Contents

1. Layout

The CSD simulator is considered a light-weight training simulator as it can be transported in two peli-cases. It contains the following hardware components:

Peli-case 1:
Simulator case, PLC
Type : MSA-S-0324-1

Contains the following:
- Industrial PC:
- Multiped:
- Internally installed inside case several hubs and power supplies. (no batteries)

2x pouch inside lid, contains the following:

- 4x cabling set Asus monitors, HDMI to HDMI-D and USB-C to USB-C, 3m
- 2x cable USB-A to USB-A, joysticks, 3m
- 1x cabling set Audio, Bose mini, MINIJACK tot MINIJACK (3,5mm) and USB-A to USB-C, 3m
- 1x USB-A extension cable, 3m
- 1x USB receiver wireless keyboard
- 1x charging cable Windows surface
- 1x power cable
- 1x Ethernet cable

External case dimensions: 62.5x50x30 CM
Gross weight: 24 Kg

Peli-case 2:
MSA-S-0324-2
Simulator case, Hardware

Contains the following:
4x Monitor with screen protector, 15” with touch (with battery) type: Asus MB16AMT(7800mA)

- 1x Tablet with bumper case, Windows, (with battery), type Samsung surface-Go-3-1(26,8W)
- 4x Monitor standard
- 1x Speaker, (with battery), type Bose II mini, black
- 1x Keyboard with touchpad, wireless,
- 1x joystick, portside
- 1x joystick, starboard

External case dimensions: 62.5x50x30 CM
Gross weight: 22 Kg

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separate box.
32” Ilyama Monitor, GB3266QSU-B1
External case dimensions: 83x52x25 cm
Gross weight: 13kg

Detailed images will be added.

2. Installation

Detailed images will be added + single line.

Ip addresses:
- main pc : 192.0.1.250
- tablet : 192.0.1.251
- Access point : 192.0.1.254
- Multiped : 192.0.1.240

username : admin / password : admin

2.1. Displays

The displays on the sides are interactive touch screen monitors (also called “Portside” and “Starboard” displays). The center display (called “Bow” display) visualizes the instrument bar and the 3D outside environment (showing the ladder). Additionally, a fourth monitor (called “Stern” display) can be used on-site to render the 3D rear view (showing the spud carrier).

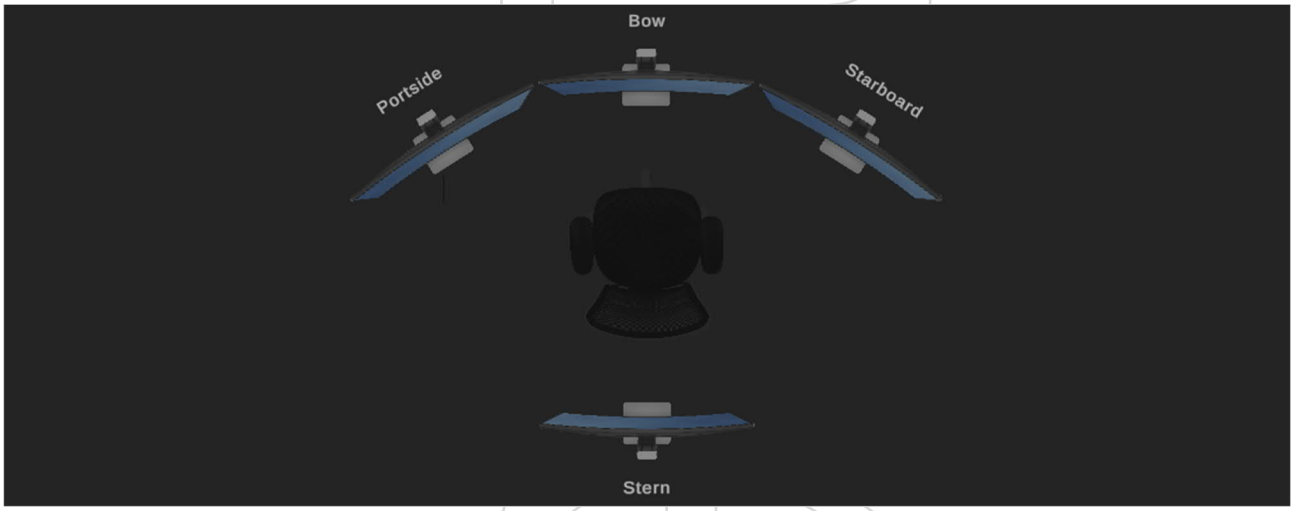


Figure 1: Example of the displays set-up.

2.2. Joysticks

The joysticks that are used by the operator contain a mounting device that can be attached to a desk. They are labelled “PS” (left) and “SB” (right) to be positioned on the correct side.

Detailed images will be added.

2.3. Tablet

The tablet is used to display the Trainer Interface. The trainer can start-up the simulator from this interface and adjust specific parameters for a training and in induce specific events for the operator to react on.

link will be added to tutorial video how to connect simulator

3. CSD Simulator

This section will describe how the trainer operate the simulator. The trainer uses the Trainer Interface to start the simulator and change conditions during simulation. By default, the simulation starts a scenario with the vessel in a default position.

3.1. Preparations

First turn on all the hardware components listed below:

- Turn on all the monitors.
- Turn on the PC.
- Turn on the tablet.

Once all hardware is up and running, we will start up the Trainer Interface.

- Navigate to the desktop and select the "*CSD Trainer Interface.exe*" to start the Trainer Interface.

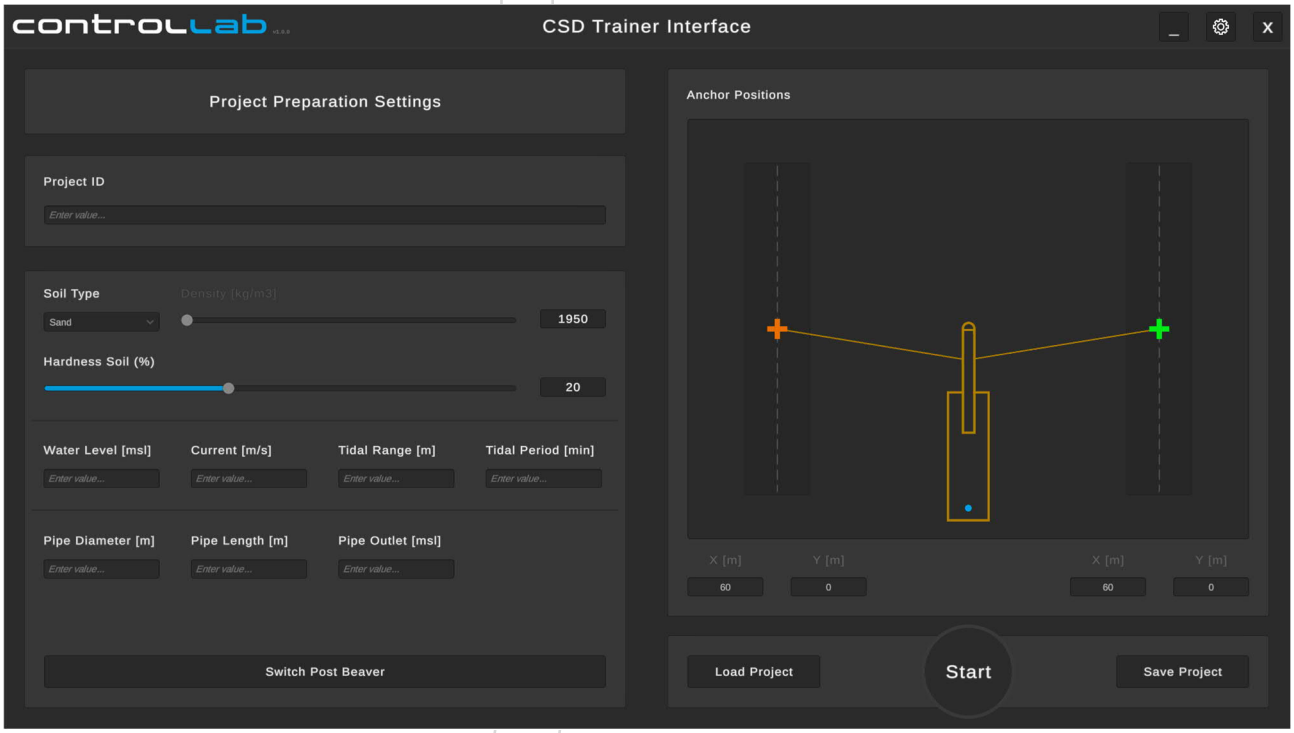


Figure 2: Example of the Trainer Interface after start-up.

The Trainer Interface (shown in Figure 2) contains parameters that are set before simulation. The trainer can adjust and save the settings for future sessions.

3.2. Run the CSD Simulator

- Hold the “Start” button until the blue circle is complete.

Make sure all parameters contain a valid value.

As Figure 3 shows, the “Project Preparation Settings” panel changes to a “Project Simulation Settings” panel with new options that are available during the simulation.

Figure 3: Example of the simulation settings.

3.3. Minimize the CSD Simulator

- Press the “_” button in the right-top corner to minimize the Trainer Interface.

3.4. Stop the CSD Simulator

- Press the “Stop” button to stop the simulation.
- Press the “X” button in the right-top corner to shut down the Trainer Interface.

3.5. Change the displays

- Press the “Displays” button to open the display settings.
- By opening this panel, ID’s appear in the right-top corner of each monitor. Set the ID to the corresponding display and press “Apply” to confirm the change.

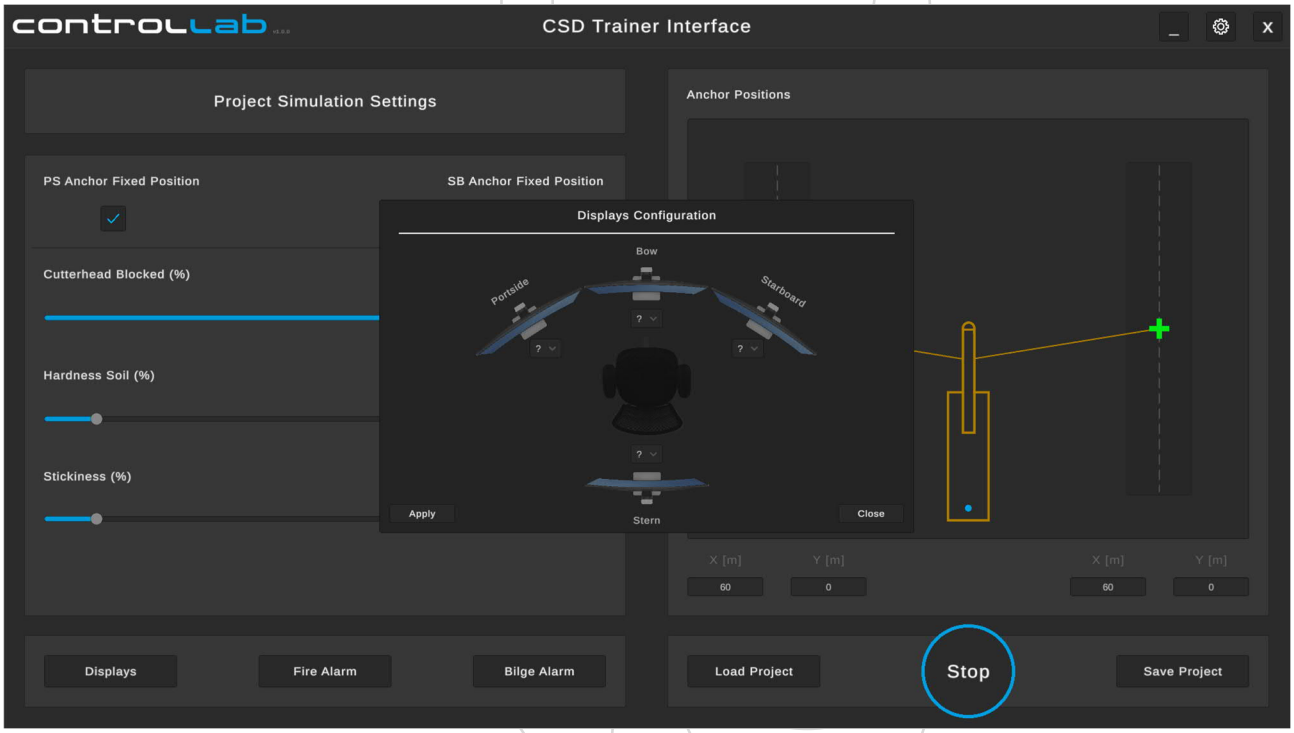


Figure 4: Example of the display panel.

Parameters
See below a list of all options that are available for the trainer.

Parameters before simulation

Key	Information
Project Name	Set the name of the project.
Soil Type	Set the soil type: 0 = sand, 1 = clay, 2 = silt, 3 = gravel
Density	Set the density parameter.
Hardness Soil (%)	...
Water Level (msl)	...
Current (m/s)	...
Tidal Range (m)	...
Tidal Period (min)	...
Pipe Diameter (m)	...
Pipe Length (m)	...
Pipe Outlet (m)	...
Switch Post Beaver	Switches version of the beaver (changes in the simulation and HMI).
Anchor Positions	Set the X/Y position of the portside/starboard anchors.
Save Project	Save all settings to disk.
Load Project	Load settings from disk.
Start	Start simulation (only works when all input fields are filled in). On success also changed the ‘Preparation Settings’ to ‘Simulation Settings’.

Parameters during simulation

Setting	Information
Anchor Fixed Position	Toggle the portside/starboard anchor fixed position.
Cutterhead Blocked (%)	Change the blockage value.
Hardness Soil (%)	Change the hardness soil value.
Stickiness (%)	Change the stickiness value.
Displays	Change cameras of the Unity visualization (3D views and HMI). When this dialogue is opened, it automatically shows an ID in the right-top corner of each display.
Fire Alarm	Toggle the fire alarm.
Bilge Alarm	Toggle the bilge alarm.
Anchor Positions	Change the X/Y position of the portside/starboard anchors.
Stop	Stop the simulation. This changes the “Simulation Settings” back to the “Preparation Settings” and enables Save/Load options again.

4. MULTIPED

The MULTIPED collects all the simulation data and displays it a clear dashboard. This allows the trainer to rewind in time to analyse the simulation data to point out potential mistakes or improvements to the operator.

Additional info will be added

5. Operator

This section describes all interface elements that are available to the operator to operate the simulator

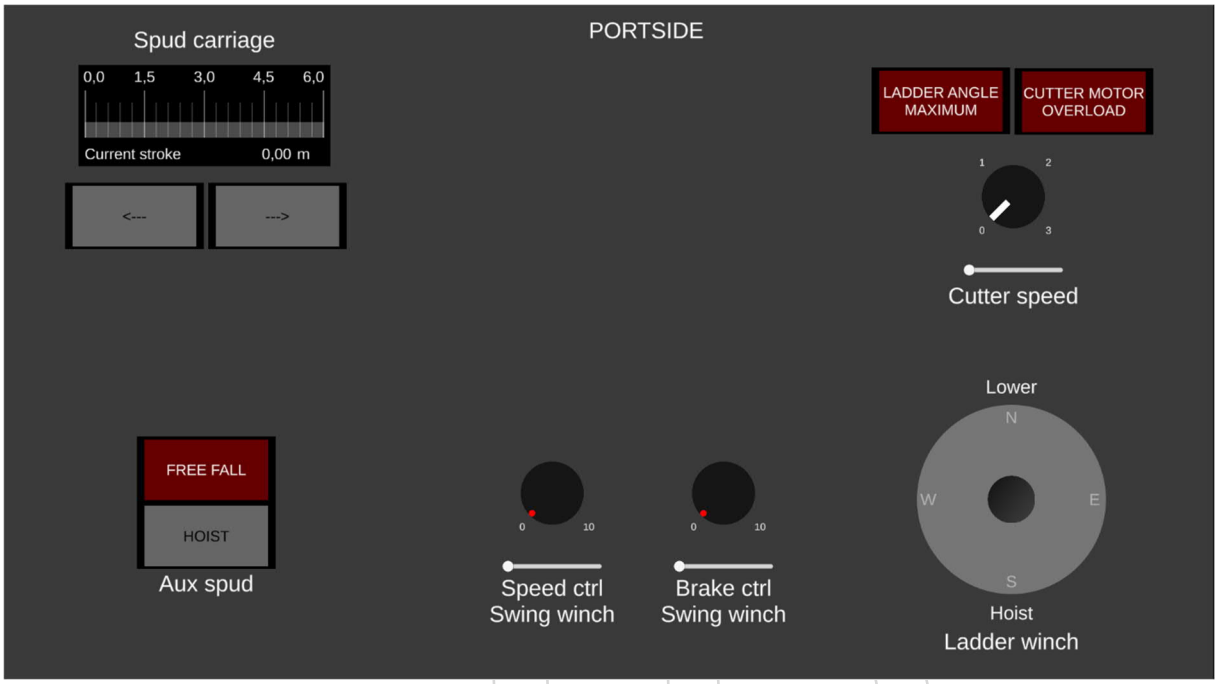


Figure 5: Portside desk (Pre 2009)

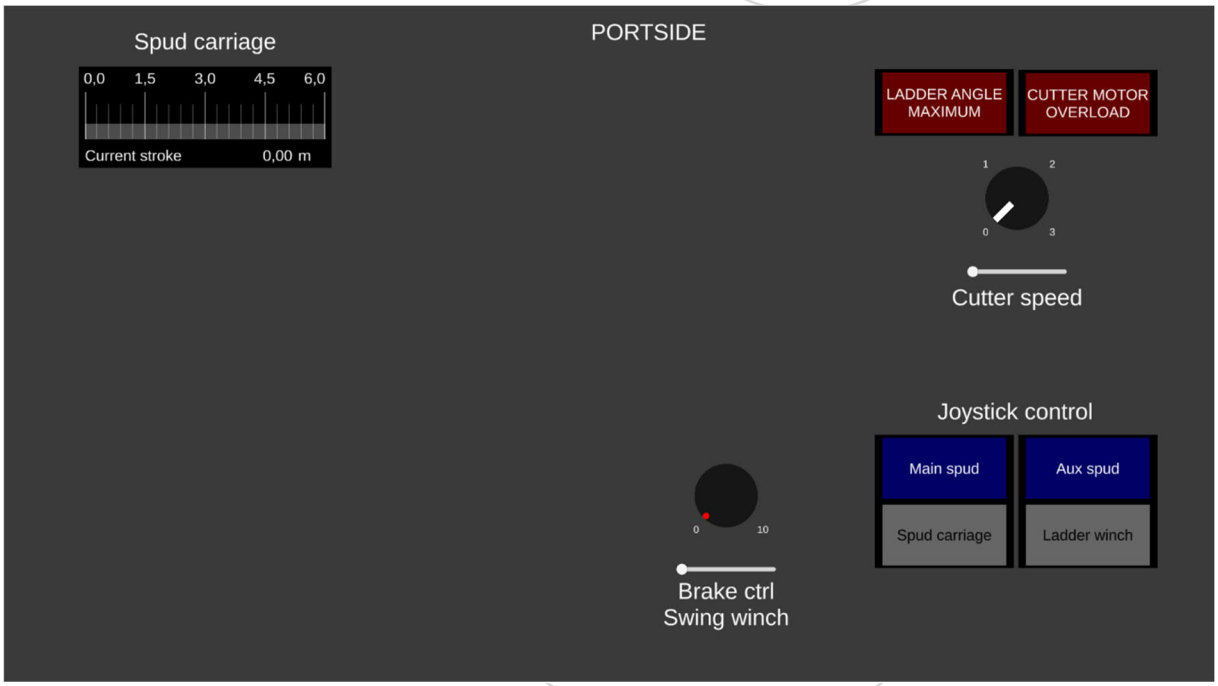


Figure 6: Portside desk (Post 2009)

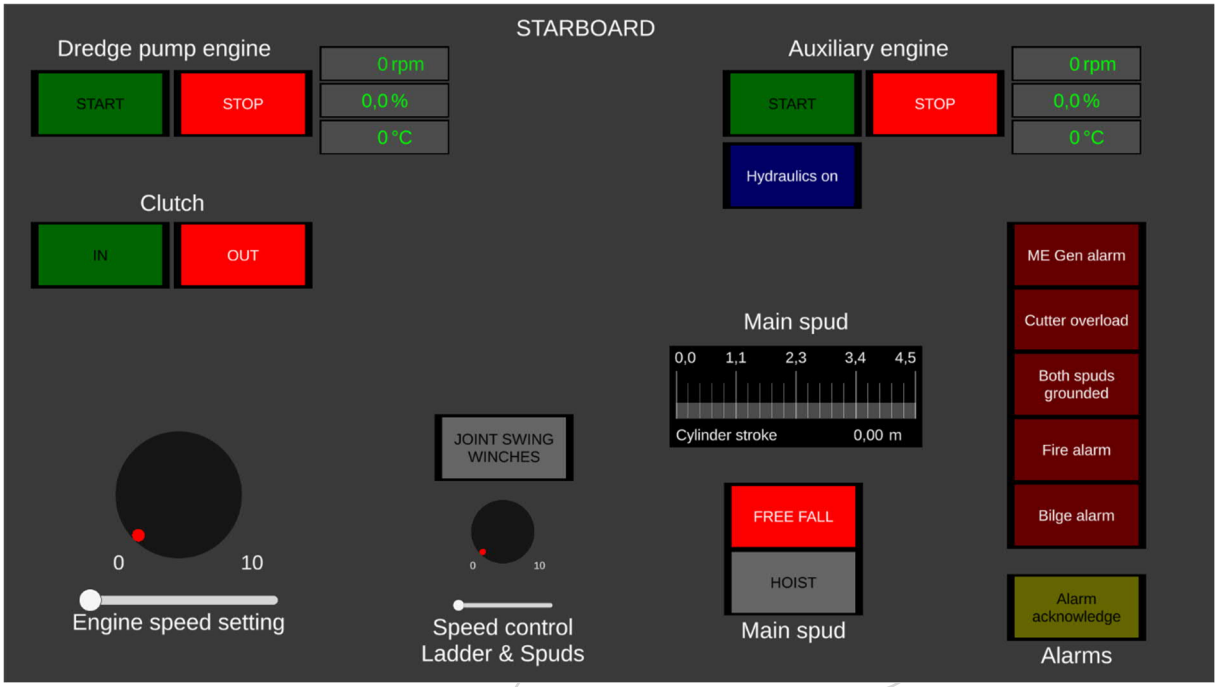


Figure 7: Starboard desk (Pre 2009)

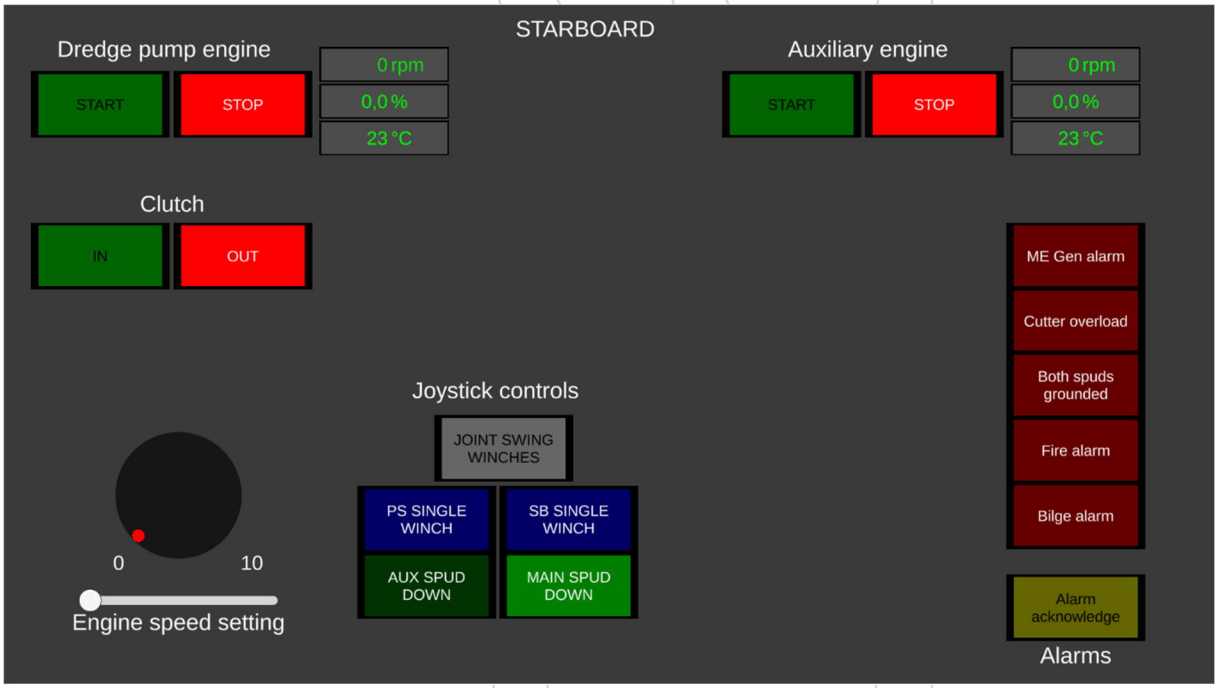


Figure 8: Starboard desk (Post 2009)

5.1. Diesel engines

Start conditions

- Cutter speed setpoint rotary switch = zero
- PS Winch hardware joystick returned to center position
- SB Winch hardware joystick returned to center position
- No active alarm:
    - ME Gen alarm not active
    - Cutter overload not active
    - Both spuds grounded not active
    - Fire alarm not active
    - Bilge alarm not active
    - Ladder max angle alarm not active

Start and stop controls

The main and auxiliary engine controls both have a Start and a Stop command button. All those buttons also have indication lights inside them to indicate the current engine mode of the corresponding engine. See Engine control sequence for more information about the possible engine modes.

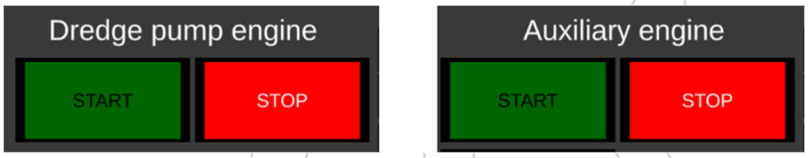


Figure 9: Start and stop controls

Mode	Start button (Green)	Stop button (Red)
None	Off	Off
STOPPED	Off	On
STARTING	Flashing 1Hz	Off
RUN	On	Off
CLUTCHING	On	Off
RUN CLUTCHED	On	Off
STOPPING	Off	Flashing 1Hz

Speed setting

The Main engine also has a potentiometer for the speed setting which is only evaluated in certain engine modes. The range of this speed setting is from 600 rpm to 1600 rpm.

The auxiliary engine does not have such a potentiometer so its speed setting will always be set to 1600 rpm, which is also only evaluated in certain engine modes.

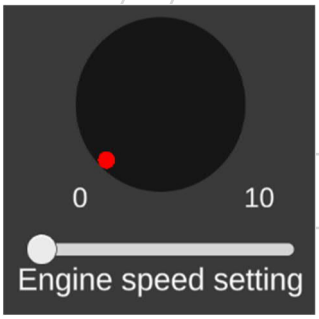


Figure 10: Engine speed setting

5.2. Engine mode sequence

Mode	Condition	Next mode	Speed setpoint	Remark
None	Startup	STOPPED	0 rpm	Start of simulation
STOPPED	Ready & Start command	STARTING	0 rpm	For Ready see Start conditions
STARTING	> 575 pm	RUN	600 rpm	
	Stop command	STOPPING		
	Start fail	STOPPING		
RUN	Clutch In command	CLUTCHING	Speed setting	
	Stop command	STOPPING		
	Rpm < 10	STOPPING		
CLUTCHING	Rpm > 1400 rpm	RUN CLUTCHED	Speed setting	
	Stop command	STOPPING		
	Rpm < 10	STOPPING		
RUN CLUTCHED	Stop command	STOPPING	Speed setting	
	Rpm < 10	STOPPING		
STOPPING	< 10 rpm > 10sec	STOPPED	0 rpm	

STOPPED MODE

A diesel engine can be started by using its corresponding Start button. This can only be done when the engine is in Stopped mode and the start conditions are met. The engine will enter its start sequence. The speed setpoint will be set to 600 rpm.

STARTING MODE

If the 575 rpm is reached within a certain time then the engine will be set to Run mode. If the 575 rpm is not reached within 10 seconds, a start failure will be initiated and the engine will be set into Stopping mode. If the Stop button is used in the Starting mode then the engine will be set into Stopping mode.

RUN MODE

At this time the clutch can be engaged by using the Clutch In button. The engine will go into Clutching mode. If no clutch is configured for the engine, like the auxiliary engine, then the engine will stay in this mode. If the Stop button is used then the engine will be set into Stopping mode.

CLUTCHING MODE

In clutching mode the engine speed must be increased to over 800 rpm. When that speed is reached, the clutch is considered to be fully engaged. When the engine reaches 1400 rpm the engine will enter the Run Clutched mode. If Stop button is used then the engine will be set into Stopping mode.

RUN CLUTCHED

In Run Clutched mode the speed setting can be increased to its nominal speed of 1600 rpm. To stop the engine its corresponding Stop button can be used. The engine will enter the Stopping mode.

STOPPING MODE

In Stopping mode the Stop button indication light flashing with a frequency of 1Hz. In the Stopping mode the speed will be decreased to 0 rpm. If the engine speed reaches 10 rpm a rundown timer of 10 seconds is started. When this timer elapses, the engine will enter the Stopped mode. The engine sequence is completed and be started again.

5.3. Clutch

Clutch control

On the Main Engine there is a clutch for engaging and disengaging the dredge pump to the main engine. This control is done by using the clutch in and clutch out button.

Figure 11: Clutch control

Clutch engaging

To engage the clutch the Clutch In button can be used when the engine is started.
The Clutch can only be engaged when:

- Engine speed > 65 rpm
- Engine speed < 650 rpm
- Clutch is not clutching out

Clutch disengaging

To disengage the clutch the Clutch Out button can be used at any time. It is the operators responsibility to clutch out at a reasonable engine speed to avoid the engine going into overspeed.

Automatically disengage

If for whatever reason the engine speed decreases to below 65 rpm, the clutch will automatically disengage.

Clutch indication

The clutch state is indicated on the clutch buttons:

Mode	Clutch In (Green)	Clutch Out (Red)	Remark
None	Off	Off	
Disengaged	Off	On	
Engaging	Flashing 1Hz	Off	
Engaged	On	Off	
Disengaging	Off	On	Auto or manual

5.4. Alarming

Alarms	Pre warn	Active	Remark
ME Gen alarm		Load > 90% or Speed > 115%	Main engine only
Cutter overload	> 100% < 15sec	> 100% > 15sec	
Both spuds grounded		Main & Aux spud grounded	
Fire alarm		Trainer interface	
Bilge alarm		Trainer interface	
Ladder angle maximum		Ladder depth > Max depth	Set to 25m

Alarm pre-warning

A pre-warning is raised when its condition is met. If the alarm has an indication light then this indication light will flash with a 1Hz frequency. When the condition disappears, the pre warning will disappear also and the corresponding indication light will switched off.

Figure 12: Alarms acknowledge

Alarm activation and acknowledgment

An alarm is raised when its conditions are met. The corresponding indication light and the illumination on the Alarm acknowledge button will be switched on. The alarm will stay active for as long as the alarm is not reset. An alarm can be reset by using the Alarm acknowledge button only when its conditions are no longer met. When the alarm is reset, the corresponding indication light and the illumination of the Alarm acknowledge button will be switched off.

5.5. HMI Controls in Pre- and Post-2009 mode

The CSD Beaver simulation can be switched to Pre-2009 or Post-2009 control mode. This can be done in the trainer interface. In Pre-2009 control mode only the swing winches can be activated by using the North-South axes of the both hardware joysticks. All other controls can only be done using the software controls on the Portside and Starboard control screens. In Post-2009 control mode more controls will be available in the hardware joysticks instead of on the Portside and Starboard control screens. In the next table an overview is shown of all the software controls and their corresponding control mode.

Control	Screen	Control modes	Remark
ME Start button	Starboard	Pre and Post 2009	
ME Stop button	Starboard	Pre and Post 2009	
ME Speed indication	Starboard	Pre and Post 2009	
ME Load indication	Starboard	Pre and Post 2009	
ME Temp indication	Starboard	Pre and Post 2009	
AUX Start button	Starboard	Pre and Post 2009	
AUX Stop button	Starboard	Pre and Post 2009	
AUX Speed indication	Starboard	Pre and Post 2009	
AUX Load indication	Starboard	Pre and Post 2009	
AUX Temp indication	Starboard	Pre and Post 2009	
Clutch In button	Starboard	Pre and Post 2009	
Clutch Out button	Starboard	Pre and Post 2009	
ME Speed setting	Starboard	Pre and Post 2009	
Joint Swing winches button	Starboard	Pre and Post 2009	In Post 2009 indication only
Speed control Ladder & Spuds	Starboard	Pre 2009	
Main spud Free Fall button	Starboard	Pre 2009	
Main Spud Hoist button	Starboard	Pre 2009	
PS Single winch button	Starboard	Post 2009	Indication only
SB Single winch button	Starboard	Post 2009	Indication only
Main spud down	Starboard	Post 2009	
Aux spud down	Starboard	Post 2009	
ME Gen alarm indication	Starboard	Pre and Post 2009	
Cutter Overload indication	Starboard	Pre and Post 2009	
Both spuds grounded indication	Starboard	Pre and Post 2009	
Fire alarm indication	Starboard	Pre and Post 2009	
Bilge alarm indication	Starboard	Pre and Post 2009	
Alarm acknowledge button	Starboard	Pre and Post 2009	
Spud carriage <---	Portside	Pre 2009	For moving cylinder in
Spud carriage --->	Portside	Pre 2009	For moving cylinder out
Spud carriage position indication	Portside	Pre and Post 2009	
Aux spud Free Fall button	Portside	Pre 2009	
Aux Spud Hoist button	Portside	Pre 2009	
Speed ctrl swing winch	Portside	Pre 2009	
Brake ctrl swing winch	Portside	Pre and Post 2009	In Post 2009 indication only
Ladder angle max indication	Portside	Pre and Post 2009	
Cutter motor overload indication	Portside	Pre and Post 2009	
Cutter speed setting switch	Portside	Pre and Post 2009	
Ladder winch joystick	Portside	Pre 2009	

5.6. Joystick controls

Below pictures show overviews of the Portside and Starboard hardware joystick buttons in their handles. Each joystick also has a red button on the back side of the stick.

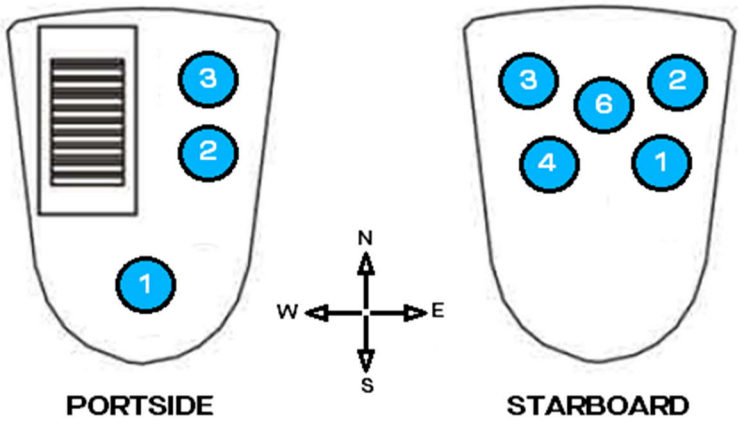


Figure 13: Joystick layout

Side	Control	Mode	Function
Portside	N/S	Pre-2009	If Joint winches: N = n/a, S = Swing to PS Else: N = PS Winch veer, S = PS Winch Haul
	N/S	Post-2009	If Ladder: N = LDR Winch Veer, S = LDR Winch Haul If Spud carrier: N = Extent cyl, S = Retract cyl If Main spud: N = Extent cyl, S = n/a If Aux spud: N = Extent cyl, S = n/a
	E/W	Post-2009	n/a
	Thumb wheel	Post-2009	If Joint winches: Tension setting braking winch
	Red button	Post-2009	Select Ladder winch control
	Btn1	Post-2009	Select Spud carrier control
	Btn2	Post-2009	Select Aux spud control
	Btn3	Post-2009	Select Main spud control
Starboard	N/S	Pre-2009	If Joint winches: N = n/a, S = Swing to SB Else: N = SB Winch veer, S = SB Winch Haul
	N/S	Post-2009	If PS single winch: N = PS Winch veer, S = PS Winch Haul If SB single winch: N = SB Winch veer, S = SB Winch Haul
	E/W	Post-2009	If Joint winches: E = Swing to SB, W = Swing to PS
	Fire	Post-2009	n/a
	Btn1	Post-2009	Select Main spud control
	Btn2	Post-2009	Select SB Single winch control
	Btn3	Post-2009	Select PS Single winch control
	Btn4	Post-2009	Select Aux spud control
	Btn6	Post-2009	Select joint winch control

5.7. Spud carriage

The spud carriage cylinder can be used to reposition the cutter dredger. This cylinder can be operated by using the corresponding buttons in the Pre 2009 setup and by the hardware joystick in the Post 2009 setup. There are 2 condition for this control to be enabled.

1) The auxiliary engine must be running. The hydraulic pressure is assumed to be limitless available as long as this engine is running.
2) Main and auxiliary spud are not both grounded.

The maximum stroke of the cylinder is from 0.0m to 4.5m.
The maximum speed for the cylinder is 6m per minute.

5.8. Pre-2009 controls

When the spud carriage is ready for use then the cylinder can be extended by using the button: "--->" and can be retracted by using the button: "<--". As long as a button is pressed it will be slightly illuminated. When the button is released, the cylinder will stop were it is and the illumination of the button will be switched off. The current position of the spud cylinder will be indicated in a horizontal bar graph above the buttons in green. The actual speed for moving the cylinder is determined by the potentiometer: "Speed control Ladder & Spuds", located in the Starboard desk. The range of this potentiometer on the screen is 0 to 10 which corresponds to a speed of 0 – 100% of the maximum speed.

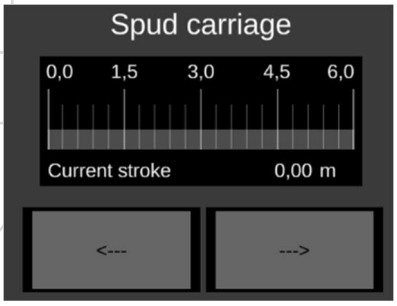


Figure 14: Spud carriage

5.9. Post-2009 controls

To be able to use the hardware joystick for the Spud carriage cylinder, first the Spud carriage function must be selected on the Portside hardware joystick. This can be done by using the corresponding button (1) on the joystick.

Figure 15: Post-2009 controls

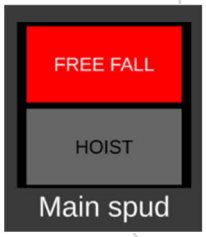
If another control was active and not busy anymore then that control will be deselected and the Spud carriage function will be selected for that joystick, which will be indicated by illumination of the Spud carriage Joystick control indication light on the Portside desk. If the button is used while the spud carriage control was already selected, then the Spud carriage control will be deselected. The actual speed for moving the cylinder is determined by the Portside joystick North-South setting.

5.10. Spuds

The Main spud and the Auxiliary spud can be used for repositioning the cutter dredger. They can be operated by using the corresponding buttons in the Pre 2009 setup and by the hardware joystick in the Post 2009 setup. There is only 1 condition for this control to be enabled. The auxiliary engine must be running. The hydraulic pressure is assumed to be limitless available as long as this engine is running. The maximum stroke of the spud cylinders is 0.0m to 2.6m. The maximum speed for the cylinder is 6m per minute.

Pre 2009 control

Each spud has a button: “Hoist” for hoisting the corresponding spud pole. As long as a button is pressed it will be slightly illuminated. When the button is released, the cylinder will stop were it is and the illumination of the button will be switched off. The actual speed for moving the cylinder is determined by the potentiometer: “Speed control Ladder & Spuds”, located in the Starboard desk. The range of this potentiometer on the screen is 0 to 10 which corresponds to a speed of 0 – 100% of the maximum speed.



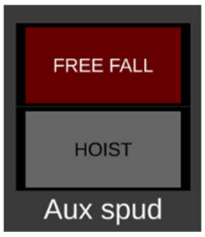


Figure 16: Main spud, aux spud, speed controls

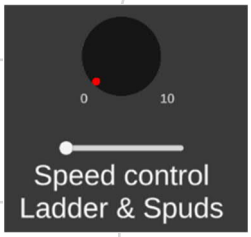


Figure 17: Speed controls

Each spud also has a button: “Free Fall”. When this button is pressed, it will be latched until the spud stops moving for more than 1 second. Then the spud is assumed to be grounded. While the Free fall is activated and when the spud is grounded the illumination of the Free fall button will be switched on.

Post 2009 control

To be able to use the Portside hardware joystick for hoisting a spud, first the corresponding spud function must be selected on the Portside hardware joystick. This can be done by using one of the buttons (2 for PS or 3 for SB) on the joystick.

Figure 18: Portside and starboard desk

If another control was active and not busy anymore then that control will be deselected and the chosen spud function will be selected for that joystick, which will be indicated by illumination of the Joystick control indication light of the chosen spud on the Portside desk. If the button is used while the chosen spud control was already selected, then the chosen spud control will be deselected. The actual speed for hoisting the cylinder is determined by the Portside joystick North-South setting. Each spud also has a Joystick control button on the Starboard desk: “Down”. When this button is pressed, it will be latched until the spud stops moving for more than 1 second. Then the spud is assumed to be grounded. These buttons can be used regardless of the chosen function of the Portside hardware joystick. While the Spud down is activated and when the spud is grounded the illumination of the Spud down button will be switched on.

5.11. Ladder winch

The ladder winch can be used to lower and lift the cutter head. This is controlled by the hoisting and lowering of the ladder winch. Hauling the winch will hoist the ladder and veering the winch will lower the ladder. In Pre 2009 control it can be operated by using the software joystick on the PS control desk and in Post 2009 control it can be operated by using the Portside hardware joystick(after selecting the mode ladder winch with button).. There is only 1 condition for this control to be enabled. The auxiliary engine must be running. The hydraulic pressure is assumed to be limitless available as long as this engine is running.

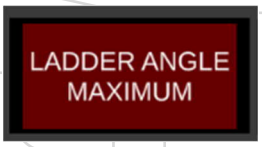


Figure 20: Ladder angle maximum

Figure 19: Depth parameter

If the ladder is lowered too far, over the maximum permissible angle, then an alarm is activated. This alarm is ignored when the auxiliary engine is switched off. The current depth of the ladder is indicated on the Center screen in a vertical rotating scale in which 0m is considered to be the waterline. The normal working range is indicated as a black scale, the outside normal range is indicated as a red scale.

Pre 2009 control

The winch can be operated by the software joystick on the Portside desk. For hoisting the ladder the joystick knob needs to be dragged to the south, for lowering the ladder the joystick knob needs be dragged to the north.

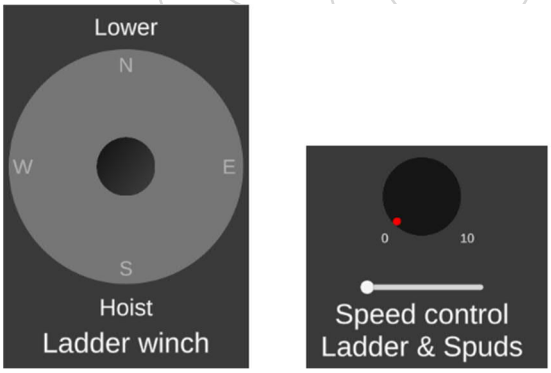


Figure 21: Hoist ladder winch and speed control

The actual speed for moving the winch is determined by the potentiometer: “Speed control Ladder & Spuds”, located in the Starboard desk. The range of this potentiometer on the screen is 0 to 10 which corresponds to a speed of 0 – 100% of the maximum speed.

Post 2009 control

To be able to use the Portside hardware joystick for hoisting or lowering the ladder, first the ladder function must be selected on the Portside hardware joystick. This can be done by using the red button in the palm grip of the joystick.

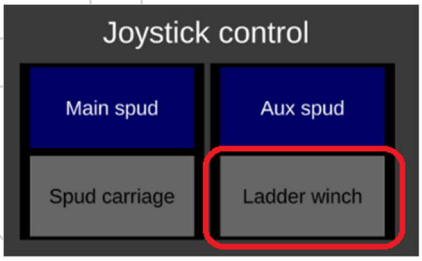


Figure 22: Joystick control

If another control was active and not busy anymore then that control will be deselected and the ladder function will be selected for that joystick, which will be indicated by illumination of the Ladder winch Joystick control indication light on the Portside desk. The actual speed for moving the ladder winch is determined by the Portside joystick North-South setting.

5.12. Swing winches

Two swing winches are available, one on Portside and one on Starboard. They can be used for swinging the cutter dredger around its spud pole. They can be operated independently from each other, called the Single winch control, but they can also be operated together, called the Joint winch control. In Single winch control a single winch can be operated to haul or veer its cable. This mode is only for maintenance purposes of the winch and its cable. In Joint winch control both winches will work together. If active then one winch will be used for hauling its cable while the other winch will veer its cable with a configurable tension (to avoid slack in that cable or to prevent the cutter from “running” over the sea floor when cutting in harder soil). This mode must be used to swing the cutter dredger around the spud pole.

There are 3 condition for this control to be enabled.

1) The auxiliary engine must be running. The hydraulic pressure is assumed to be limitless available as long as this engine is running.
2) The cutter is not overloaded
3) Main and auxiliary spud are not both grounded.

Figure 23: Swing angle

The current swing angle is shown in the center desk in the horizontal indication bar. That bar has a range of 90° divided over the Portside direction and the Starboard direction. The Portside direction is defined as 0° to -45° and the Starboard direction is defined as 0° to 45°. Below the bar small arrows indicate the different level settings. At the Pre warning level, indicated by an orange arrow, the bar will color orange. At the Alarm level, indicated by a red arrow, the bar will color red. To avoid rapid switching between colors a hysteresis of 5% is used, meaning that the value needs to be below 95% of the setting before its color is reset to the lower level color.

Pre 2009 controls

To select the desired winch control mode the button Joint swing winches can be used. If the Joint swing winch mode is active then the illumination of this button will be switched on. If the Joint swing winches button is used while it was already activated then the mode will be switched back to Single winch mode and its illumination will be switched off. In Single winch mode the Portside winch can be operated by using the Portside hardware joystick and the Starboard winch can be operated by using the Starboard hardware joystick.

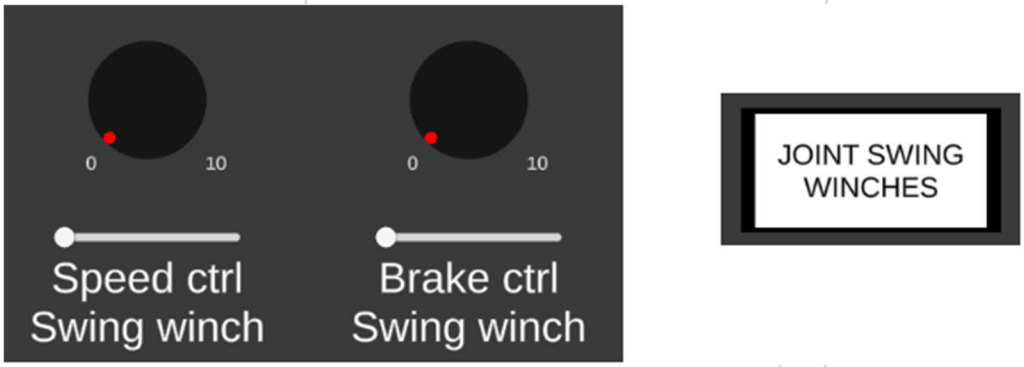


Figure 24: Speed control and joint swing winches

In joint winch mode swinging to Portside can be done by pulling the Portside joystick (PS winch hauling) and swinging to Starboard can be done by pulling the Starboard joystick (SB winch hauling). The actual speed for moving the winch is determined by the potentiometer: “Speed ctrl Swing winch”, located in the Portside desk. The range of this potentiometer on the screen is 0 to 10 which corresponds to a speed of 0 – 100% of the maximum speed. In single mode the speed is used for the concerning individual winch, hauling and veering, and in Joint winch control for the concerning hauling winch. The amount of tension in the cable of the veering winch in Joint winch mode is determined by the potentiometer: “Brake ctrl Swing winch” and will only be applied to the veering winch.

Post 2009 controls

To operate the winches the Starboard joystick can be used. This joystick can be used in three ways:

- Joint swing winch
- PS Single winch
- SB Single winch

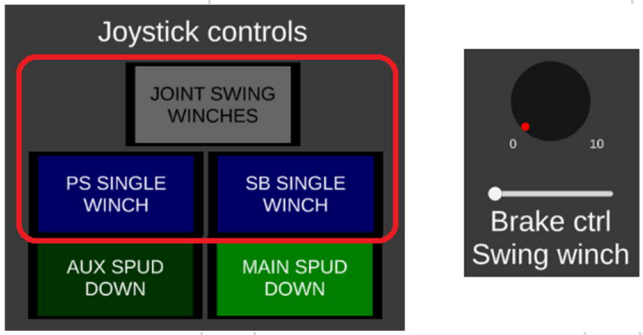


Figure 25: Joystick controls, brake ctrl swing winch

To select a desired control mode for this joystick, its corresponding button can be used. If another control was active and not busy anymore then that control will be deselected and the Joint swing winch mode will be selected for the joysticks, which will be indicated by illumination of the Joint swing winches Joystick controls indication light on the Starboard desk. If the concerning mode was already active then using the button will switch the control mode off. The actual speed for moving the winch in Single winch mode is determined by the by the Starboard joystick North-South setting. The actual speed for moving the winches in Joint winch mode is determined by the by the Starboard joystick East-West setting. The West direction of the joystick is used for swinging to Portside and the East direction of the joystick is used to swing to Starboard. The amount of tension in the cable of the veering winch in Joint winch mode is determined by the thumb wheel in the Starboard joystick. Pushing the thumb wheel will increase the tension while pulling the thumb wheel will decrease the tension. If the thumb wheel is released then it will return to its center position and the tension will remain as it was set. To have a visual feedback of the current tension setting, the potentiometer: “Brake ctrl Swing winch” will show the actual value as an indication only.

5.13. Cutter controls

The cutter can be used to loosen the soil from the bottom. It can be operated by setting its rotational speed. There are 2 condition for this control to be enabled.

1) The auxiliary engine must be running. The hydraulic pressure is assumed to be limitless available as long as this engine is running.
2) The cutter is not overloaded

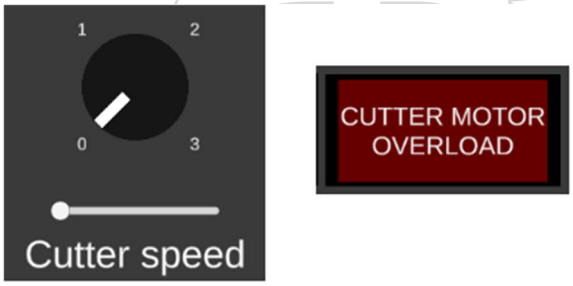


Figure 26: Cutter speed and cutter motor overload

For setting the speed a switch is available which can be set to zero to switch it off and to a position of 1 to 3 to set the desired speed. This number corresponds to the amount of hydraulic pumps to be used for driving the hydraulic motor of the cutter. This means that the higher this setting the higher rotational speed the cutter will have. The cutter is built to work to a certain maximum 100% load. This load may be exceeded for a short time but for no longer than 15 cumulative seconds. During this 15 seconds the alarm indication light of the cutter overload will flash. This indication light will not be switched off before the cutter load has been brought back to below 100% for the same amount of time as it was overloaded. If the cutter is overloaded for more than 15 cumulative seconds then the Cutter Overload alarm will be activated, the cutter will be stopped and the alarm indication light Cutter overloaded will be switched on. This alarm needs to be reset before the cutter can be used again.

5.14. Control details

Mouse vs Touchscreen controls

The simulator can be operated by using a mouse or the touchscreens. A mouse click will have the same behavior as a touch on the screen. So anywhere in the text below where the words click, clicked or clicking are used can also be read as touch, touched and touching. A mouse action is considered as a click when its left button is pressed down and released within the limits of a control.

Potentiometer

The potentiometer can be used to set a parameter on a certain value. The pointer of the potentiometer is depicted as a red dot. The current value of the potentiometer is shown in the rotational placement of the pointer in the knob and in the horizontal placement of the gray knob in the slider below the potentiometer. The range of the potentiometer is 0 – 10 which corresponds to 0% to 100% of the concerning parameter.

The potentiometer can be changed in two ways:

- Using the knob
- Using the slider

Changing the potentiometer using the knob

The knob of the potentiometer can be rotated by clicking on one side of the knob. Clicking on the right half will rotate the knob to the right, increasing the current value with 5% of full range. Clicking on the left half will rotate the knob to the left, decreasing the current value with 5% of full range. When clicked on one of the sides a transparent square will appear, indication the side of the knob that has been clicked. If the other side is then clicked then the square will move to the other side. If no side is clicked for two consecutive seconds then the square will disappear again.

Changing the potentiometer using the slider

The gray knob in the slider of the potentiometer can be dragged from left to right and vice versa. Dragging it to the right will increase the value, dragging it to the left will decrease the value. The range for this slider is the same range as the potentiometer and is divided linear over the slider. This means that in the middle of the slider the value of the potentiometer is 50%. If clicked on the slider on a position other than the location of the slider knob, then this will move the slider knob to the clicked position and will therefore set the potentiometer value accordingly.

Rotational switch

The rotational switch can be operated like the potentiometer but then with a number of predefined stop positions audible indicated with a clicking sound. The pointer of the switch is depicted as a small white bar. The current value of the switch is shown in the rotational placement of the pointer in the knob and in the horizontal placement of the gray knob in the slider below the switch.

Figure 27: Switches

The range for the switch is shown on the switch itself.
The switch can be changed in two ways:

- Using the knob
- Using the slider

Changing the switch using the knob

The knob of the switch can be rotated by clicking on one side of the knob. Clicking on the right half will rotate the knob to the right, moving the switch knob one position upwards. Clicking on the left half will rotate the knob to the left, moving the switch knob one position downwards. When clicked on one of the sides a transparent square will appear, indication the side of the knob that has been clicked. If the other side is then clicked then the square will move to the other side. If no side is clicked for two consecutive seconds then the square will disappear again.

Changing the switch using the slider

The gray knob in the slider of the switch can be dragged from left to right and vice versa. Dragging it to the right will increase the value to the next position upwards, dragging it to the right will decrease the value to the next position downwards. The range for this slider is the same range as the switch and is divided over the same positions as the knob of the switch. If clicked on the slider on a position other than the location of the slider knob, then this will move the slider knob to the defined position closest to the clicked position and will therefore set the switch value accordingly.

Production indication

In the center desk a production indicator is shown. This indicator shows two values on different scales. The scale from bottom left to upper right is indicating the density of the product. The scale from right bottom to top left is indicating the velocity of the product.

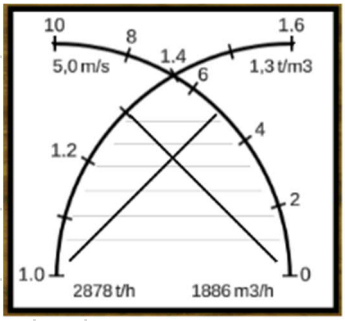


Figure 28: Production indication

The current value of each product indication is shown as a pointer over the scale and also as a numeric value at the end of the corresponding scale. At the bottom of the production indicator two values are shown. The first value is the mass of the product currently being removed in tons per hour and the other value is the flow rate at which that product is being removed in cubic meter per hour.

6. Updates

This section describes how to do a update

6.1. Versions

The version number (of the deliverable) is displayed in the left-top corner of the Trainer Interface and tells us what version of the simulator is installed. It tells us also what version of the 20-sim model, FMU and Trainer Interface are being used.

6.2. How to update the simulator

In case of an update, a ZIP-file will be sent. The contents of this ZIP-file will need to be extracted over two different devices; the PC and the tablet.

Note: *Please overwrite the contents and do not delete the contents beforehand as saved simulation settings and log files might be lost.*

PC

The contents inside the “PC” folder of the ZIP-file will be extracted to: **C:\CSD-Simulator**

Tablet

The contents of the folder “Tablet” of the ZIP-file will be extracted to: **C:\CSD-Trainer-Interface**

7. Troubleshooting

7.1. Computer crash

In case of problems please contact Dutch Dredging Simulators.

Dutch dredging simulators
Mainhavenweg 17
1043 AL Amsterdam
Tel : +31(0)20-2475000
E-mail : info@dutchdredgingsimulators.nl
Web : www.dutchdredgingsimulators.nl

7.2. Restart

To re-start the simulator ..