

# RotoSpider Trial User Manual

Version: EN trial V0.5.1, by sean.wu@zhihuo.com

## 1. Introduction

RotoSpider is a Windows desktop app for planning mold layouts on rotational molding machine spiders. It helps a production scheduler decide whether a requested mold combination can fit within the selected arm/spider geometry, then computes a layout that places as many requested molds as possible while keeping the 3D center of gravity close to the rotation axis.

The trial version is for functional demonstration. Its molds, machines, rule settings, and spider visual overlays are representative sample data, not certified data for a specific factory. Production use should be customized to the client's real machine geometry, mold installation method, riser options, reporting needs, and operating rules. This trial is valid through July 31, 2026.

V0.5.1 includes several user-visible capabilities:

- 2D spider visual overlays that show machine-maker style beam, ring, and hub line art below placed molds.
- 3D spider visual overlays printed onto spider surfaces, including both spiders on straight-arm machines and the single spider on Offset Arm machines.
- configurable mold-to-mold clearance, defaulting to 300 mm, with amber dashed clearance outlines in the 2D views.
- in-app Settings, Mold Data, and Spider/Arm Data pages for maintaining common trial data without opening Excel for every small edit.

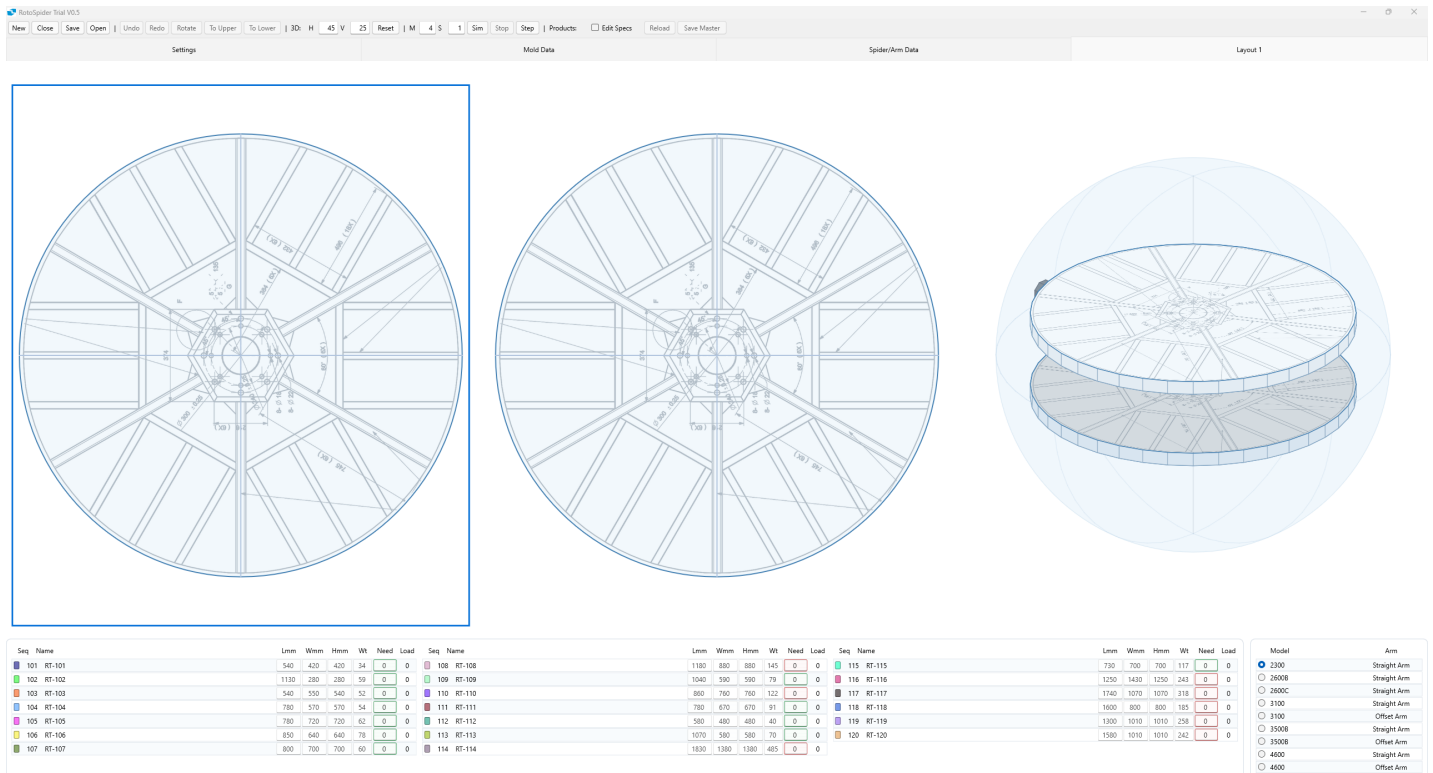
The trial package loads:

```
data\trial\masterdata.xlsx  
data\trial\setting.json  
data\trial\spider_visuals
```

## 2. Quickstart

### Step 1: Open the trial app

Run `RotoSpider_V0.5.1.exe` from the English trial package. On the first launch, review the trial license agreement and click **I Agree**. After acceptance, the app opens with one blank layout tab and the trial master data already loaded.



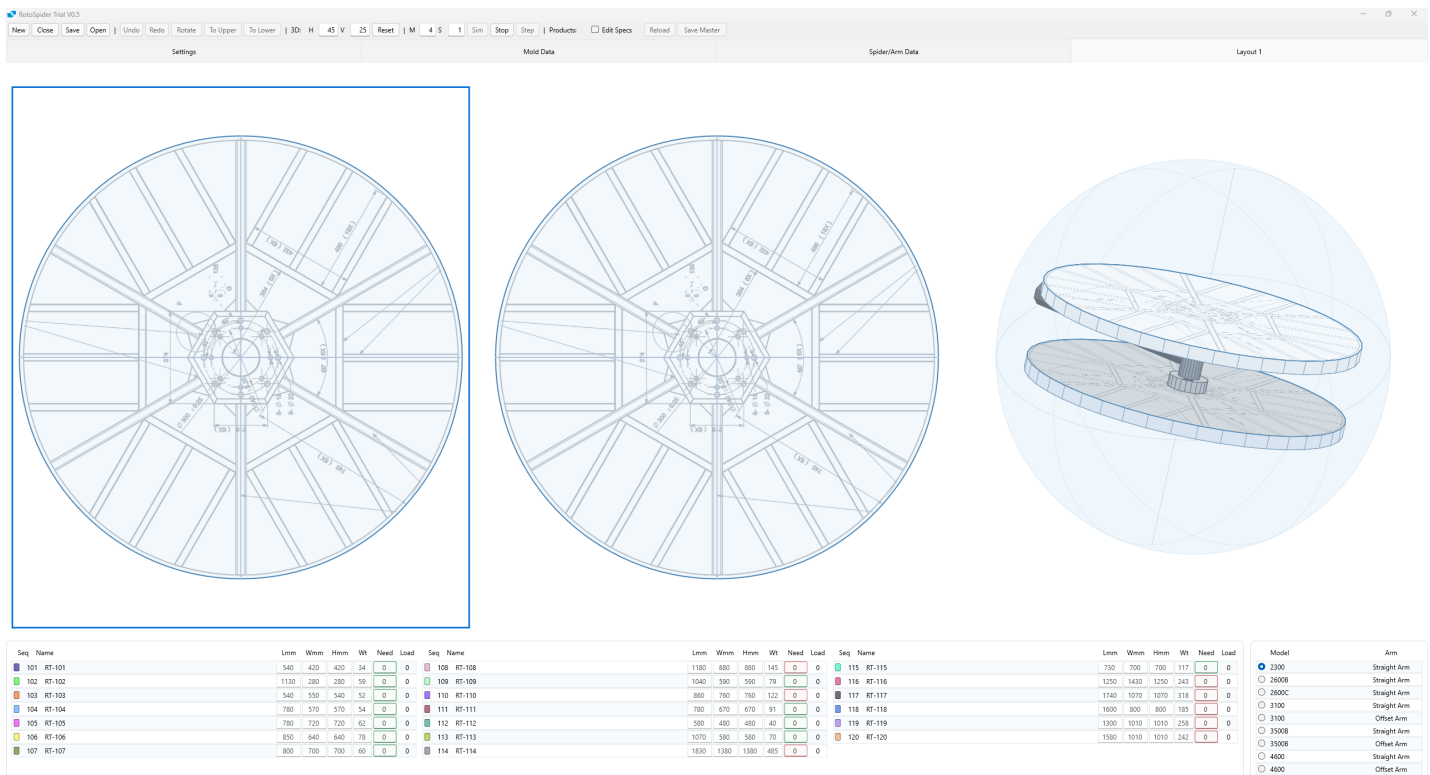
Startup main window

The default screen has:

- upper spider 2D view on the left
- lower spider 2D view in the middle
- 3D view on the right
- mold table at the bottom left
- machine and arm list at the bottom right
- toolbar and page tabs at the top

## Step 2: Click **Sim** to see the arm and spiders rotate

Click **Sim** in the top toolbar. The 3D view starts simulation. The **Stop** button becomes available while simulation is running.



3D simulation

For a straight arm, the app shows upper and lower spiders inside a translucent spherical envelope. Molds need to stay within this envelope.

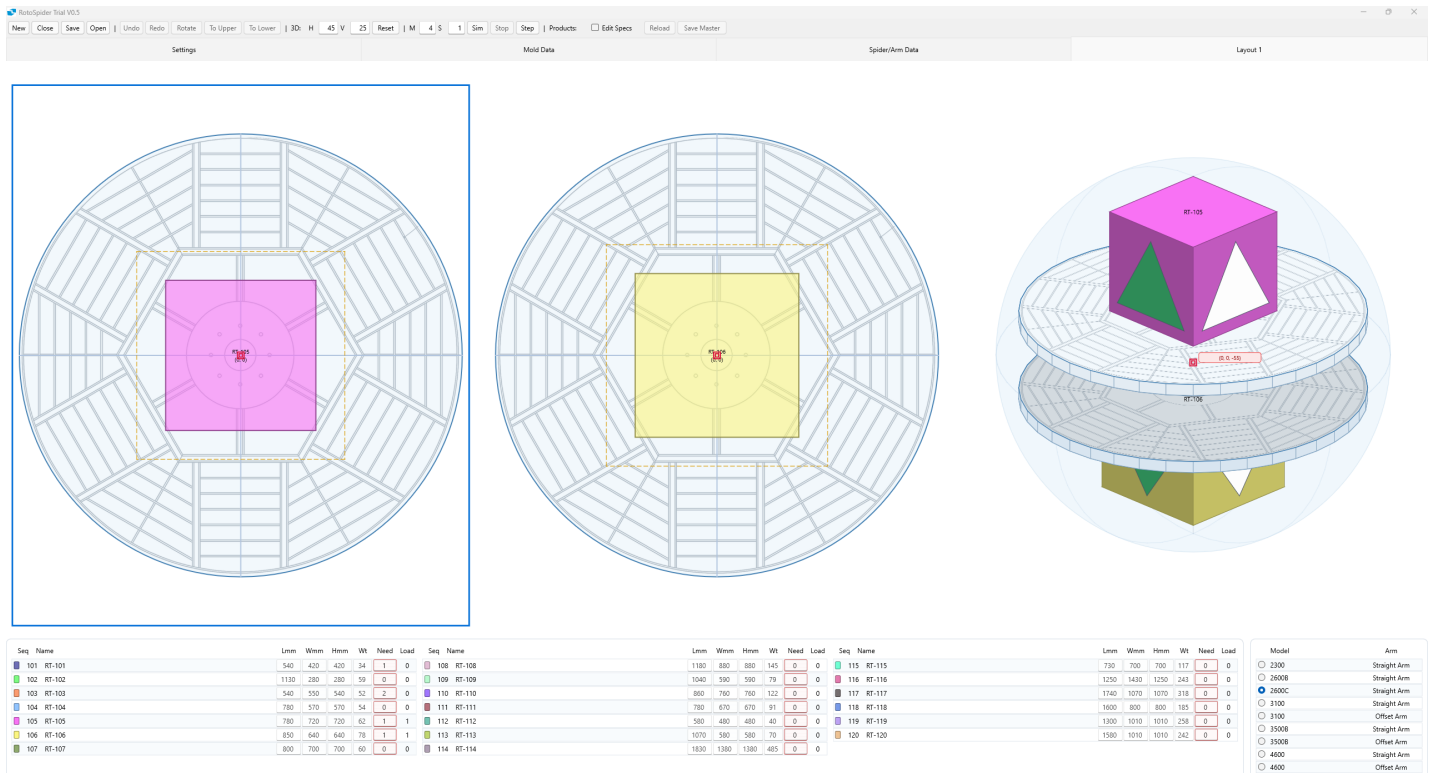
### Step 3: Enter mold **Need** quantities

The mold table has a number box under **Need** for each mold. It means the quantity of that mold requested for this layout. You can type a value, or hover over the number box and scroll the mouse wheel.

Each change triggers recalculation. **Load** is the quantity actually placed by the solver, which may be less than **Need**.

For example, the screenshot below shows a straight-arm request on **2600C [Straight]**:

- RT-101: 1
- RT-103: 2
- RT-105: 1
- RT-106: 1



Auto layout after entering quantities

You can see:

- **Need** is the requested quantity. **Load** is the quantity placed.
- A green **Need** box indicates another mold can still be added. A red box indicates it cannot under the current machine and rules.
- The light gray line art below the molds is the spider visual overlay. It is a visual aid only; the solver still uses the numeric masterdata and settings.
- The amber dashed outline around each mold is the clearance footprint used for the configured mold-to-mold clearance.
- You can drag a mold in the 2D view. The app checks the edited placement against the same geometry and clearance rules.

## Step 4: Try a different machine or arm

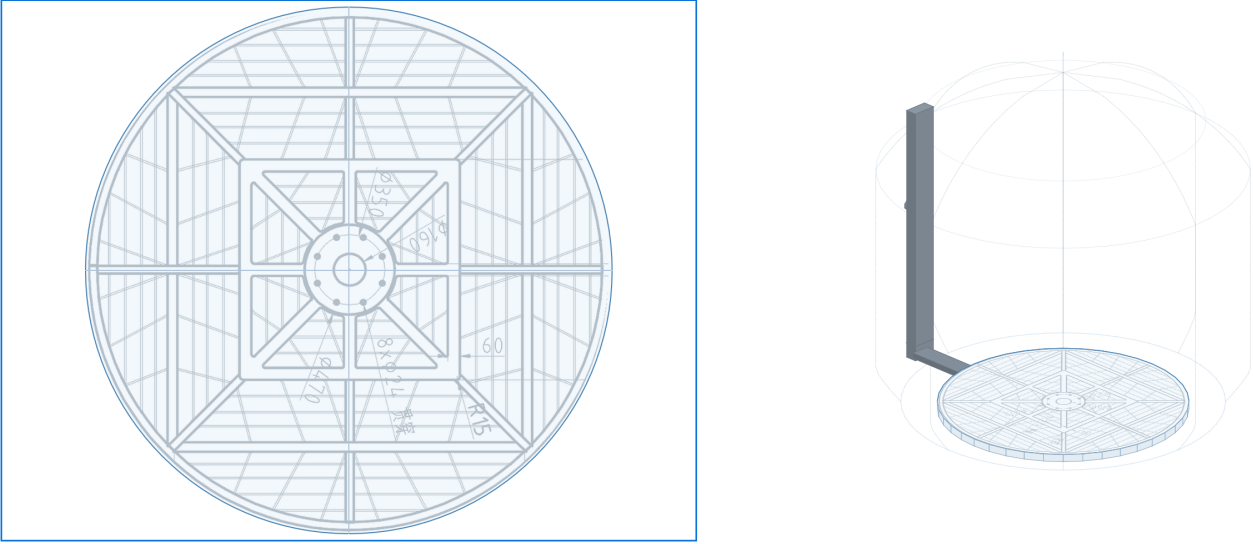
Select another row in the machine list. The same mold request is recalculated on that geometry.

The trial data includes both straight-arm and **Offset Arm** rows. An **Offset Arm** is a single-spider offset arm for installing some large molds. It uses a trimmed spherical envelope, a single spider, a spider Y offset, and optional riser heights.

RotoSpider Trial V0.5

New Close Save Open | Undo Redo Rotate To Upper To Lower | 3D H 45 V 25 Reset | M 4 S 1 Sim Stop Step | Products Edit Specs Reload Save Master

Settings Mold Data Spider/Arm Data Layout 1



Seq. Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq. Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq. Name	Lmm	Wmm	Hmm	Wt	Need	Load
101 RT-101	540	420	420	34	0	0	106 RT-106	1180	880	880	145	0	0	115 RT-115	750	700	700	117	0	0
102 RT-102	1130	280	280	59	0	0	109 RT-109	1040	890	590	79	0	0	116 RT-116	1250	1430	1250	243	0	0
103 RT-103	540	550	540	52	0	0	110 RT-110	860	760	760	122	0	0	117 RT-117	1740	1070	1070	318	0	0
104 RT-104	780	570	570	54	0	0	111 RT-111	780	670	670	91	0	0	118 RT-118	1600	800	800	185	0	0
105 RT-105	780	720	720	62	0	0	112 RT-112	580	480	480	40	0	0	119 RT-119	1300	1010	1010	258	0	0
106 RT-106	850	640	640	78	0	0	113 RT-113	1070	580	580	70	0	0	120 RT-120	1580	1010	1010	242	0	0
107 RT-107	800	700	700	60	0	0	114 RT-114	1830	1380	1380	485	0	0							

Model

2500

2600B

2600C

3100

3100

3500B

3500B

4500

4600

Arm

Straight Arm

Straight Arm

Straight Arm

Straight Arm

Offset Arm

Straight Arm

Offset Arm

Straight Arm

Offset Arm

### Offset Arm machine selection

In the trial data:

- 3500B [Offset Arm] has a 470 mm riser option.
- 4600 [Offset Arm] has 775 mm and 350 mm riser options.

When the solver chooses a nonzero riser, the 3D view shows a Riser + ... mm label.

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New
Close
Save
Open
Undo
Redo
Rotate
To Upper
To Lower
3D
H
45
V
25
Reset
M
4
S
1
Sim
Step
Products
Edit Specs
Reload
Save Master

Settings
Mold Data
Spider/Arm Data
Layout 1

Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load
101	RT-101	540	420	420	34	0	0	106	RT-106	1180	880	880	145	0	0
102	RT-102	1130	280	280	59	0	0	109	RT-109	1040	590	590	79	0	0
103	RT-103	540	550	540	52	0	0	110	RT-110	860	760	760	122	0	0
104	RT-104	780	570	570	54	0	0	111	RT-111	780	670	670	91	0	0
105	RT-105	780	720	720	62	0	0	112	RT-112	580	480	480	40	0	0
106	RT-106	650	640	640	78	0	0	113	RT-113	1070	580	580	70	0	0
107	RT-107	800	700	700	60	0	0	114	RT-114	1830	1380	1380	465	1	1

Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load
115	RT-115	730	700	700	117	0	0	119	RT-119	1300	1010	1010	258	0	0
116	RT-116	1250	1430	1250	243	0	0	120	RT-120	1580	1010	1010	242	0	0
117	RT-117	1740	1070	1070	318	0	0								
118	RT-118	1600	800	800	185	0	0								

Model
Arm

☐ 2300
Straight Arm
☐ 2600B
Straight Arm
☐ 2600C
Straight Arm
☐ 3100
Straight Arm
☐ 3100
Offset Arm
☐ 3500B
Straight Arm
☐ 3500B
Offset Arm
☒ 4600
Straight Arm
☐ 4600
Offset Arm

Offset Arm riser used

## Step 5: Save and reopen a layout

Click **save** to save the current layout as an Excel workbook. Later, click **open** to reopen a saved layout workbook.

RotoSpider Trial V0.5

New
Close
Save
Open
Undo
Redo
Rotate
To Upper
To Lower
3D
H
45
V
25
Reset
M
4
S
1
Sim
Step
Products
Edit Specs
Reload
Save Master

Settings
Mold Data
Spider/Arm Data
Layout 1

Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load
101	RT-101	540	420	420	34	1	0	108	RT-108	1180	880	880	145	0	0
102	RT-102	1130	280	280	59	0	0	109	RT-109	1040	590	590	79	0	0
103	RT-103	540	550	540	52	2	0	110	RT-110	860	760	760	122	0	0
104	RT-104	780	570	570	54	0	0	111	RT-111	780	670	670	91	0	0
105	RT-105	780	720	720	62	1	1	112	RT-112	580	480	480	40	0	0
106	RT-106	650	640	640	78	1	1	113	RT-113	1070	580	580	70	0	0
107	RT-107	800	700	700	60	0	0	114	RT-114	1830	1380	1380	465	0	0

Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load	Seq	Name	Lmm	Wmm	Hmm	Wt	Need	Load
115	RT-115	730	700	700	117	0	0	119	RT-119	1300	1010	1010	258	0	0
116	RT-116	1250	1430	1250	243	0	0	120	RT-120	1580	1010	1010	242	0	0
117	RT-117	1740	1070	1070	318	0	0								
118	RT-118	1600	800	800	185	0	0								

Model
Arm

☐ 2300
Straight Arm
☐ 2600B
Straight Arm
☒ 2600C
Straight Arm
☐ 3100
Straight Arm
☐ 3100
Offset Arm
☐ 3500B
Straight Arm
☐ 3500B
Offset Arm
☐ 4600
Straight Arm
☐ 4600
Offset Arm

Saved and reopened layout

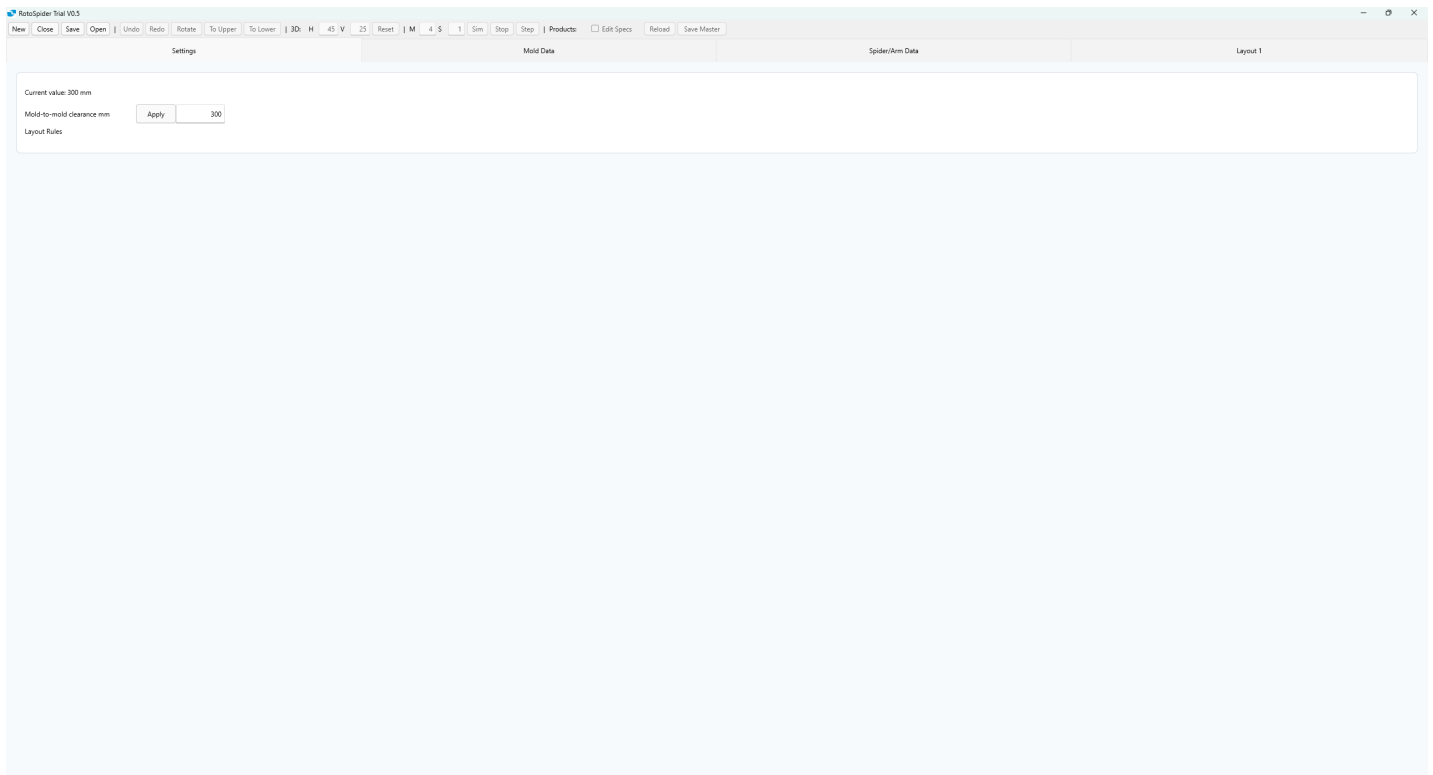
The saved workbook is both a report and a reload file. It includes a layout summary, embedded 2D/3D images, and internal layout data.

### 3. Settings And Master Data

V0.5.1 can maintain common settings and master data inside the app. Excel editing is still available for batch changes, but the in-app pages are easier for understanding field meaning and making targeted edits.

#### Settings: mold-to-mold clearance

Open the **Settings** tab to change **Mold-to-mold clearance** mm. The trial default is **300** mm.



*Settings page for mold-to-mold clearance*

**Mold-to-mold clearance** means the minimum edge-to-edge space between neighboring molds on the same spider. It is mainly mounting access clearance, so workers have room for hands, bolts, clamps, and tools.

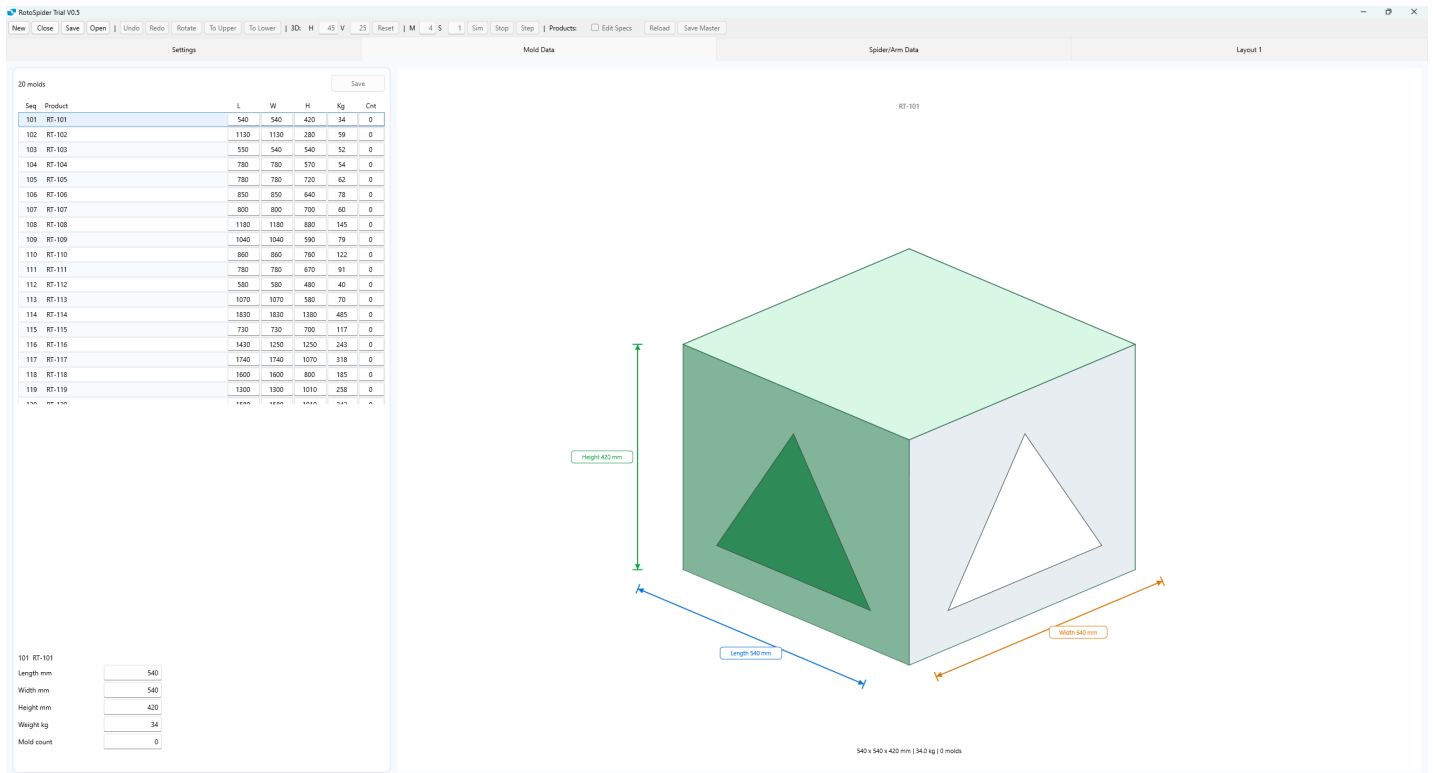
It is not mold-to-spider-edge clearance, and it is not mold-to-envelope clearance. The solid rectangle is the real mold footprint. The amber dashed rectangle is the clearance footprint used for pairwise mold spacing. Envelope and spider boundary checks still use the real mold footprint.

To change the value:

1. Enter a new value in **Mold-to-mold clearance** mm.
2. Click **Apply**.
3. The app saves **setting.json** and recalculates the active layout.

#### Mold Data page

Open the **Mold Data** tab to review and edit mold master data. The left side is a table. The right side is a 3D preview of the selected mold.



*Mold data maintenance*

The mold preview explains the fields:

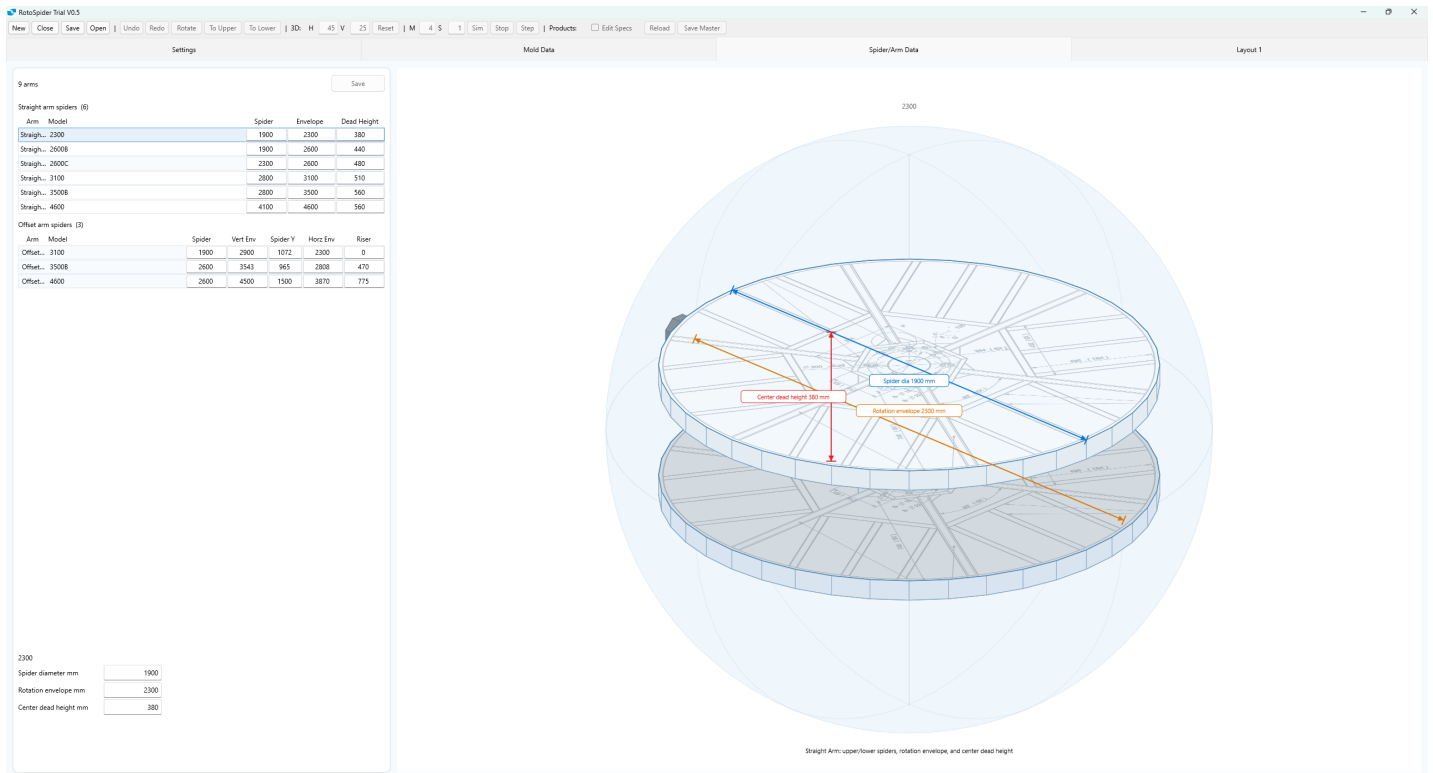
- The green face and white triangle show mold orientation.
- Blue, orange, and green dimension lines show length, width, and height.
- Drag the preview area to rotate the view.
- Edits to length, width, height, and weight refresh the preview.

Click **Save** to write changes back to `masterdata.xlsx`. Keep a backup before making real master-data changes.

## Spider/Arm Data page

Open the **Spider/Arm Data** tab to maintain straight-arm and offset-arm geometry. The left side is split into two tables because the field sets are different.





*Straight-arm spider data maintenance*

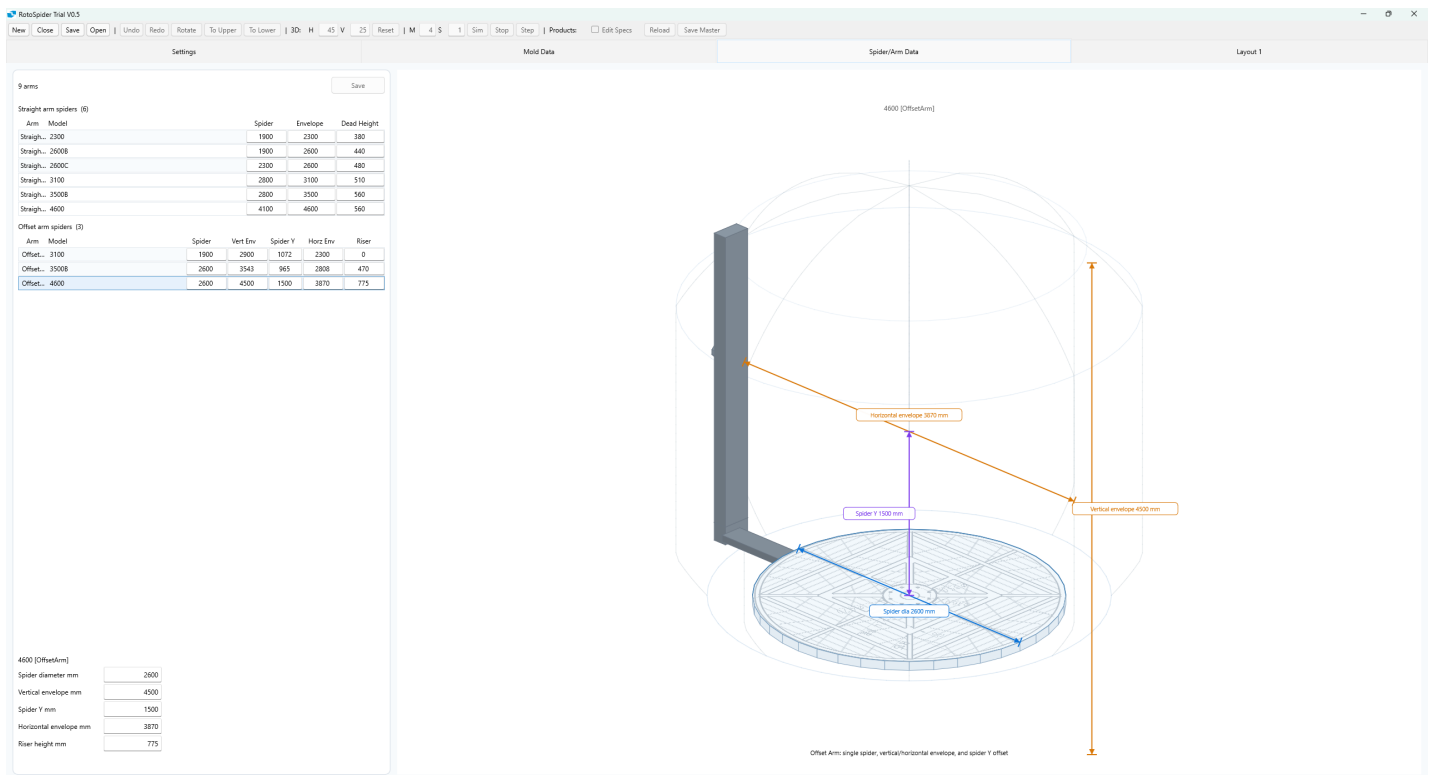
Straight-arm rows use:

- spider diameter
- rotation envelope diameter
- center dead height between the upper and lower spider surfaces

Offset-arm rows use:

- spider diameter
- vertical envelope diameter
- spider Y offset
- horizontal envelope diameter after side trim
- riser height option

The right-side 3D preview labels the corresponding geometry. It is rotatable by dragging.



Offset-arm spider data maintenance

Click **Save** to write edited arm/spider values back to `masterdata.xlsx`.

## Excel workbook fields

The trial workbook is:

`data\trial\masterdata.xlsx`

The **Molds** sheet uses these columns:

Column	Meaning	Unit / format
<b>Seq</b>	sequence number used as a stable display id	integer
<b>Name</b>	mold display name	text
<b>LengthCm</b>	mold footprint length	cm in workbook, shown as mm in app
<b>WidthCm</b>	mold footprint width	cm in workbook, shown as mm in app
<b>HeightCm</b>	mold height	cm in workbook, shown as mm in app
<b>WeightKg</b>	mold weight	kg
<b>Color</b>	mold display color	hex color such as #6E6EB6; blank values are auto-filled by the app

The **Machines** sheet uses these columns:

Column	Meaning	Unit / format
<b>Model</b>	machine model shown in the machine list	text

Column	Meaning	Unit / format
StraightEnvelopeDiaMm	straight-arm rotation envelope diameter	mm
StraightSpiderDiaMm	straight-arm spider diameter	mm
StraightDeadHeightMm	unusable center height between upper and lower spider surfaces	mm
OffsetArmVertDiaMm	offset-arm vertical or full rotation envelope diameter	mm
OffsetArmSpiderDiaMm	offset-arm spider diameter	mm
OffsetArmSpiderYmm	offset-arm spider Y offset from spider center to sphere center	mm
OffsetArmHorzDiaMm	offset-arm horizontal usable envelope diameter after side trim	mm
OffsetArmRiserHeightMm	riser options, such as 470 or 775 , 350	mm

If one row has both straight-arm and offset-arm fields, the app creates two selectable arm rows for that model.

## Riser selection

Riser selection applies only to **Offset Arm** rows. For each requested layout, the solver evaluates:

- 0 mm, meaning the mold is mounted directly on the spider
- every positive riser height listed in **OffsetArmRiserHeightMm**

The same global riser height is used for one Offset Arm layout. The trial version does not assign different riser heights to different molds on the same spider.

The solver chooses results in this order:

1. place more requested molds
2. prefer a fully feasible layout over a partial layout
3. among comparable feasible results, choose the riser height with better 3D center-of-gravity position
4. use 2D balance, spider utilization, area, and packing penalty as tie-breakers
5. if everything still ties, choose the lower riser height

## 4. Main Screen Tour

### Top toolbar

Control	What it does
New	Create a new blank layout tab.
Close	Close the active layout tab.
Save	Save the active layout as an Excel layout workbook.
Open	Open a saved RotoSpider layout workbook.
Undo	Undo the last manual layout edit.
Redo	Redo the last undone manual layout edit.
Rotate	Rotate the selected mold, if the rotated placement is feasible.
To Upper	Move the selected mold to the upper spider, if feasible.
To Lower	Move the selected mold to the lower spider, if feasible.
3D: H	Horizontal camera angle for the 3D view.
3D: V	Vertical camera angle for the 3D view.
Reset	Reset the 3D view and simulation angle.

Control	What it does
M	Major-axis simulation speed.
S	Minor-axis simulation speed.
Sim	Start simulation.
Stop	Stop simulation.
Step	Advance the simulation one step.
Edit Specs	Allow mold Lmm, Wmm, Hmm, and Wt fields to be edited in the active layout.
Reload	Reload mold specs from the master data workbook.
Save Master	Save current mold spec edits back to the master workbook.

## 2D views

Straight-arm machines show upper and lower spider 2D views. Each circle is a spider. Mold rectangles show real mold placement. The visual overlay, when available, is drawn below the molds.

Offset Arm machines are single-spider layouts, so the lower spider pane shows a placeholder.

## 3D view

The 3D view shows:

- upper/lower or single-spider machine geometry
- spider visual overlays on the spider surfaces
- translucent rotation envelope
- mold boxes
- Offset Arm riser label when a nonzero riser is selected
- selected mold marker
- simulated arm/spider rotation

Use the 3D view for visual inspection. Current solving constraints are still controlled by masterdata dimensions, envelope geometry, risers, and mold-to-mold clearance.

## Mold table

Column	Meaning
color square	mold display color; click to choose another color
Seq	mold sequence number
Name	mold name
Lmm	mold length in millimeters
Wmm	mold width in millimeters
Hmm	mold height in millimeters
Wt	mold weight in kilograms
Need	requested quantity
Load	quantity placed by the solver

Increasing or decreasing **Need** recalculates the layout immediately.

## Machine list

The machine list shows **Model** and **Arm**. Select a row to recalculate the active layout with that geometry.

## 5. Common Workflows

### Create a new layout

1. Click **New**.
2. Select a machine and arm.
3. Enter **Need** quantities.
4. Review **Load**, 2D placement, and 3D view.
5. Save if the layout should be kept.

### Layout copies and global data

**Settings**, **Mold Data**, and **Spider/Arm Data** are global defaults for new layouts. Each layout tab keeps its own copy of the mold data, arm geometry, and layout settings that were active when the layout was created or opened.

If global data changes while a layout tab remains open, the layout does not change immediately. When you return to that layout, choose **Yes** to sync from global data and recalculate, or **No** to keep the layout's current copy.

What-if edits inside a layout affect only that layout. Use **Save Master** only when the local mold spec changes should become masterdata.

### Compare machines

1. Keep the current **Need** quantities unchanged.
2. Select another machine or arm row.
3. Compare placed count, envelope feasibility, center of gravity, and spider utilization.
4. Save or screenshot cases where the result does not match production experience.

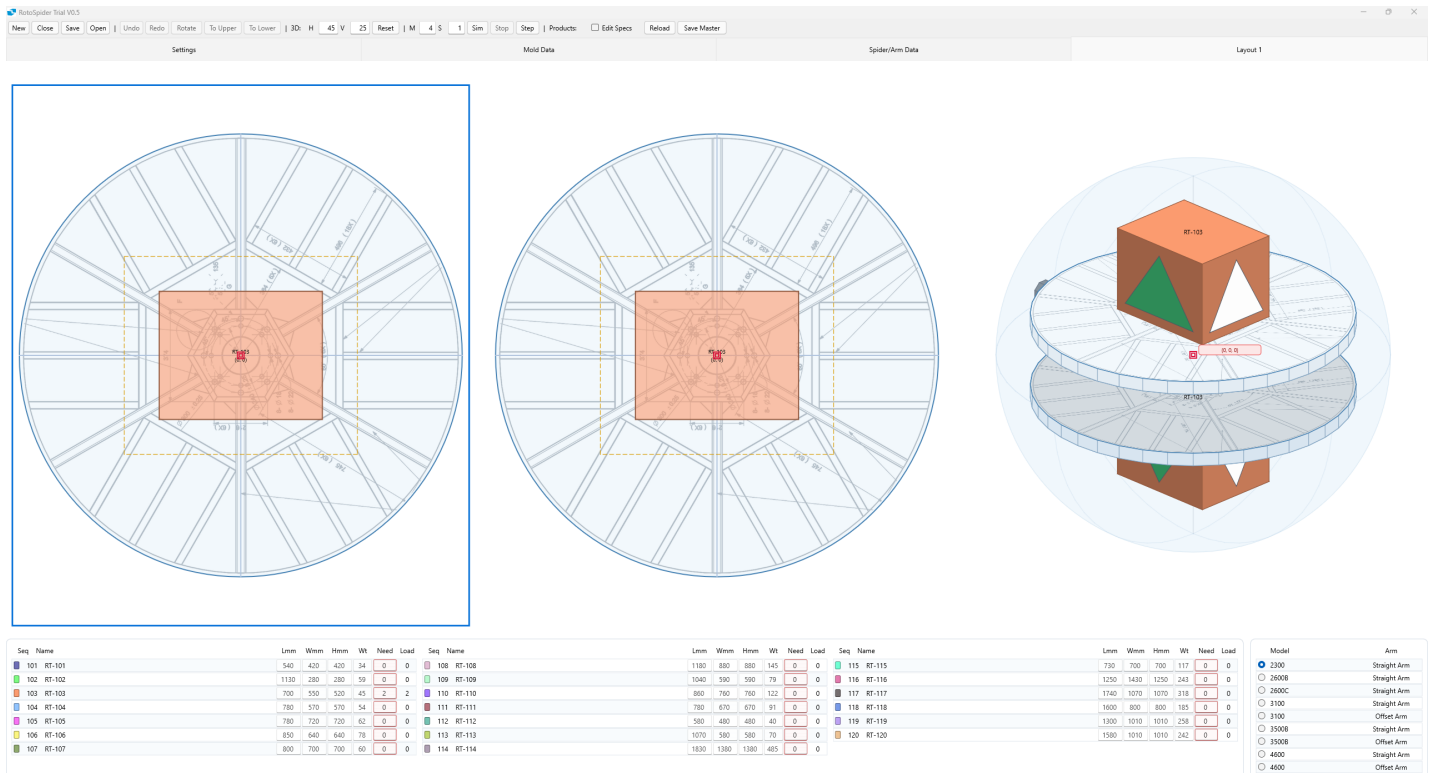
### Manually adjust a layout

1. Click a mold rectangle in a 2D view.
2. Drag it inside the spider view.
3. Use **Rotate** if the mold can be rotated.
4. Use **To Upper** or **To Lower** for straight-arm dual-spider layouts.
5. Use **Undo** or **Redo** to review changes.

Manual edits are checked by the app. If the target position violates geometry or clearance constraints, the app blocks the edit.

### Edit mold dimensions inside the active layout

Use this for quick what-if checks when you want to test a different mold size or weight without first editing Excel.



What-if mold specification edit

## Steps:

1. Check **Edit Specs**.
2. Edit **Lmm**, **Wmm**, **Hmm**, or **Wt** in the mold table.
3. Change **Need** or review the recalculated layout.
4. Click **Save Master** only if the edited specs should update the master workbook.
5. Click **Reload** to discard current in-app spec changes and return to the master workbook values.

**Save Master** writes to **masterdata.xlsx**.

## 6. Practical Notes

- Use **Need** for planning requests and **Load** for what was actually placed.
- If a mold cannot be fully loaded, try a larger machine or arm, reduce other mold loads, or review clearance.
- Use the 2D visual overlay as context, not as a hard constraint.
- Use the 3D view to inspect rotation envelope clearance and riser height.
- Use the master-data pages for targeted edits, and Excel for larger batch changes.
- Keep backups before changing **masterdata.xlsx** or **setting.json**.
- Trial data and rules are for demonstration. Final customer delivery should be customized.

## 7. Change Log

### V0.5.1

- Product and package version updated to **RotoSpider Trial V0.5.1**.

- English trial package now asks for first-run trial license acceptance and includes `TRIAL_LICENSE.txt`.
- Layout tabs now keep local mold, arm, and settings snapshots so open layouts do not silently change after global data edits.
- Rebuilt the release package with static runtime linking and `NOTICE.txt`.

## **V0.4**

- Added trial spider visual overlays under `data\trial\spider_visuals`.
- Added 3D spider visual overlays on spider surfaces, including both plates on straight-arm machines.
- Added `mold-to-mold clearance` setting with default `300 mm`.
- Added amber dashed clearance outlines in 2D spider views.
- Added `Settings`, `Mold Data`, and `Spider/Arm Data` pages.
- Added rotatable master-data previews with dimension labels for molds and arm/spider geometry.
- Updated Offset Arm 3D illustration to include the opposite-side balancing extension.

## **V0.3 and earlier**

- Established trial mold and machine masterdata loading.
- Supported straight-arm and Offset Arm layout solving, riser selection, manual 2D edits, 3D inspection, save, and reopen.