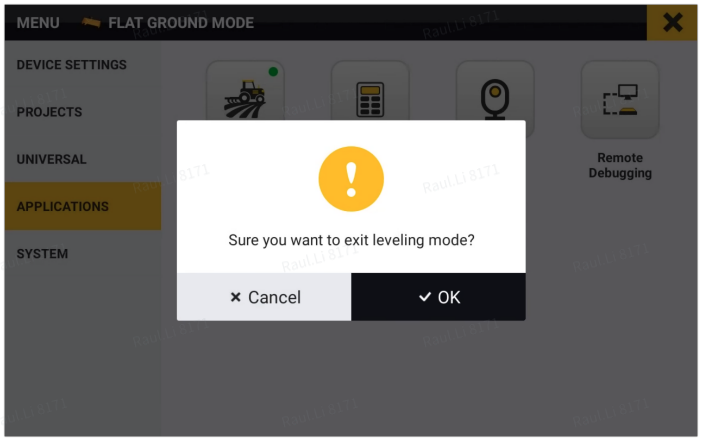
Remote Debugging switch view

5.6 Switch to the Auto Steering Application

Tap **"MENU"** → **"APPLICATIONS"** → **"Auto Steering"**, the system will be changed after you confirm the operation.



The Auto Steering switch



The confirm dialog

5.7 Advanced Settings

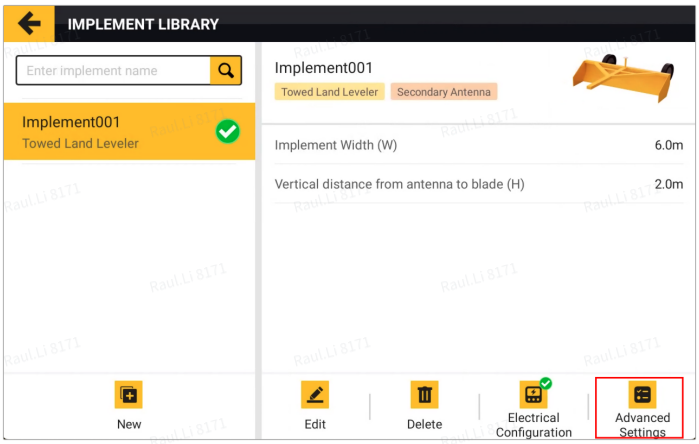
Video——Advanced settings and change deadband on the home screen

You can set the value of every control deadband gear level on the advanced settings view.

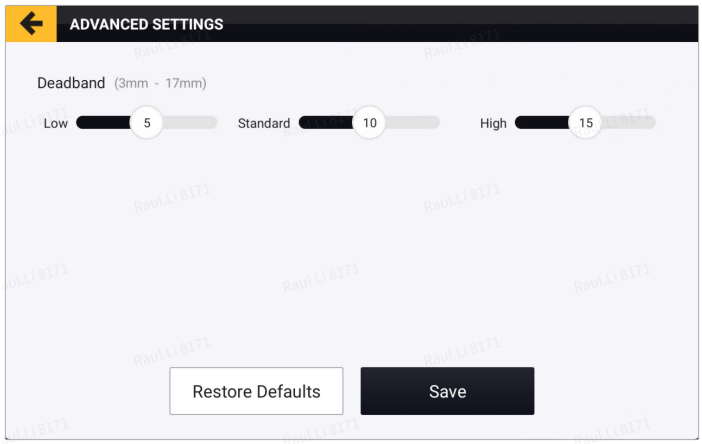
Tap **"MENU"** → **"DEVICE SETTING"** → **"Implement Library"**, and tap the **"Advanced Settings"** after selecting the implement you want to set. There are three levels on the view: low, standard and high. You can slide every level button from left to right to adjust the value of it, and which will take effect after tap the **"Save"** button.

The higher gear level is, the lower accuracy of the job is. The lower gear level is, the higher accuracy of the job is.

Note - If the gear level is too low, the blade may shake frequently while it is controlled by the system, and prolonged operation may cause the temperature of the hydraulic system too hot.



Advanced Settings Entrance

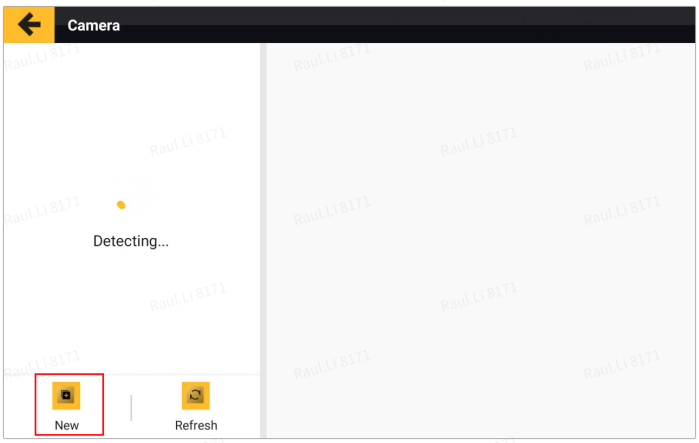


Advanced Settings view

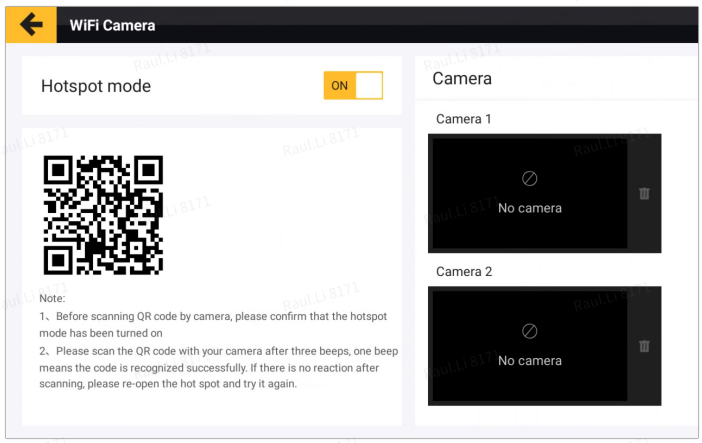
5.8 Camera (Optional)

Complete the hardware connection of the camera and power it on.

Tap **"MENU"** → **"APPLICATIONS"** → **"Camera"**, you can bind camera on the screen, and the hotspot is turned on automatically. Use the camera to scan the QR code to identify and bind the camera (refer to the instructions on the screen for details). The bound camera is displayed on the right side of the screen. You can tap the delete icon to unbind the camera.



To bind a camera



The binded camera list

Chapter 2 Common Faults and Solutions

No	Fault	Solution	
1	RTK connection exception	Check if the base station indicator light is normal	
		Placed in a wide and unobstructed position	

		Check if the base station radio antenna is damaged	
		Check whether the V1 base station is configured as a reference station	
2	Ntrip RTK connection exception	Check if the WIFI network is working properly	
		Check if the Ntrip account can be used	
3	Satellite connection anomaly	Check the antenna receiver and connector for damage	
4	When you use Easy Control, it has no action.	Check if Easy Control is turned on	
		Remove the battery from Easy Control and reinstall it.	
5	When you control your implement, it has no action.	First, check if the solenoid valve indicator light is on, then inspect the hydraulic system of your implement.	
6	When you control your implement, its action is oppositly	Swap the Solenoid Valve Connectors	
7	How can we ensure that no elevation offset occurs when starting work the next day? If it does occur, how can it be resolved?	We recommend that users keep the base station in the exact same position when working on the same project. If the client notices an elevation offset, they can use the "Re-bench through the master benchmark" option or manually adjust the position of the master benchmark. There’ s a method prevent the moving of the elevation, assuming the base station remains in a fixed location: enable the "Known Point Startup" option in the base station settings. However, proceed with caution—be sure to disable this setting if you plan to move the base station to a different location.	When you control your implement, its action is oppositly
8	Blade Raises but Does Not Lower	**If an IMU is present, turn it off first**, as calibration errors may be causing the issue. **If the IMU is turned off or not present**（AL02 doesn't come with IMU）： • First, check if the **indicator light** on the **lowering solenoid valve** is on.	

		• Use a screwdriver or similar tool to manually operate the solenoid valve to rule out solenoid valve malfunctions (applies to standard solenoid valves). **Swap the connectors of the raising and lowering solenoid valves:** • If the system **can lower but not raise** after swapping, the issue is likely with the **control box or wiring harness**. • If the system **still only raises but does not lower**, then the **coil of the lowering solenoid valve** may be faulty.	

Most Asked Questions

1. How to allow multiple land levelers to work in the same field?

Both **FJDynamics AL01 & AL02** support **project file export and import**, enabling **fleet cooperation** for multi-machine operations. This feature allows farmers to use **a single system for mapping and design**, then seamlessly transfer the project to other land leveling machines via a **USB drive**.

How to Export a Project File:

1️⃣ Go to **Project Management**.
2️⃣ Select the desired **project**.
3️⃣ Insert a **USB drive** (ensure it is properly connected).
4️⃣ Click **"Export Project File"** (first button on the lower left).

How to Import a Project File:

1️⃣ Click **"Create Project"**.
2️⃣ Select **"Import"** to load the saved file.

Watch the full tutorial here: 👉 YouTube Link

2. **Can UAV (Drone) mapping data be directly imported into the land leveling system?**

Yes, but with a process. The current version supports importing **design files** rather than raw UAV survey data. Users need to first process the **drone mapping data** in third-party design software such as Ezigrade or Optisurface, export it in **AGD format**, and then import it into the system for land leveling. Before leveling, **a primary reference point must be calibrated** in the file. So please keep in mind that you would need to have a master benchmark in the file.

3. **Can the land leveling system’ s survey data be exported to third-party software for editing and then re-imported?**

Yes. The system allows exporting mapping data in **AGS format**, which can be edited in external software. The next version will also support **importing AGS mapping files**, and further expansions for additional file formats will be planned based on customer needs.

4. **Does the system be able to execute complex land leveling designs, such as variable rate surfaces?**

Yes. The system can **execute variable rate surface designs** created in third-party software.

5. **Why is setting a master benchmark necessary? What should I keep in mind when setting it?**

Understanding the Concept of a Master Benchmark

To ensure precise positioning, every job site operates within a defined coordinate system. However, this coordinate system may drift due to various factors, such as the movement of the RTK base station. This drift results in a misaligned coordinate system (let's call it **Coordinate System'**).

To eliminate such errors, a **master benchmark** is introduced. By aligning two master benchmark points, we recalibrate the system, ensuring that **Coordinate System** and **Coordinate System'** coincide, thereby eliminating positional drift errors.

Key Considerations When Setting the Master Benchmark:

- **Standard Projects:** The first step is always setting the master benchmark. This step is mandatory and cannot be skipped.
- **Quick projects:** Quick jobs do not use a master benchmark, meaning that if coordinate drift occurs (often called **elevation drift**), the accuracy of the work will be compromised. In such cases, users must either discard the local project or manually adjust offsets/edit the design to compensate.
- **Placement:**
  - The master benchmark **must be set outside the working area** where the leveling will not interfere with it.
  - It is recommended to place a small flag to mark the benchmark location.
  - The scraper’ s cutting edge should be directly on the benchmark location, positioned exactly **under the GNSS antenna**—typically at the center of the blade.
- **Additional Safety Measure:**

- If users are concerned about potential damage to the master benchmark, they can set up a **secondary benchmark (calibration point)**.
- If the master benchmark becomes unusable, it can be switched to the secondary benchmark in **Project Management → Benchmarks**.
- ⚠ **Proceed with caution: Once the master benchmark is replaced, the original master benchmark will be deleted and cannot be recovered.**

6. **What is the recommended file size for an AGD design file?**

The system supports a maximum file size of 30MB, which is sufficient for most projects. However, exporting designs with extremely high point density does not improve leveling accuracy. For optimal results, the point density should be equal to or slightly smaller than the implement width, ensuring efficient and precise leveling.

7. **Can I use an ATV with a V1T base station for surveying?**

- Yes! Many farmers mount the **V1T base station** on their ATVs and drive around the field to collect survey data.
- The collected data is stored in **AGS format**, which can be imported into third-party design software (e.g., Ezigrade, Optisurface).
- After designing the surface, export the design as an **AGD file**, which can then be imported into our system for execution.

8. **Why is the blade significantly suspended when the land leveler reaches an area that has already been rendered green?**

First, it could be due to an overall elevation offset, which can be corrected by calibration or manually adjusting the main reference point. However, if the issue only occurs in specific areas, the following reasons might be the cause.

When working without the IMUs, the implement cannot calculate the actual distance between the blade and the ground because it doesn't know the degree of implement's tilt. A potential issue arises when the blade is empty and passes over an area that requires filling. In this case, the blade remains suspended above the ground without actually completing the fill. However, the system may still determine that the fill has been completed, rendering the area green on the map. When the implement passes over this area again with an empty blade, the customer may observe that the blade is significantly suspended above the green area. This is not a precision issue but rather a rendering issue. The solution is to carry some soil with the land leveler and

pass over the area again. When the land leveler reaches this area a second time, observe whether the issue persists.

If the user is concerned that some fill areas might be missed in the future due to the rendering issue, I suggest initially setting the offset 1 to 2 cm higher. Once most of the field appears green, they can adjust the offset back to zero. This way, the blade will retain some soil during the final pass. The user can then drive in precise, straight lines, ensuring not only a beautifully textured finished surface but also that all fill areas are fully completed.