

SmartPacker U3 | 2026-05-22

0 Introduction

SmartPacker helps you plan container loading: it calculates loading plans from the dimensions of cartons or palletized unit loads, and lets you edit the loading plan interactively.

Container load planning brings clarity and certainty to supply-chain collaboration.

- Help shippers save freight cost by planning for a higher fill rate.
- Help buyers adjust product-quantity combinations before placing full-container-load orders.
- Help LCL dealers estimate delivery cost for competitive quotations.

SmartPacker runs on 64-bit Windows.

It does not access the internet, but it reads and writes local files.

U3 can be used for a 100-day trial.

- The software is provided as is, without warranty or liability from the provider.
- You must not crack or modify the software or its package.
- You may check <http://www.zhihuo.net/pld/> for updates.

This document may not cover the latest feature enhancements.

You can find other SmartPacker editions at www.zhihuo.net. In addition to standard editions,

- ZhiHuo provides custom algorithm development for specific loading rules.
- The software can import PMS, OMS, and WMS data, and compute plans according to your shipment scheduling rules.
- The user interface can be customized, and other Excel paperwork can be generated from your templates.

Contact email: zhzx@zhihuo.com

1 The Software Package

Right-click the software package zip file, then choose a folder to unzip it:

- Double-click SmartPackerU3.exe open the application. No installation is needed.
- The .dll and .bpl files are supporting library files; keep them in the folder.
- The data/u3 subfolder contains data.xlsx, which stores the application data.

Open data.xlsx in Microsoft Excel. The unit-load sheet contains sample cargo data. Replace the sample values with your own data, then the software can compute loading plans for your cargo.

| | A | B | C | D | E | F |
|----|-----------|-----------|----------|-----------|-----------|----------------------------|
| 1 | ID | length/mm | width/mm | height/mm | weight/kg | weight support capacity/kg |
| 2 | SP A full | 1219 | 1067 | 800 | 300 | 800 |
| 3 | SP A half | 1219 | 1067 | 400 | 150 | 800 |
| 4 | SP B full | 1200 | 1000 | 780 | 220 | 750 |
| 5 | SP B half | 1200 | 1000 | 390 | 140 | 700 |
| 6 | SP C | 1165 | 1165 | 1000 | 230 | 720 |
| 7 | SP D | 1067 | 1067 | 950 | 350 | 1200 |
| 8 | SP E | 1100 | 1100 | 420 | 200 | 1400 |
| 9 | SP F | 1200 | 800 | 450 | 250 | 920 |
| 10 | SP G | 1219 | 1016 | 700 | 290 | 855 |
| 11 | SP H | 1219 | 1219 | 850 | 380 | 1200 |

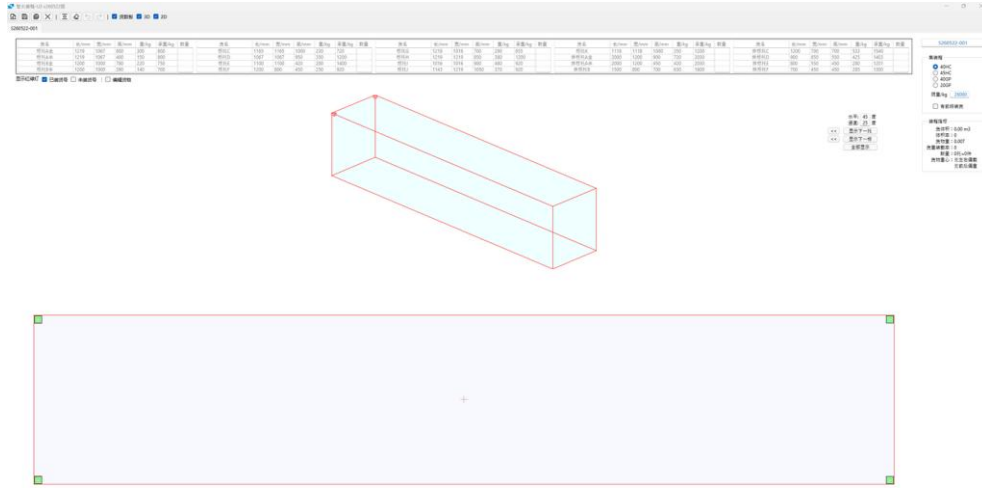
The container sheet contains the loading-space specifications for each container type. You can amend the data for your specific case.

| | A | B | C | D | E |
|---|------|-----------|----------|-----------|--------------------|
| 1 | ID | length/mm | width/mm | height/mm | weight capacity/kg |
| 2 | 40HC | 12000 | 2330 | 2640 | 26000 |
| 3 | 45HC | 13500 | 2330 | 2640 | 26000 |
| 4 | 40GP | 12000 | 2330 | 2330 | 26000 |
| 5 | 20GP | 5810 | 2330 | 2330 | 22000 |

Data customization is revisited in Chapter 5 in more detail.

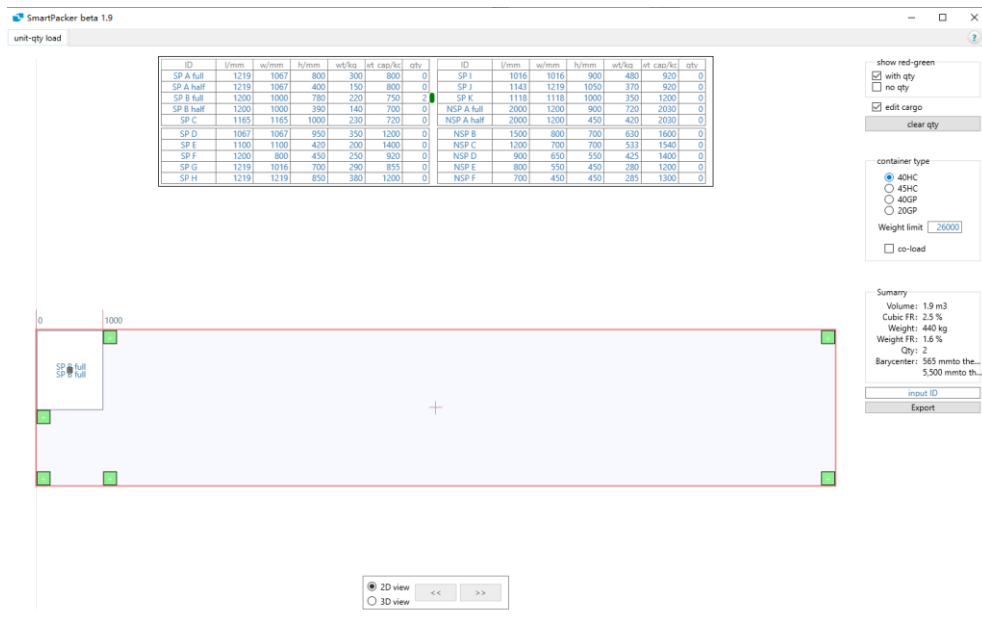
2 Load a Container by Algorithm

With the sample data in the trial package, the software interface initially appears as below.

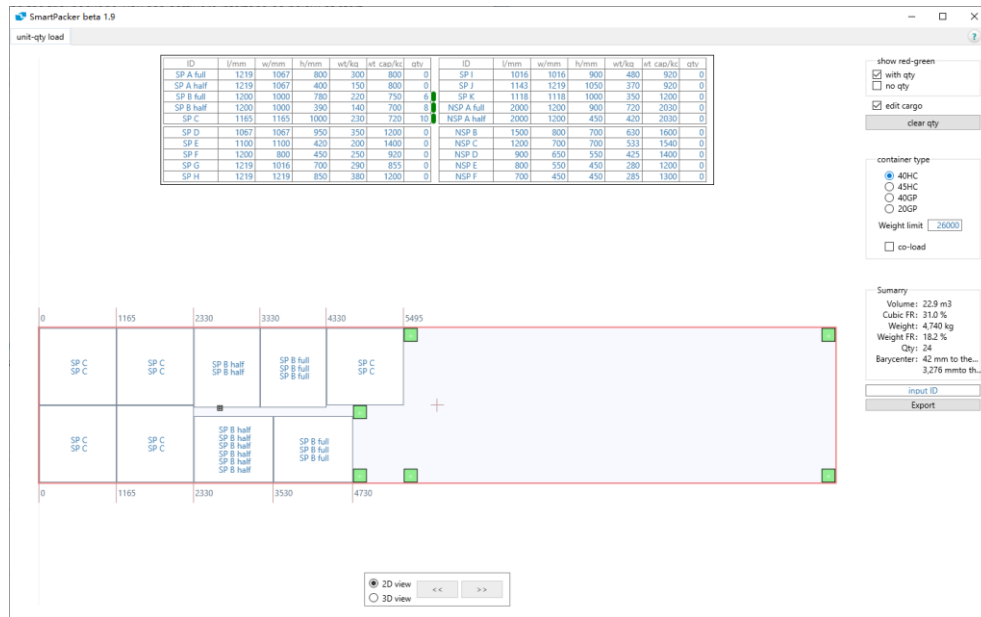


The trial edition lists 20 cargo specification/quantity rows.

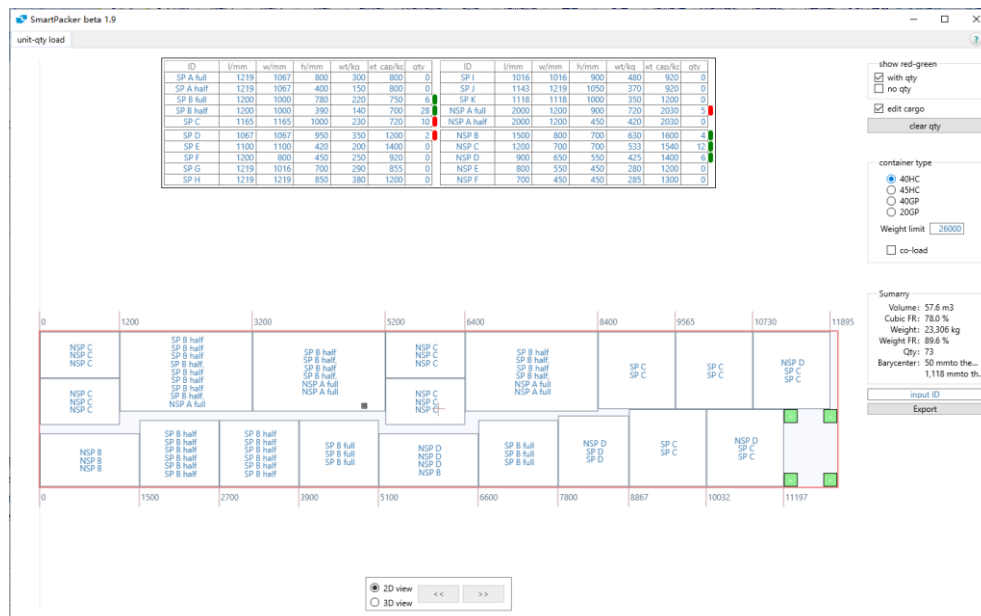
- All quantities are 0, so the container below is empty.
- Move the mouse pointer over a quantity field and scroll the mouse wheel. The quantity increases and the cargo appears in the container below.



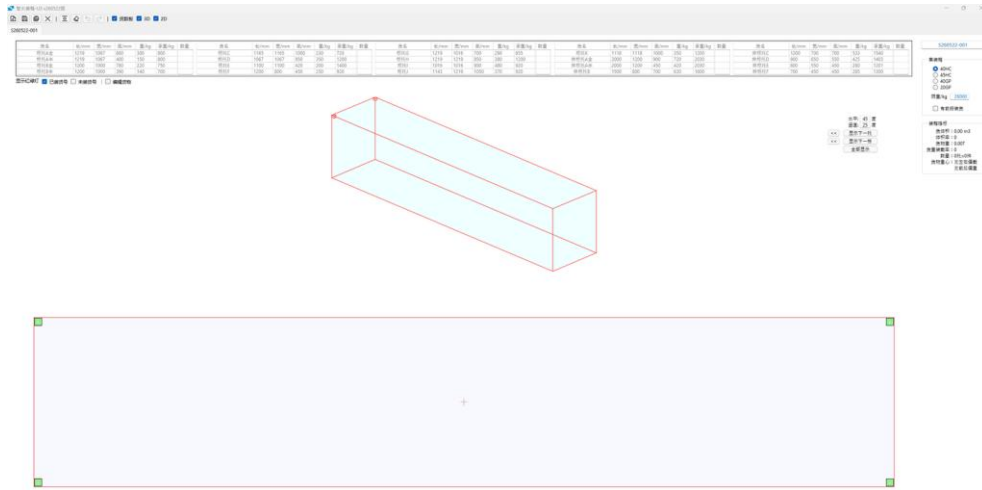
Continue increasing the quantities, and you will see cargo stacks loaded from the front end of the container, with a plan that minimizes occupied floor space.



As the loaded cargo gets closer to the rear door, you will start to see red lights instead of green lights beside the quantity input boxes. A green light means the quantity can still be increased. A red light means no more can be added, or in other words, the software algorithm found no feasible loading plan.

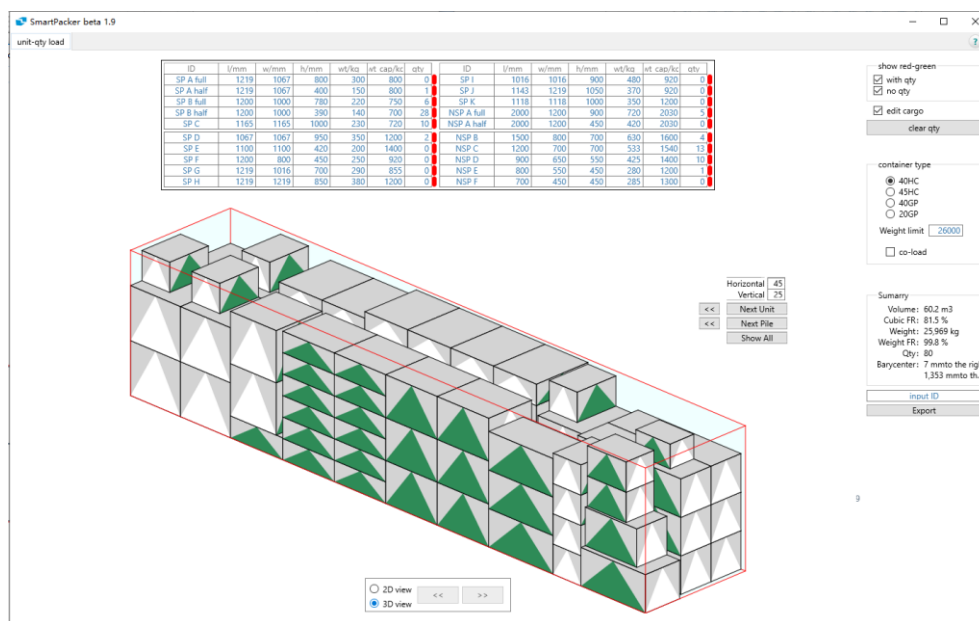


You may first load items due soon, then use different combinations of optional items to maximize fill rate with assistance from the red-green lights. You can turn on all lights, even for cargo with zero quantity. When all lights are red, you cannot add one cargo without reducing the quantity of another.

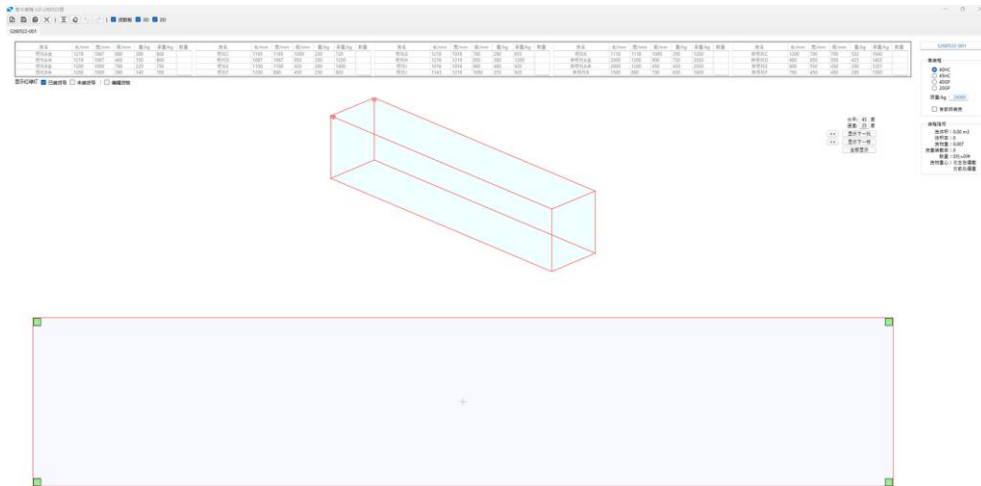


You can evaluate the loading plan by checking the summary data on the right: cubic volume and fill rate, cargo weight, and weight fill rate relative to the weight capacity constraint. You can also check the loading plan in 3D view and make adjustments, such as making stacks more stable (see page 7 for interactive editing of a loading plan).

For the plan below, you may see that more NSP D cargo can be added by space, but the current weight fill rate of 99.8% tells you that further adding is stopped by the weight constraint.



When you are satisfied with the loading plan, type a name for it in the "input ID" textbox.



Then click the Save/Export button on the toolbar to generate an Excel document, which can then be printed or sent.

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|----|--------------------------|---------------|---|----|---|---|---|---|---|---|---|---|---|---|
| 1 | Load Plan for 2021-2-2-A | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | Delivery List | | | | | | | | | | | | |
| 4 | 1 | SP A half | | 1 | | | | | | | | | | |
| 5 | 2 | SP B full | | 6 | | | | | | | | | | |
| 6 | 3 | SP B half | | 28 | | | | | | | | | | |
| 7 | 4 | SP C | | 10 | | | | | | | | | | |
| 8 | 5 | SP D | | 2 | | | | | | | | | | |
| 9 | 6 | NSP A full | | 5 | | | | | | | | | | |
| 10 | 7 | NSP B | | 4 | | | | | | | | | | |
| 11 | 8 | NSP C | | 13 | | | | | | | | | | |
| 12 | 9 | NSP D | | 10 | | | | | | | | | | |
| 13 | 10 | NSP E | | 1 | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |

To plan the next container, click the eraser button on the toolbar to clear quantities and empty the container.

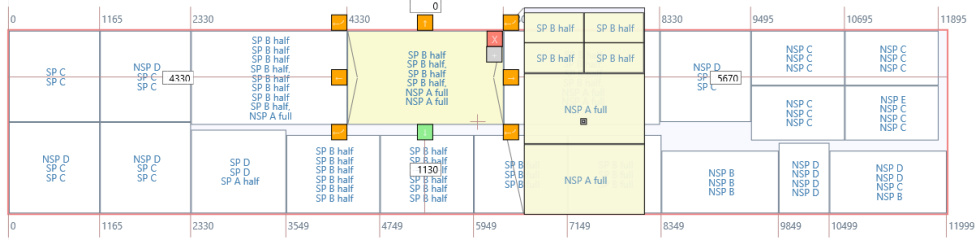
3 Edit a Loading Plan


The 2D view supports interactive editing of the container loading plan. This can be useful when:

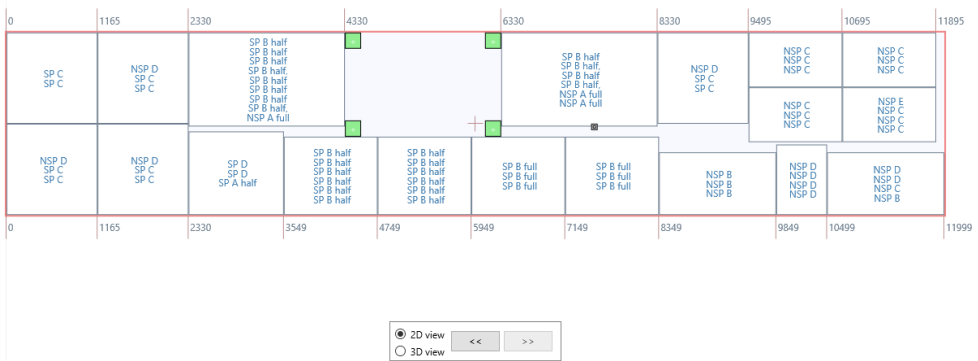
- You need to alter it for some reason, such as making loading operations easier.
- You received a loading plan by other means and want to use the software to verify it and draw an illustration.

3.1 Select and Move a Cargo Stack

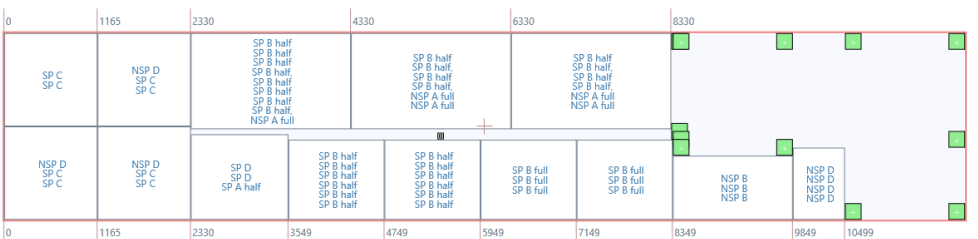
In the 2D view, click a cargo stack to select it. In the illustration below, the selected stack shows two triangle lines representing its side faces, indicating that the base unit is placed along the container length.



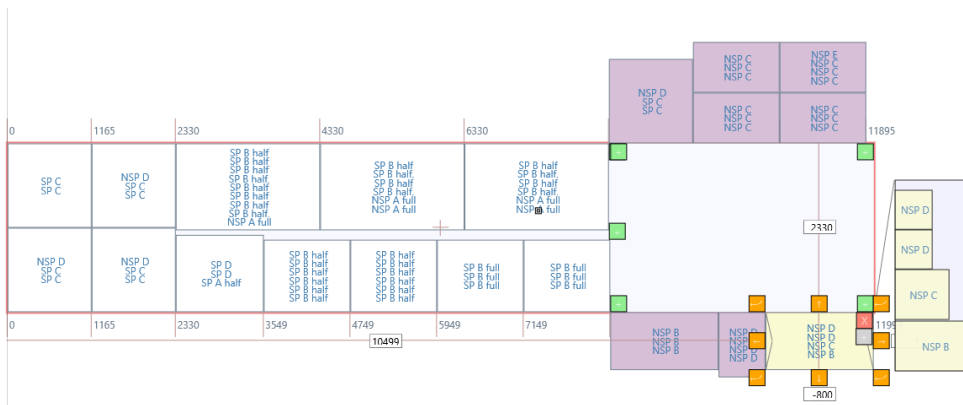
Click the red delete button  to delete the cargo stack, then use the undo button to cancel the change.



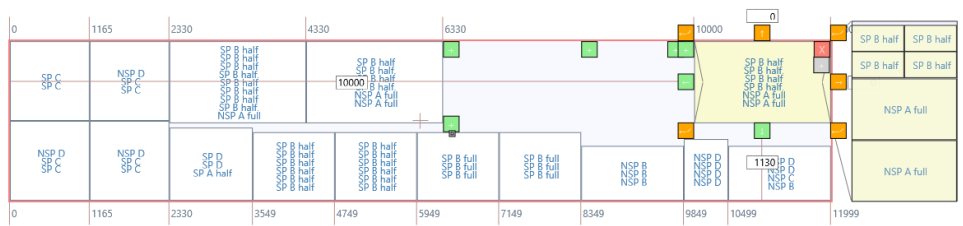
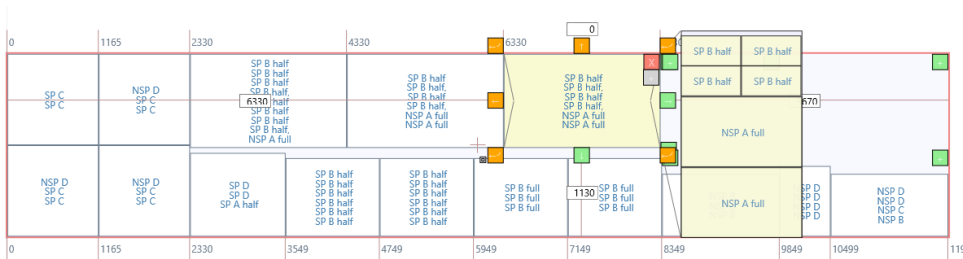
If you want to rearrange several stacks, you can delete them to clear space.



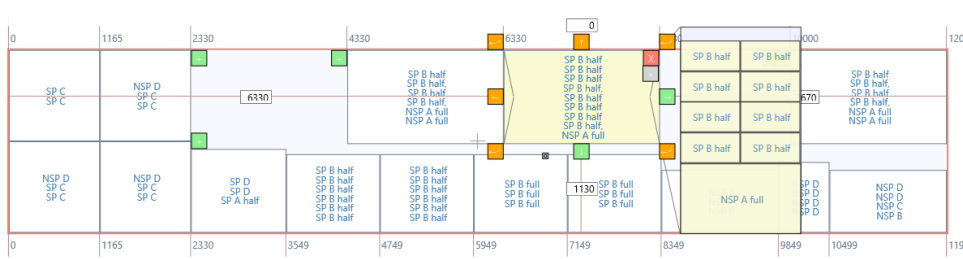
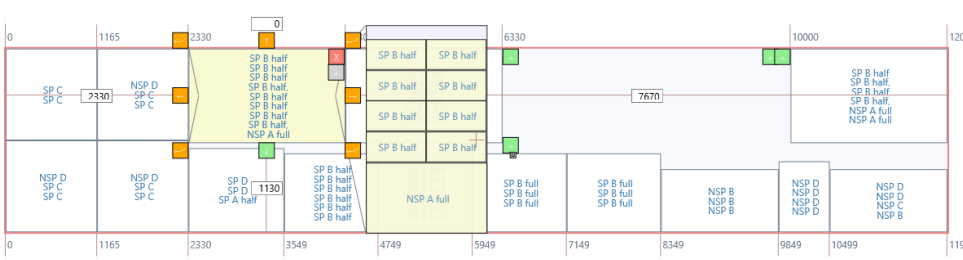
You can also click a move button to move stacks out of the container first, then relocate them.

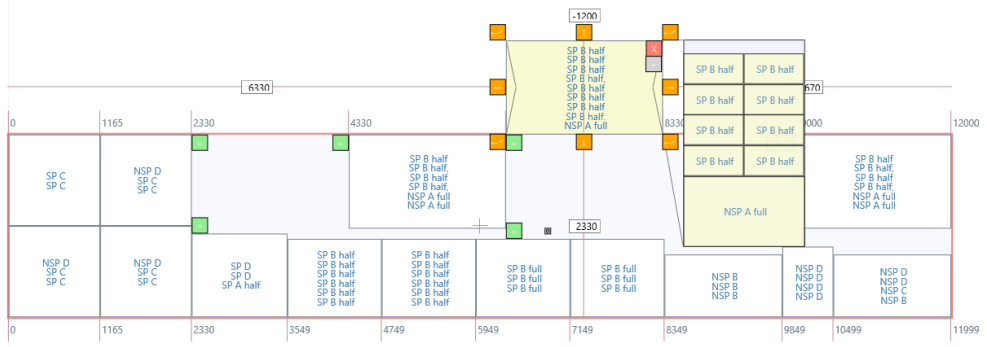


A selected stack shows four move buttons: front, back, left, and right. A green button means there is space for the stack to move in that direction. When you click it, the stack moves until it is stopped by another stack or the container wall.



An orange button means movement in that direction is blocked. You can still click it to execute the move; the stack will jump over the obstacle, or even jump out of the container. This provides more flexibility when editing stack locations, so you do not have to delete stacks just to create space for moves.

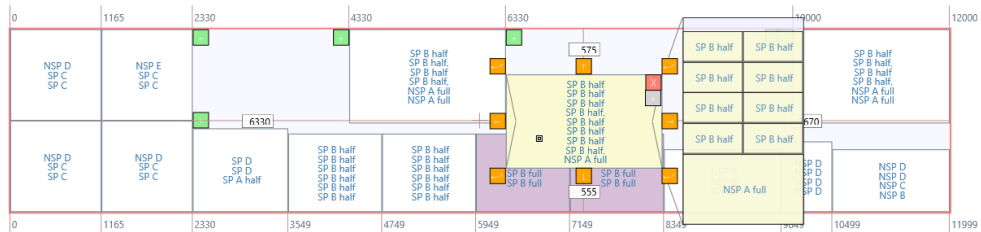




A selected stack also shows four distance number boxes on its four sides, indicating the distance in millimeters between the stack and a container wall or door.

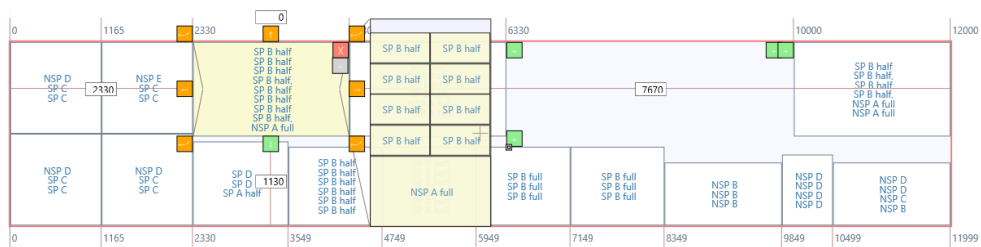
You can type a new value in a distance box, or scroll the mouse wheel to increase or decrease it. The stack will move away from or closer to that wall accordingly.

You may enter a value that causes a space conflict with other cargo, shown by the colored warning areas below, indicating that further relocation is needed.

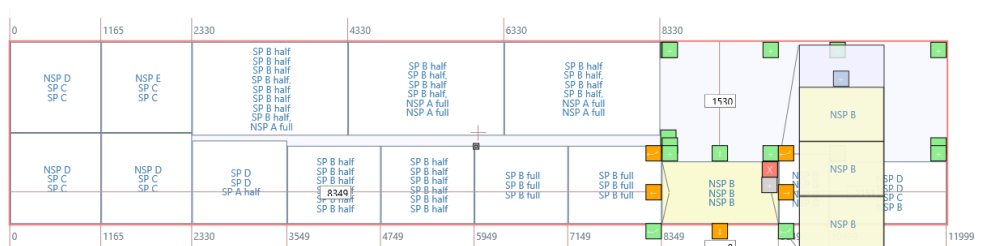


With a stack selected, you may see green buttons at space corners. Clicking one relocates the selected stack against that corner.

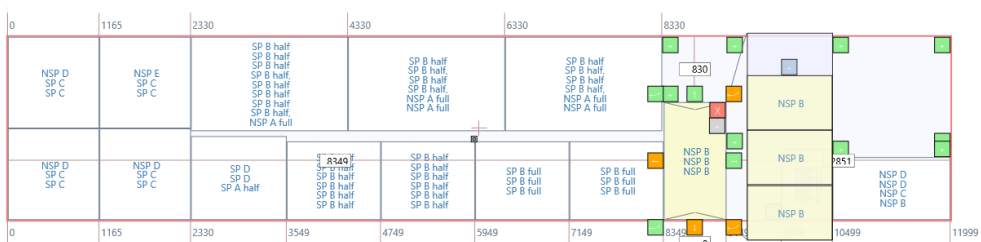
For example, if you click one of the green buttons in the front-right space of the container, the selected stack moves back to its original location.



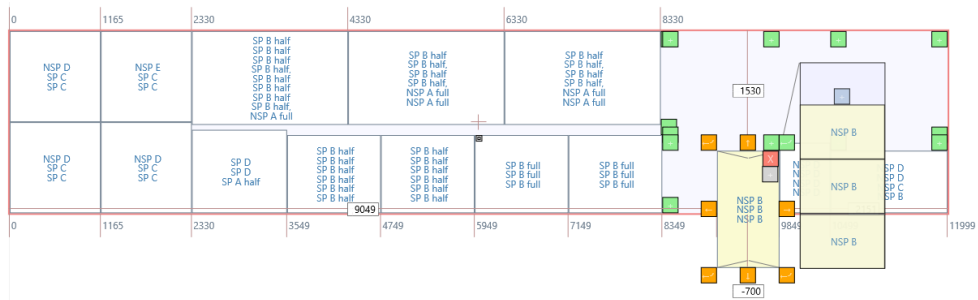
A selected stack shows four rotation buttons at its corners. Each button rotates the stack 90 degrees in the horizontal plane, anchored at that corner.



A green rotation button indicates that the rotation will not cause a space conflict.

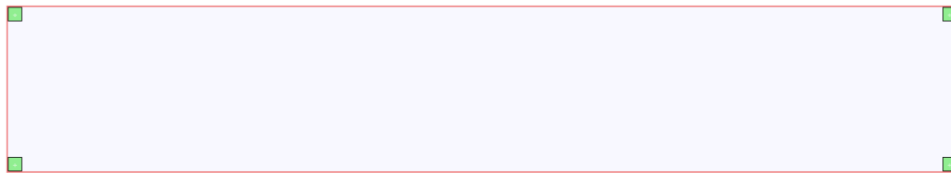


An orange rotation button indicates that the rotation will conflict with cargo or the container wall. It is still enabled to provide more flexibility during editing.



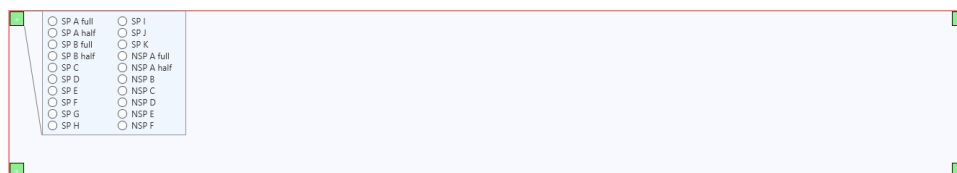
3.2 Create a New Cargo Stack

Click the eraser button on the toolbar to empty the container. You will see four green buttons at the container corners for choosing where to create a new cargo stack.

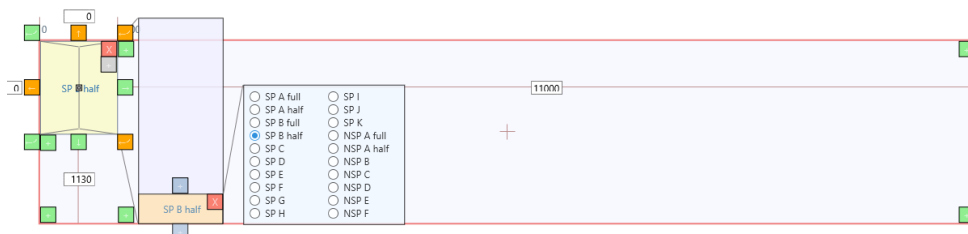


When a stack is selected, clicking a green corner button relocates the selected stack against that corner. When no stack is selected, clicking one of these green buttons creates a new cargo stack.

For example, if you click the button at the front-right corner, a panel appears for choosing a cargo type.



When you choose a cargo, one unit of that cargo is placed there as the bottom unit of a new cargo stack.



You may then add more new stacks, edit each stack as described in section 3.3, and move or rotate them as described in section 3.1 to create a loading plan from scratch.

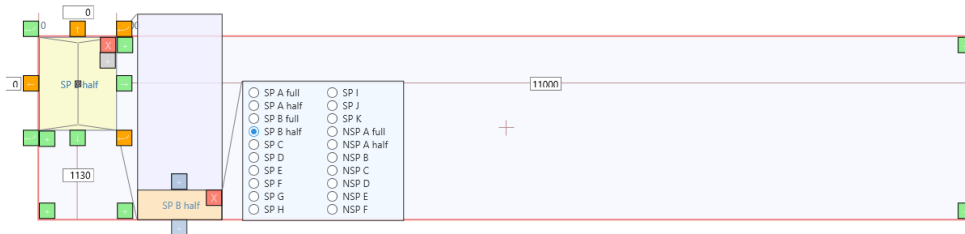
3.3 Edit the Units in a Stack

In this SmartPacker edition, a loading plan consists of cargo stacks. Each stack has one base unit plus units stacked on top of it. The construction of a stack must satisfy the rules that upper units are not wider than the units below and do not exceed their support capacity.

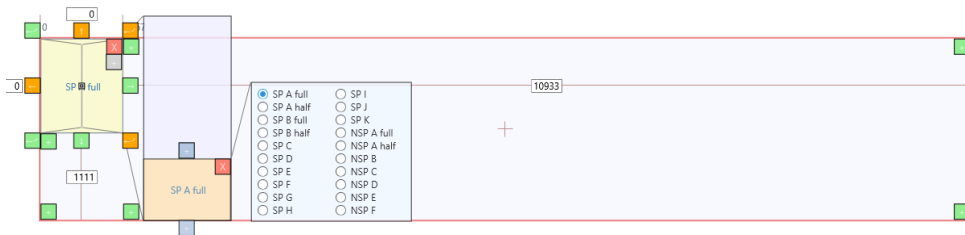
This beta 1.9 version supports only 1-on-1 and 2-on-1 patterns. It does not support 3-on-1 (three units placed side by side on top of one unit), nor 1-on-2 (one unit bridging on top of two equal-height units).

When a cargo stack is selected, a stack editing panel appears beside it, showing the units in the stack. You can click a unit in the stack to select it.

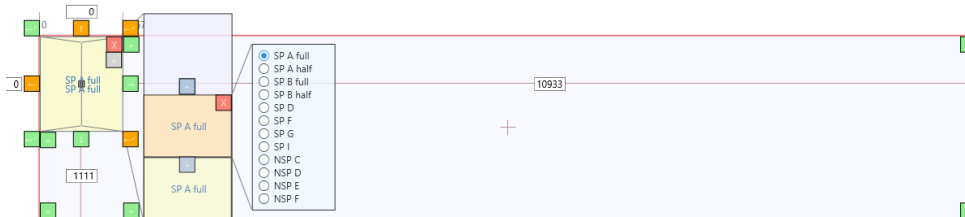
When a unit is selected, you see a cargo selection panel for changing the unit, plus two add buttons above and below it.



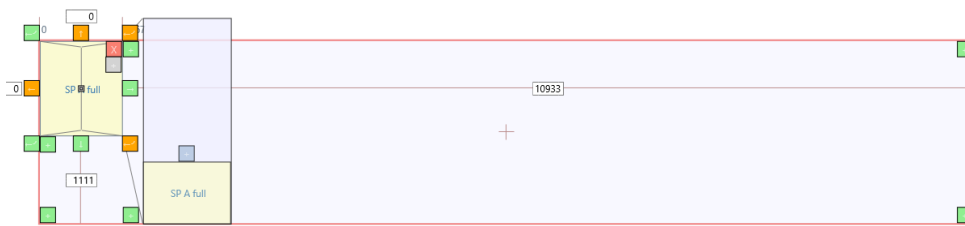
You can choose another cargo type to change the unit.



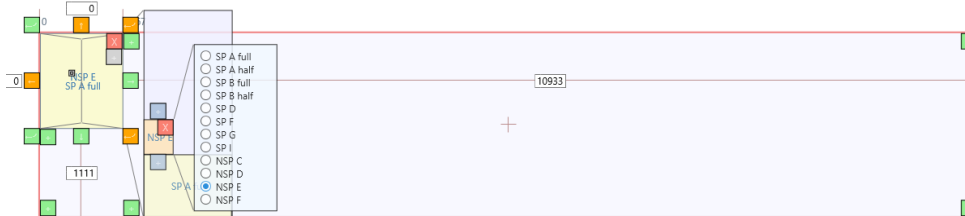
Click the add button above the selected unit to add a unit there. Since beta 1.9, the software automatically chooses the same cargo type for the added unit, saving one click in most cases. If that is not what you want, switch to the correct cargo type with a second click in the cargo selection panel.



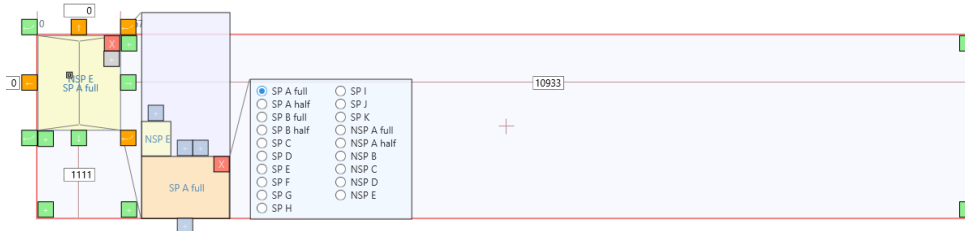
Click the red delete button to delete the selected unit.



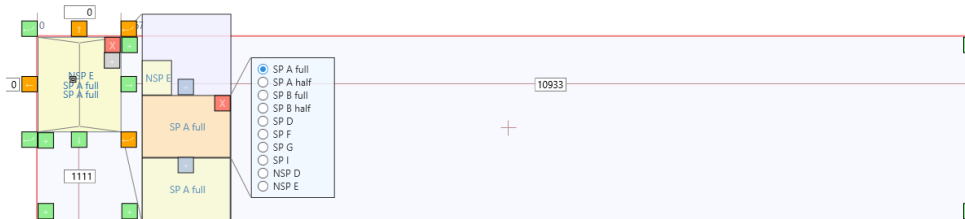
After you add a small unit above a larger one,



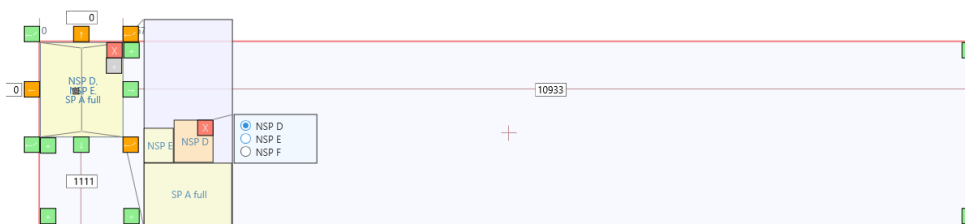
select the larger unit. You will see two add buttons above it.



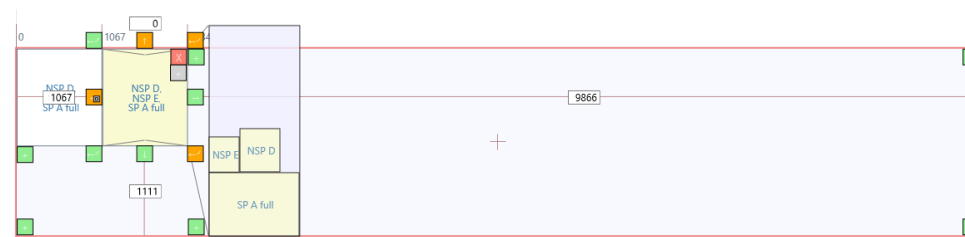
The button in the center of the top inserts a unit between the two existing units.

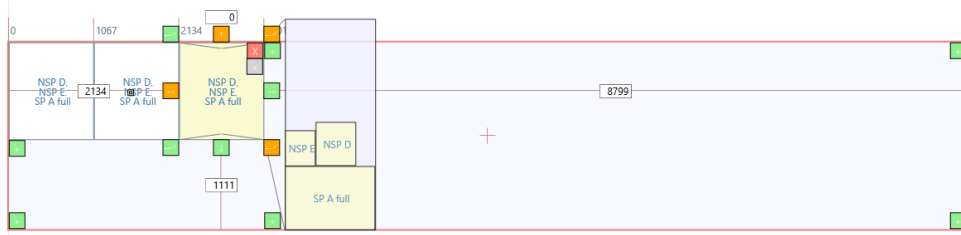


The other button adds one unit above the base unit and beside the upper unit.



After you build a cargo stack, you may want to make copies of it. Click the add button on the selected stack (below the red delete button), and a copy of the stack will be created behind the original one.

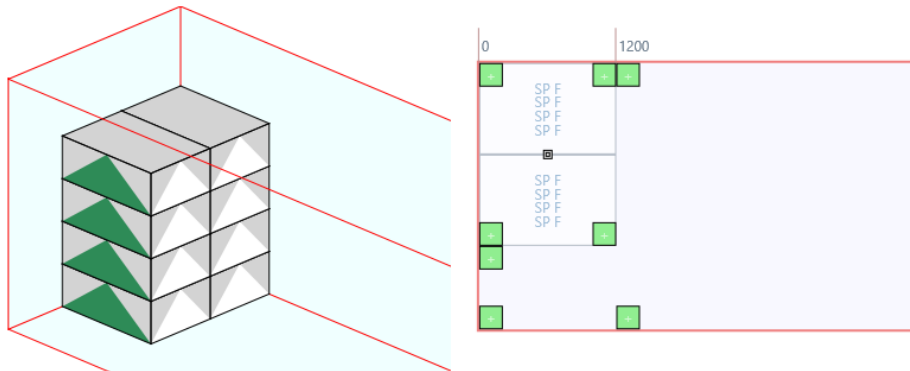




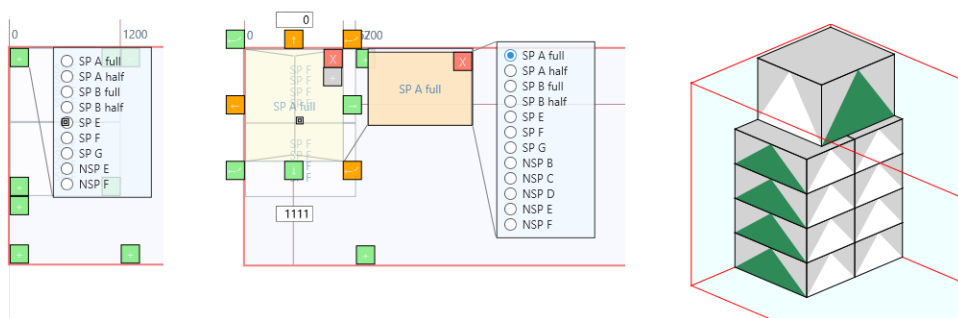
3.4 Place a Unit on a Joint Top

The stacking approach so far supports only a unit being placed on another unit with equal or larger length and width. Since beta 2.4, if several unit stacks have equal height, their tops may be recognized as a joint plane for placing new unit stacks.

In the example below, the two stacks have equal height, so four placement buttons appear on the joint top.



Click one of the green buttons. A candidate list shows which cargo types can be placed at that location, and you can then place a unit there. The candidate list accounts for the support capacity of the joint top.



4 Customize the Software for Your Use

4.1 Specify a Container Space

On the right, the "container type" parameter box lets you:

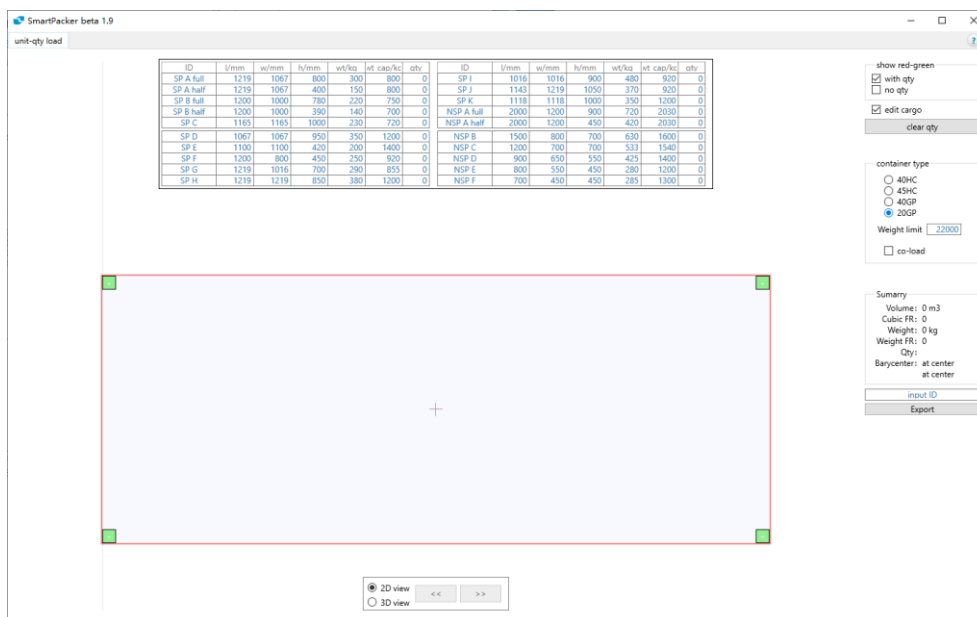
Switch among four container types.

Change the cargo weight limit.

Specify space for co-load.

The trial version includes specifications for four commonly used container types in data.xlsx, which is located in the /pld subfolder of the software package. The software reads this data at startup and shows the types as choices in the "container type" box.

| | A | B | C | D | E |
|---|------|-----------|----------|-----------|--------------------|
| 1 | ID | length/mm | width/mm | height/mm | weight capacity/kg |
| 2 | 40HC | 12000 | 2330 | 2640 | 26000 |
| 3 | 45HC | 13500 | 2330 | 2640 | 26000 |
| 4 | 40GP | 12000 | 2330 | 2330 | 26000 |
| 5 | 20GP | 5810 | 2330 | 2330 | 22000 |



If these types and parameters do not work for your case, edit data.xlsx and restart the software for the changes to take effect. Contact ZhiHuo if you need additional specifications, such as corner parts to avoid or a height constraint near the rear door.

The weight capacity parameter for a container type may differ by harbor or country. After you pick a container type and the weight limit changes accordingly, you may still want to adjust the weight limit parameter.

The "Co-load" checkbox and parameters support cases where cargo is loaded into a container where part of the space is already occupied, such as LCL consolidation or milk-run operations.

The occupied space of previous cargo is defined by:

- Container length taken from the front wall.
- Within that length, there may be a usable dent space, defined by:
 - Dent length.
 - Dent width.
 - Whether the dent is on the right side of the container.

Finally, enter the weight of the previous cargo to calculate the remaining weight capacity. In the case below, the container allows 26,000 kg, but 15,000 kg has already been loaded, so you can load only 11,000 kg in the remaining space.

The top screenshot shows the 'unit-qty load' view in SmartPacker beta 1.9. It features a 2D diagram of a container with a red outline and a white interior. A table of cargo items is displayed at the top, with columns for ID, l/mm, w/mm, h/mm, wt/kg, let cas/kg, and qty. The table lists items SP A through SP H and NSP A through NSP F. The right sidebar contains settings for container type (40HC, 45HC, 40GP, 20GP), weight limit (26000), co-load (checked), length/mm (5000), dent length (1200), dent width (1500), dent at right (checked), and wt loaded/kg (15000). The summary section shows Volume: 0 m3, Cubic FR: 0, Weight: 0 kg, Weight FR: 0, City, and Baycenter: at center.

The bottom screenshot shows the 'unit-qty load' view in SmartPacker beta 1.9. It features a 2D diagram of a container with a red outline and a white interior, showing a layout of cargo items. A table of cargo items is displayed at the top, with columns for ID, l/mm, w/mm, h/mm, wt/kg, let cas/kg, and qty. The table lists items SP A through SP H and NSP A through NSP F. The right sidebar contains settings for container type (40HC, 45HC, 40GP, 20GP), weight limit (26000), co-load (checked), length/mm (5000), dent length (1200), dent width (1500), dent at right (checked), and wt loaded/kg (15000). The summary section shows Volume: 39 m3, Cubic FR: 81.6 %, Weight: 10,890 kg, Weight FR: 89.0 %, City: 38, and Baycenter: 78 mm to the... 1,961 mm to the....

4.2 Edit the Cargo Parameters

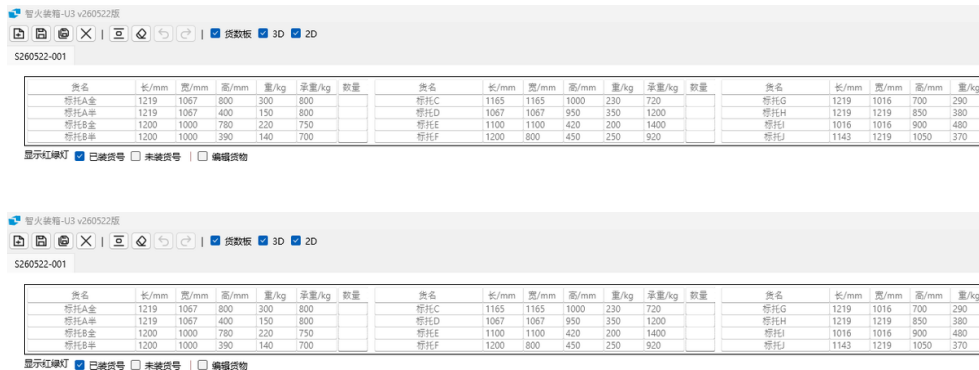
This trial version includes sample cargo parameters using standard and non-standard pallet dimensions. The data is saved in data.xlsx and read when the software starts.

| | A | B | C | D | E | F |
|----|------------|-----------|----------|-----------|-----------|----------------------------|
| 1 | ID | length/mm | width/mm | height/mm | weight/kg | weight support capacity/kg |
| 2 | SP A full | 1219 | 1067 | 800 | 300 | 800 |
| 3 | SP A half | 1219 | 1067 | 400 | 150 | 800 |
| 4 | SP B full | 1200 | 1000 | 780 | 220 | 750 |
| 5 | SP B half | 1200 | 1000 | 390 | 140 | 700 |
| 6 | SP C | 1165 | 1165 | 1000 | 230 | 720 |
| 7 | SP D | 1067 | 1067 | 950 | 350 | 1200 |
| 8 | SP E | 1100 | 1100 | 420 | 200 | 1400 |
| 9 | SP F | 1200 | 800 | 450 | 250 | 920 |
| 10 | SP G | 1219 | 1016 | 700 | 290 | 855 |
| 11 | SP H | 1219 | 1219 | 850 | 380 | 1200 |
| 12 | SP I | 1016 | 1016 | 900 | 480 | 920 |
| 13 | SP J | 1143 | 1219 | 1050 | 370 | 920 |
| 14 | SP K | 1118 | 1118 | 1000 | 350 | 1200 |
| 15 | NSP A full | 2000 | 1200 | 900 | 720 | 2030 |
| 16 | NSP A half | 2000 | 1200 | 450 | 420 | 2030 |
| 17 | NSP B | 1500 | 800 | 700 | 630 | 1600 |
| 18 | NSP C | 1200 | 700 | 700 | 533 | 1540 |
| 19 | NSP D | 900 | 650 | 550 | 425 | 1400 |
| 20 | NSP E | 800 | 550 | 450 | 280 | 1200 |
| 21 | NSP F | 700 | 450 | 450 | 285 | 1300 |

To have the software compute with your cargo specifications, you can edit and save data.xlsx before opening the software, or you can edit the parameters directly in the software interface.

In the software interface, blue numbers are editable and gray numbers are not. You can switch modes by clicking the "edit cargo" checkbox below the quantity board.

The value of a number box can change when you move the mouse pointer over it and scroll the mouse wheel. This is convenient, but it can also cause unintentional changes. You may want to uncheck "edit cargo" after you finish editing cargo parameters.

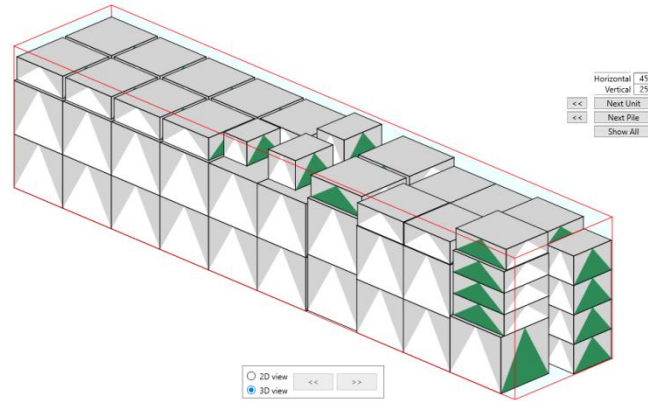


In this trial version, each cargo type has six data fields to support basic stacking and loading rules. If your cargo has more loading rules or data fields, such as maximum stacking layers, allowed placement orientations, maximum overhang by upper units, or unit division rules, contact ZhiHuo to discuss how those requirements can be handled.

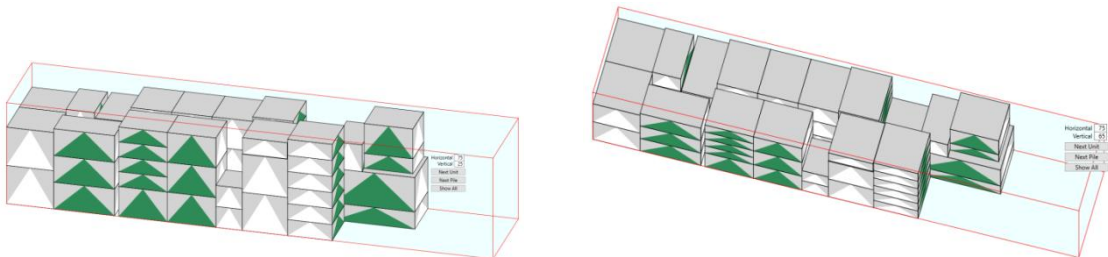
When you edit cargo parameters, the software recomputes the cargo-quantity combination along the way. To avoid slowdown or distraction, click the eraser button on the toolbar so the software has nothing to compute.

5 5 The 3D View

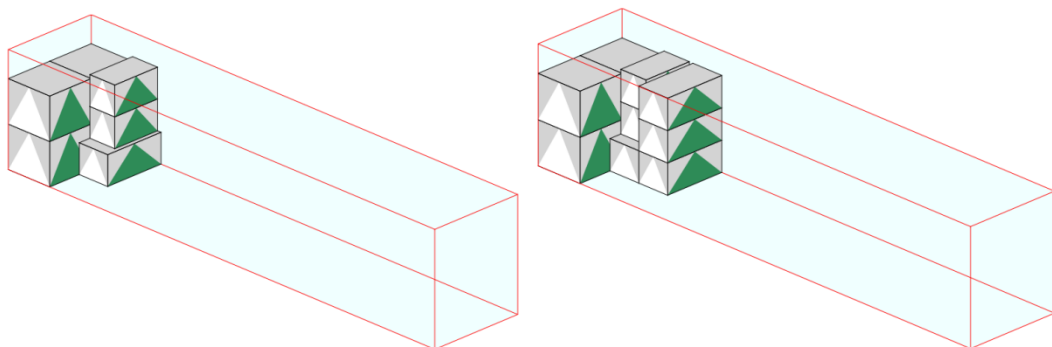
In 3D view, a green triangle represents the front face (length-height), while a white triangle represents the side face (width-height).



The default horizontal view angle is 45 degrees, and the default vertical angle is 25 degrees. If you change the horizontal angle to 75 degrees, then the vertical angle to 65 degrees,



The buttons let you check the loading plan unit by unit, or stack by stack.



The sequence for showing stacks or units is not necessarily a recommended cargo loading sequence. It is a viewing sequence that helps you see cargo that would otherwise be hidden.

Click "Show all" to exit sequential view.