

RotoSpider Trial User Manual

Version: EN trial V0.6.1, 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 September 30, 2026.

V0.6.1 corrects straight-arm mounting-surface geometry. `StraightDeadHeightMm` is the gap between the upper and lower mold-mounting surfaces; the visual spider-plate thickness no longer consumes rotation-envelope space. This restores valid layouts such as four RT-102 molds on the 2300 straight arm, with two mounted on each surface.

V0.6 added these user-visible capabilities:

- cylinder molds: a mold with a diameter-prefixed `Size` text such as `Ø120x200` is treated as a cylinder, drawn as a circle in 2D and a cylinder in 3D. Trial molds `RT-121` and `RT-122` are cylinders.
- ring layouts: when three or more copies of the same mold are requested, the solver can arrange them in a ring around the spider center, often together with a center mold, and keeps the better of the ring and standard arrangements.
- minimum and target clearance: `Settings` now has `Minimum allowed clearance mm` and `Target clearance mm`. When the full request does not fit at the target clearance, a `Clearance` selector offers relaxed alternatives down to the minimum, each labeled with the clearance actually achieved.
- optional arm weight capacity: a machine row can provide `MaxLoadWeightKg`; the solver then loads molds only up to that arm weight and reports the weight-limited partial load.

Carried over from earlier versions:

- 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.
- 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.

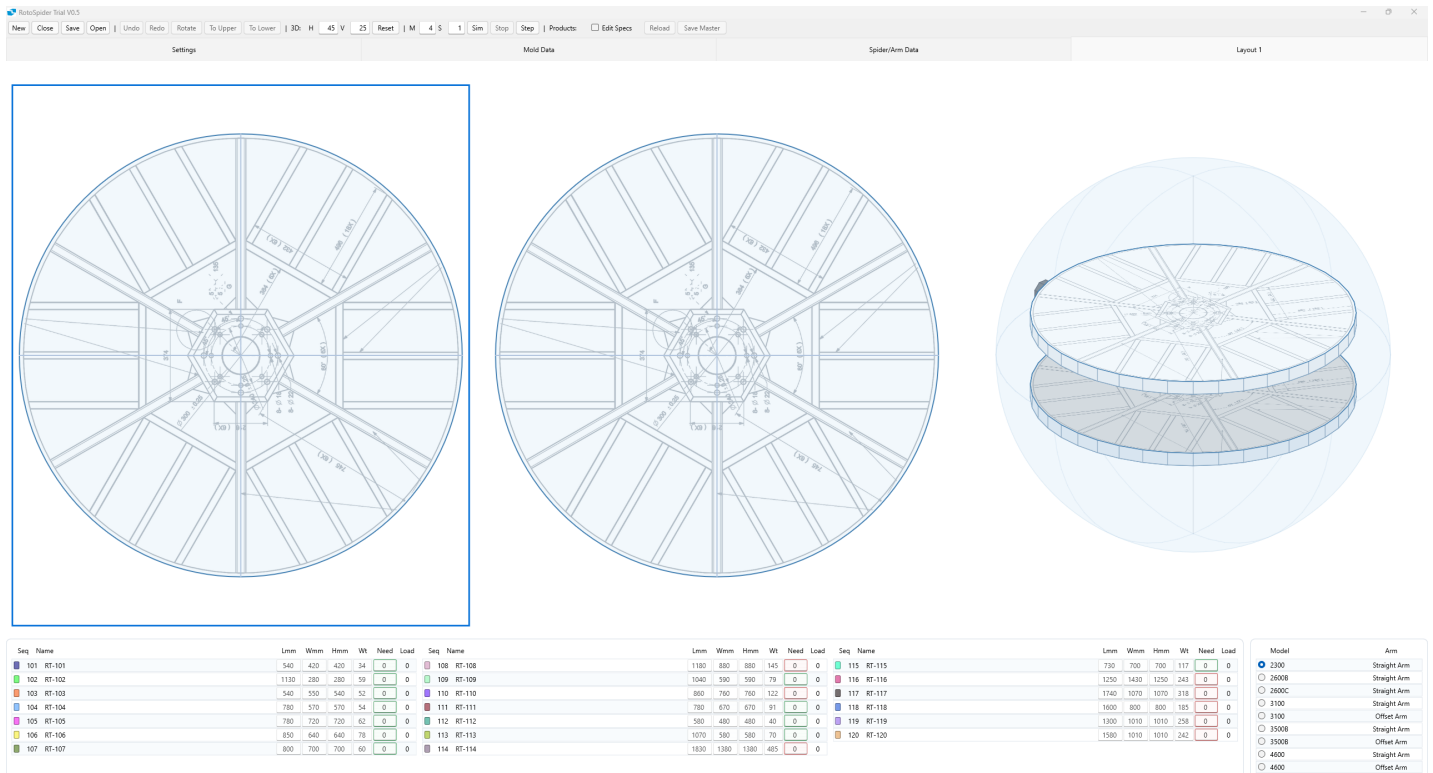
The trial package loads:

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

2. Quickstart

Step 1: Open the trial app

Run `RotoSpider_V0.6.1.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.



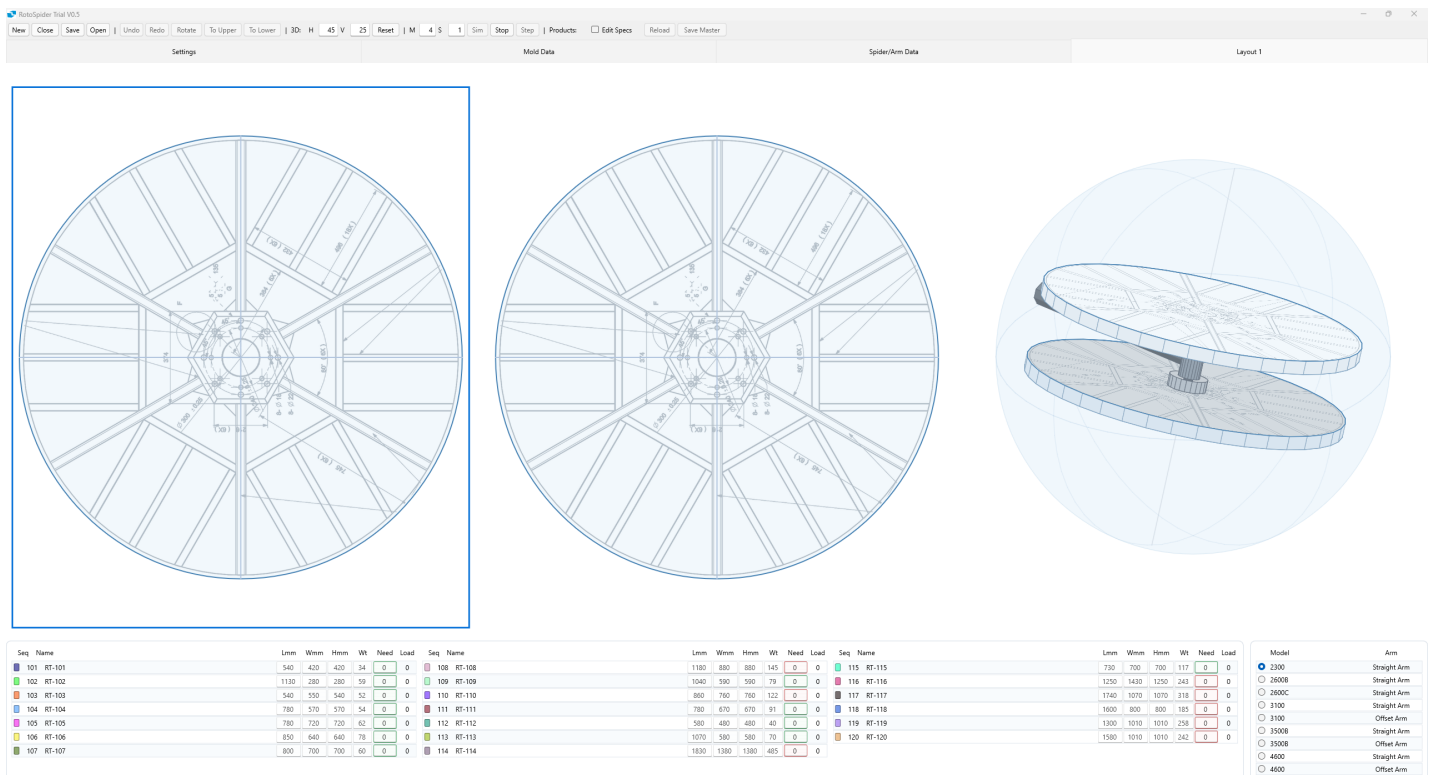
Startup main window

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.

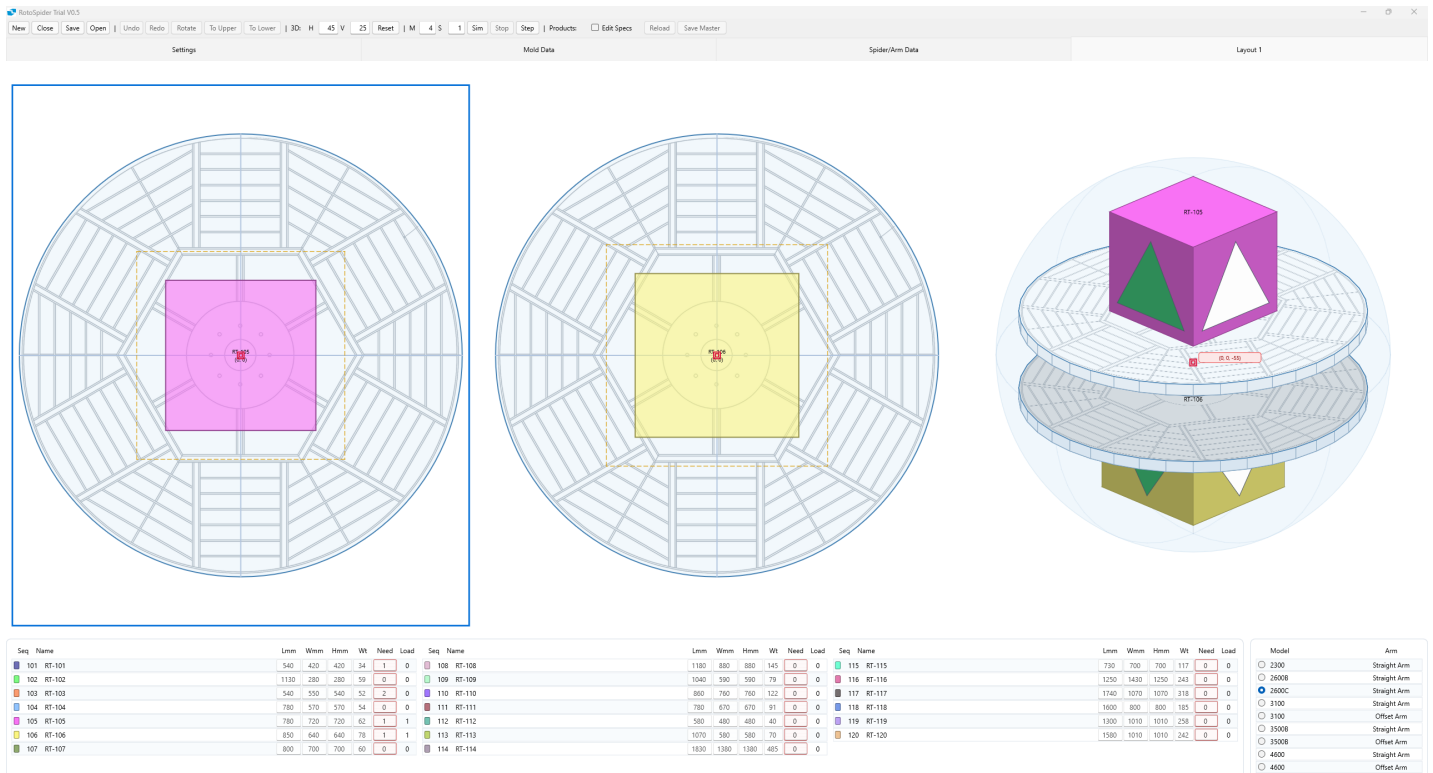
Step 3: Enter mold Need quantities

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	590	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							

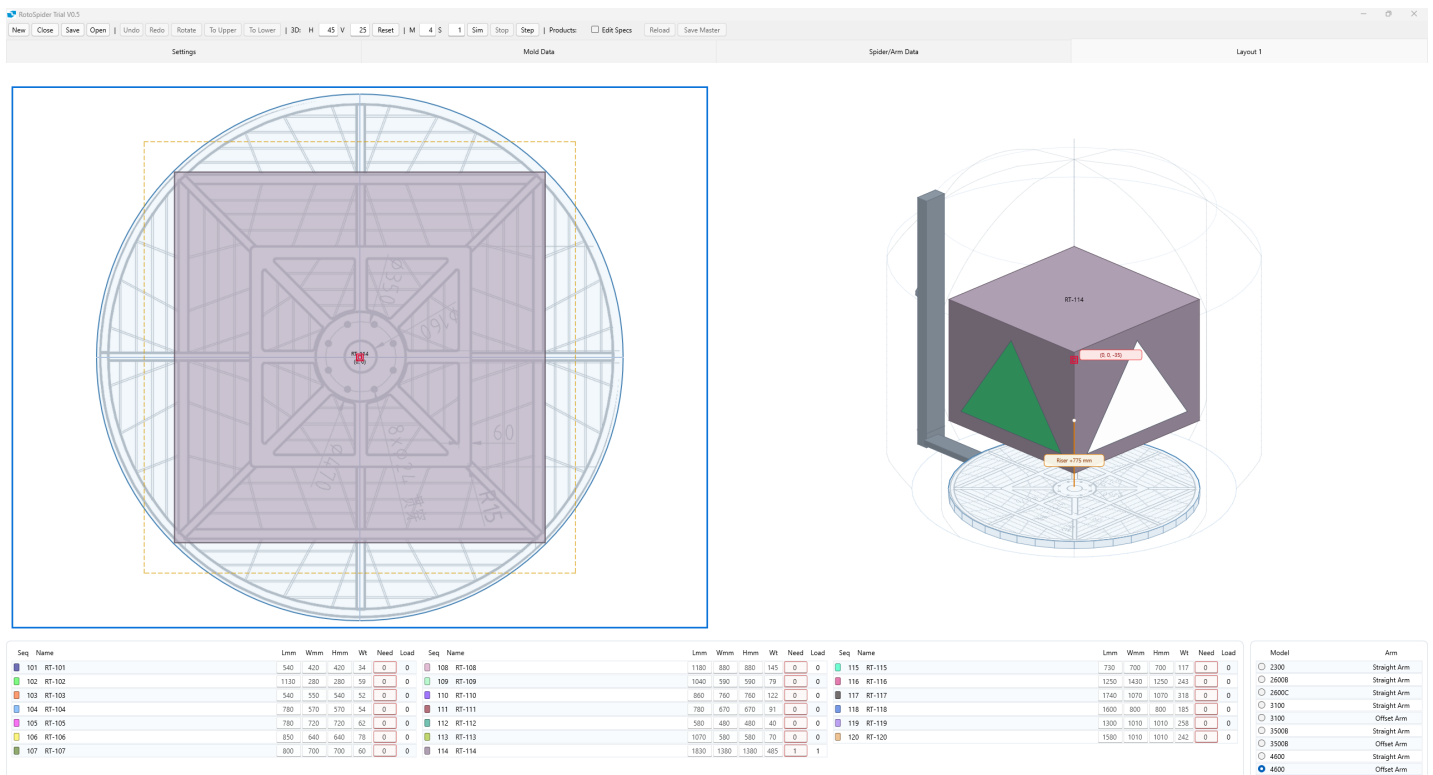
Model Arm
2300 Straight Arm
2600B Straight Arm
2800C Straight Arm
3100 Straight Arm
3100 Offset Arm
3500B Straight Arm
3500B Offset Arm
4600 Straight Arm
4600 Offset Arm

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.

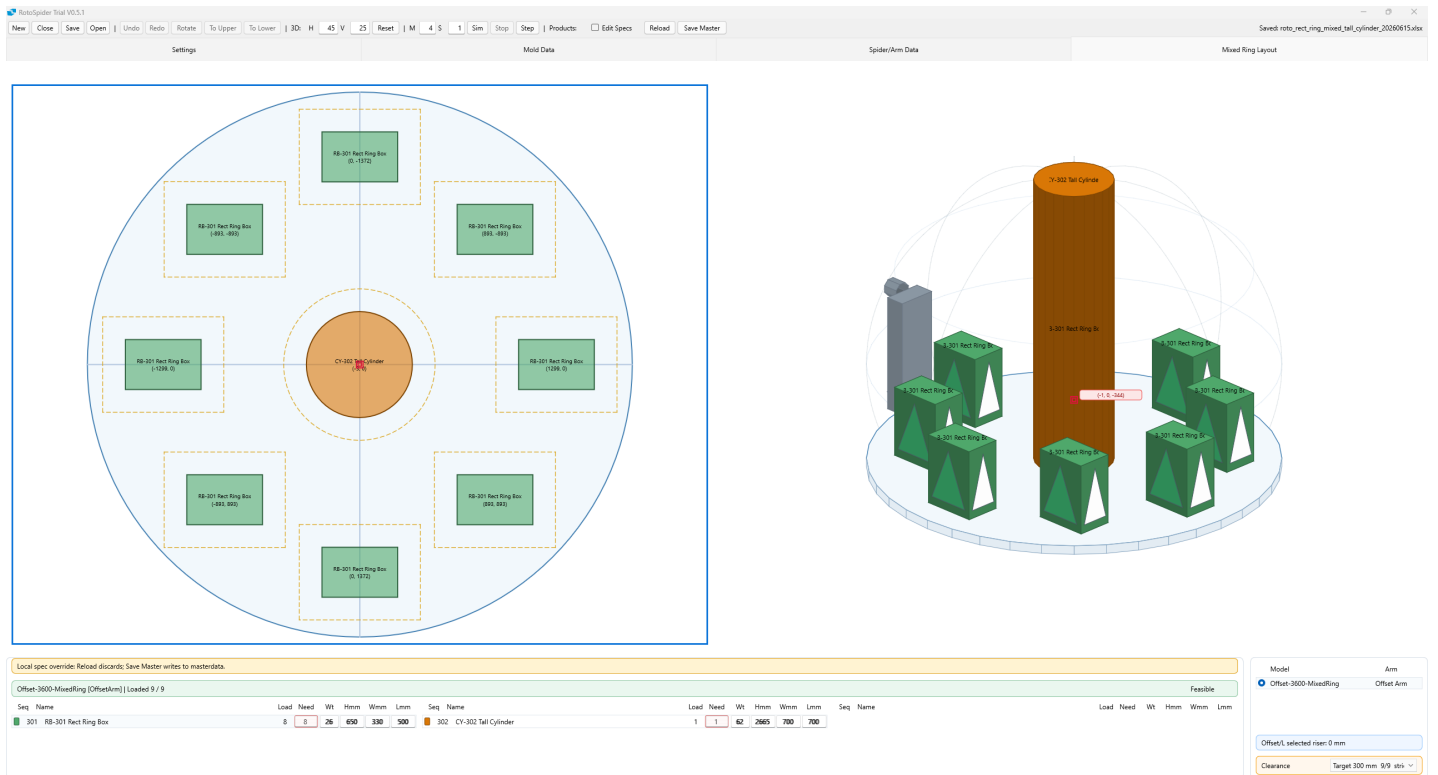


Offset Arm riser used

Step 5: Try cylinder molds and ring layouts

Trial molds RT-121 (Ø1200 x 2000 mm) and RT-122 (Ø800 x 700 mm) are cylinders. They are drawn as circles in the 2D spider views and as cylinders in 3D. For example, RT-121 x 1 fits the 4600 [Offset Arm], and RT-122 x 3 fits the 3500B [Offset Arm] as a ring.

When you request three or more copies of the same mold, the solver can arrange them in a ring around the spider center, often with another mold placed in the center. The ring arrangement is used only when it is at least as good as the standard arrangement.

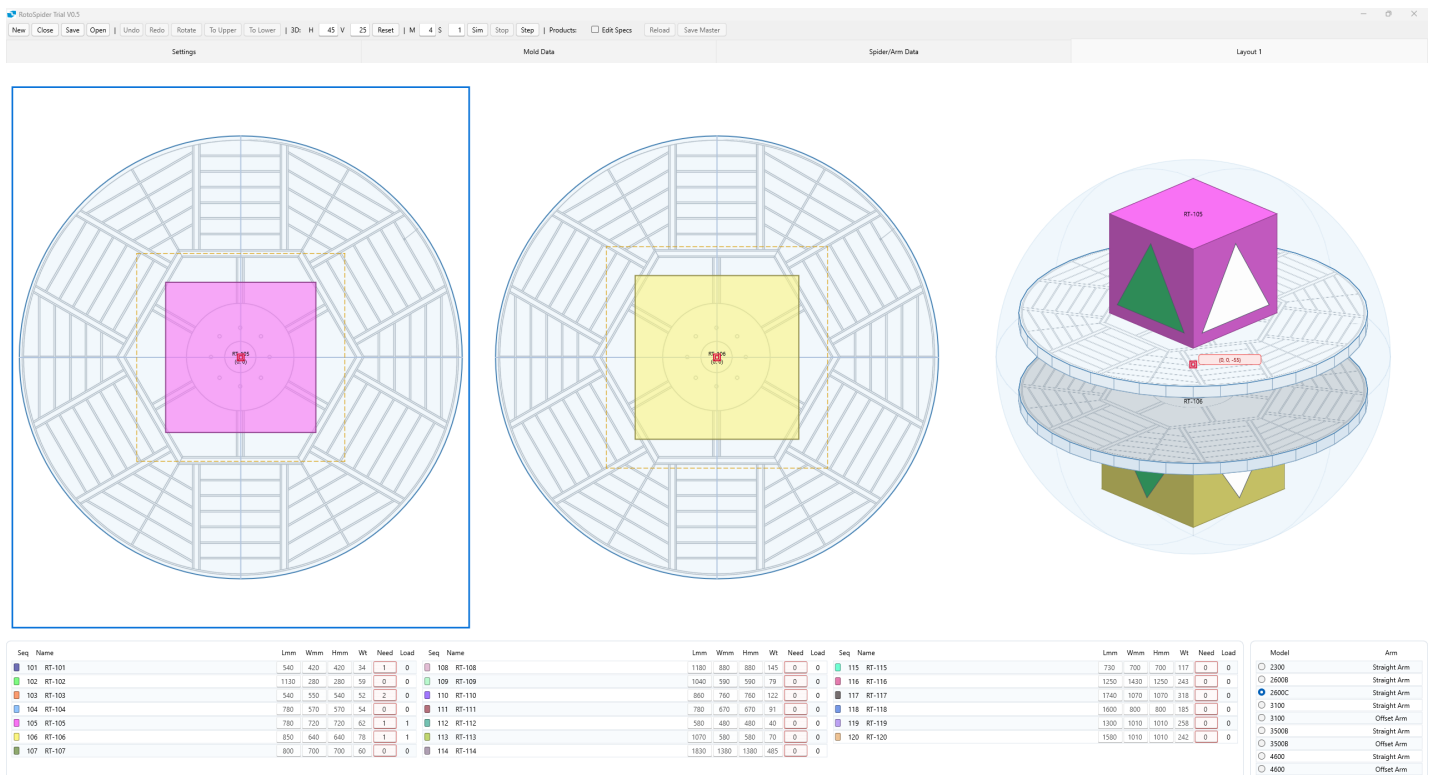


Ring layout with a center cylinder

The example above shows eight copies of one box mold placed in a ring on an offset-arm spider, plus a tall cylinder in the center, with the 300 mm clearance outlines visible in 2D and the spherical envelope visible in 3D.

Step 6: 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.



Saved and reopened layout

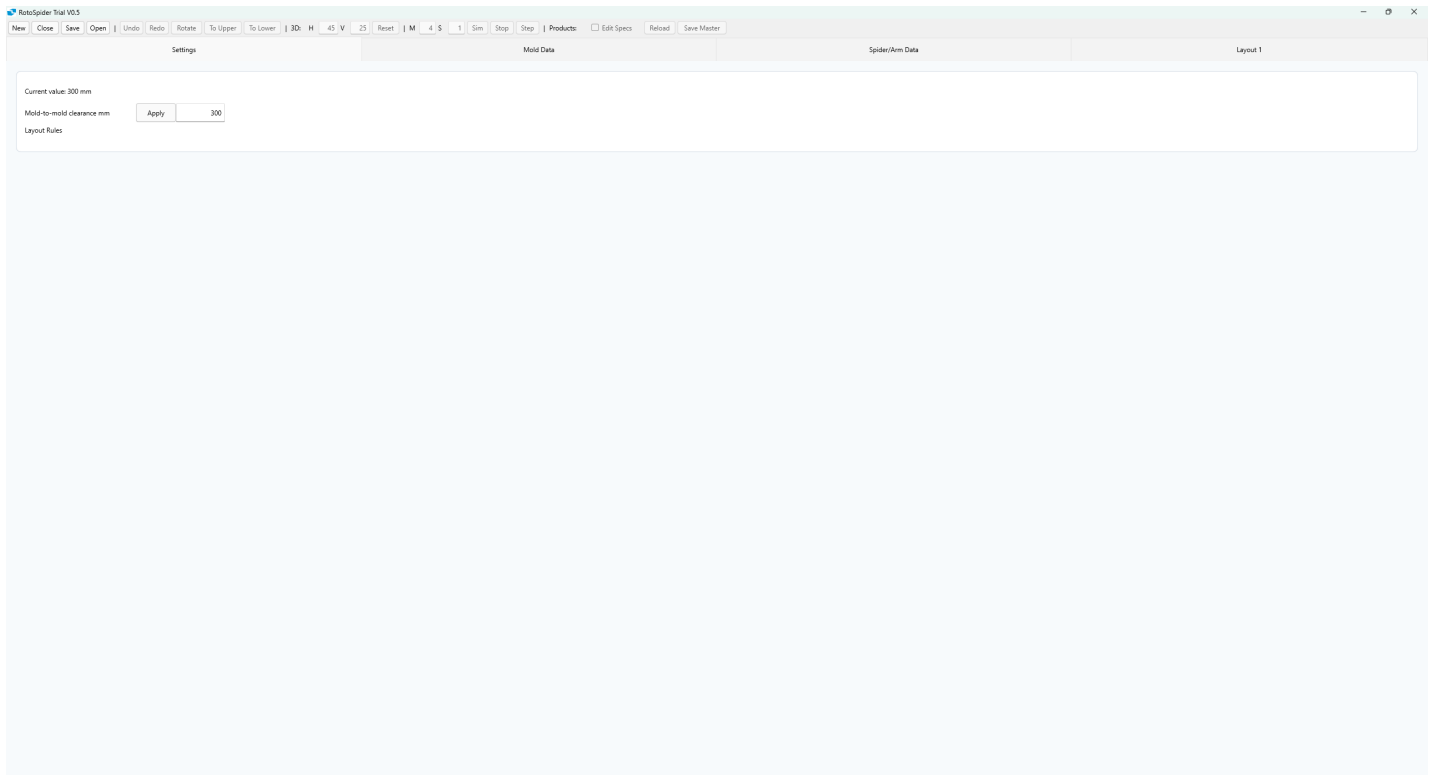
The saved workbook is both a report and a reload file. It includes a layout summary, embedded 2D/3D images, and internal layout data.

3. Settings And Master Data

The app maintains 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 the clearance values. The trial defaults are Minimum allowed clearance mm = 150 and Target clearance mm = 300.



Settings page for mold-to-mold clearance

Mold-to-mold clearance means the 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.

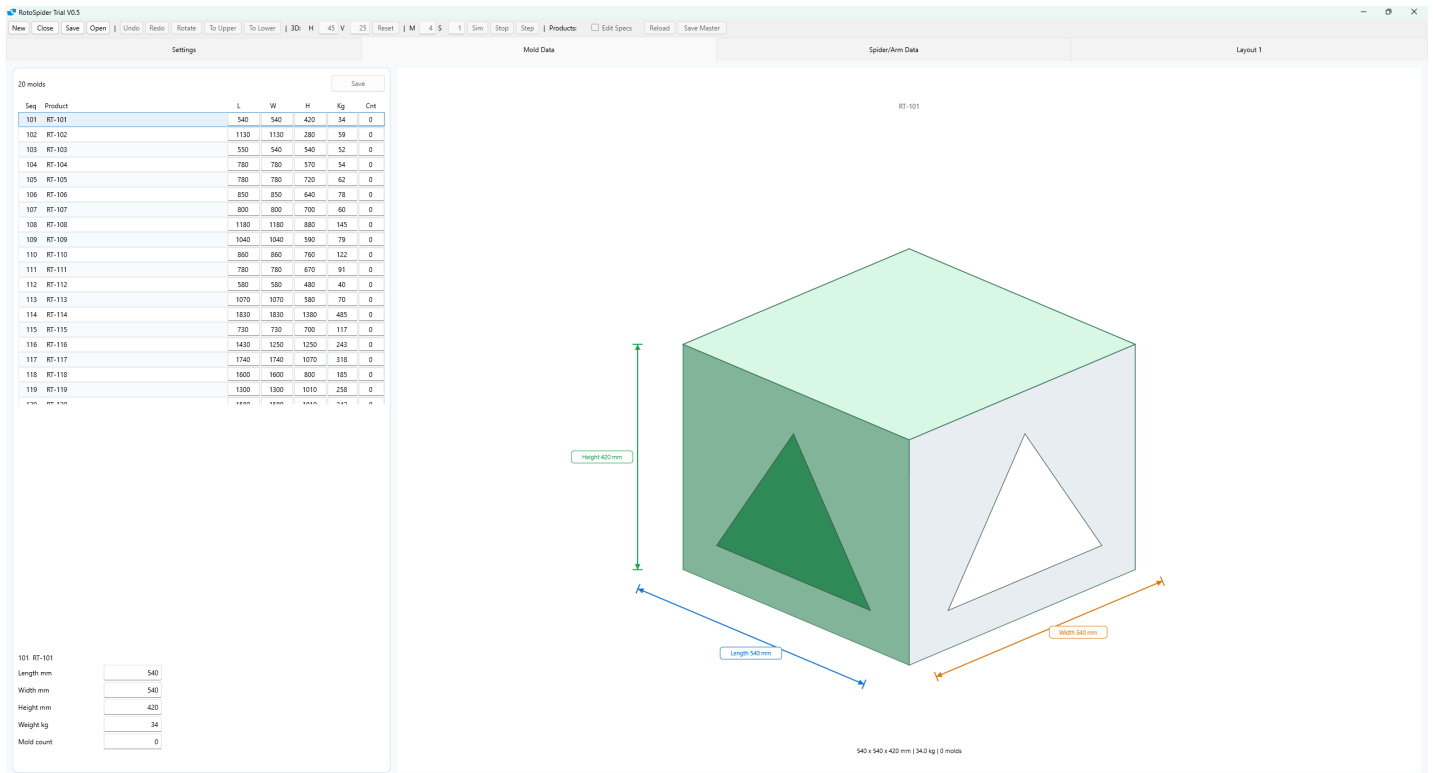
The solver first tries to satisfy the target clearance. If the full request does not fit at the target, it also computes relaxed alternatives down to the minimum allowed clearance. The Clearance selector below the machine list then lists the options, each labeled with the clearance actually achieved and the placed count, so you can decide whether a tighter-but-fuller layout is acceptable.

To change the values:

1. Enter new values in Minimum allowed clearance mm and Target 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

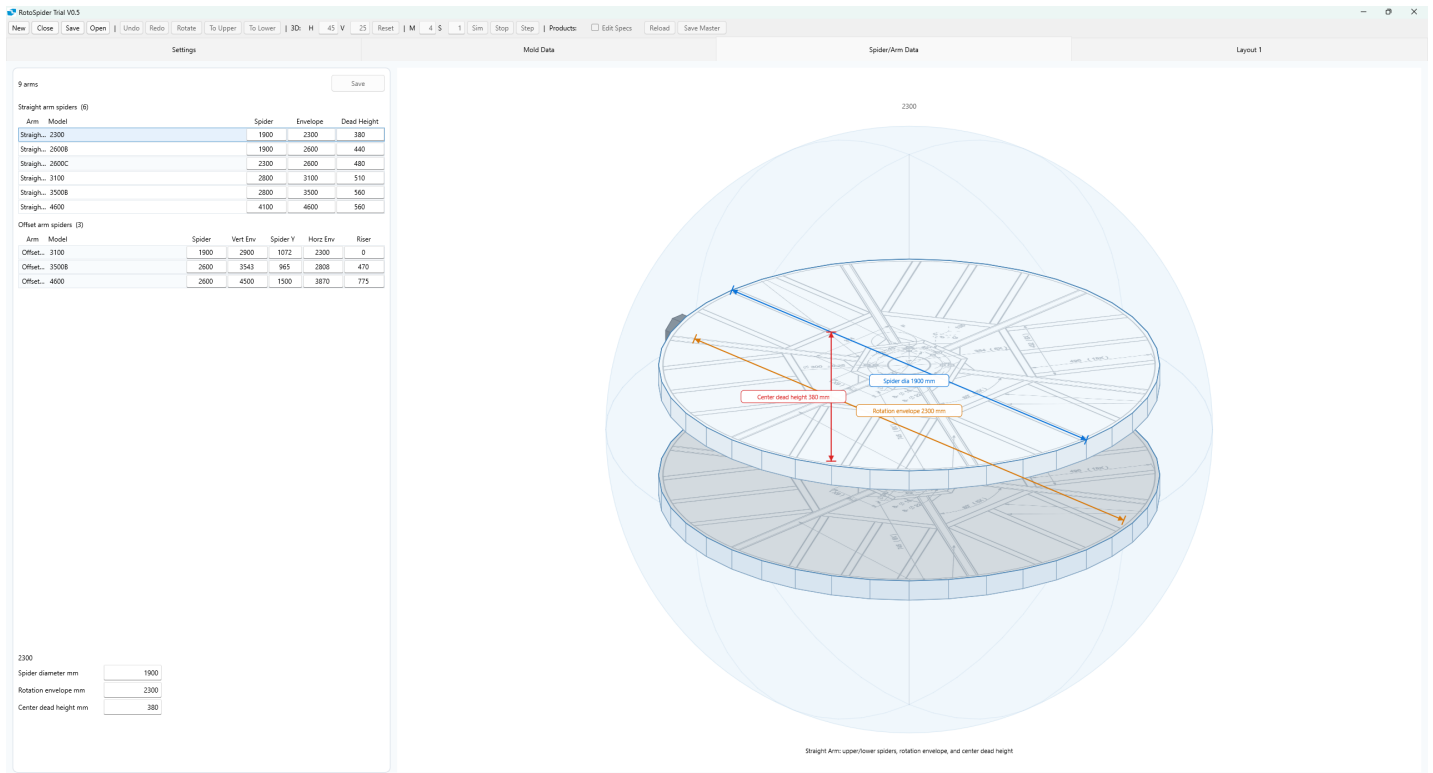
The mold preview explains the fields:

- 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

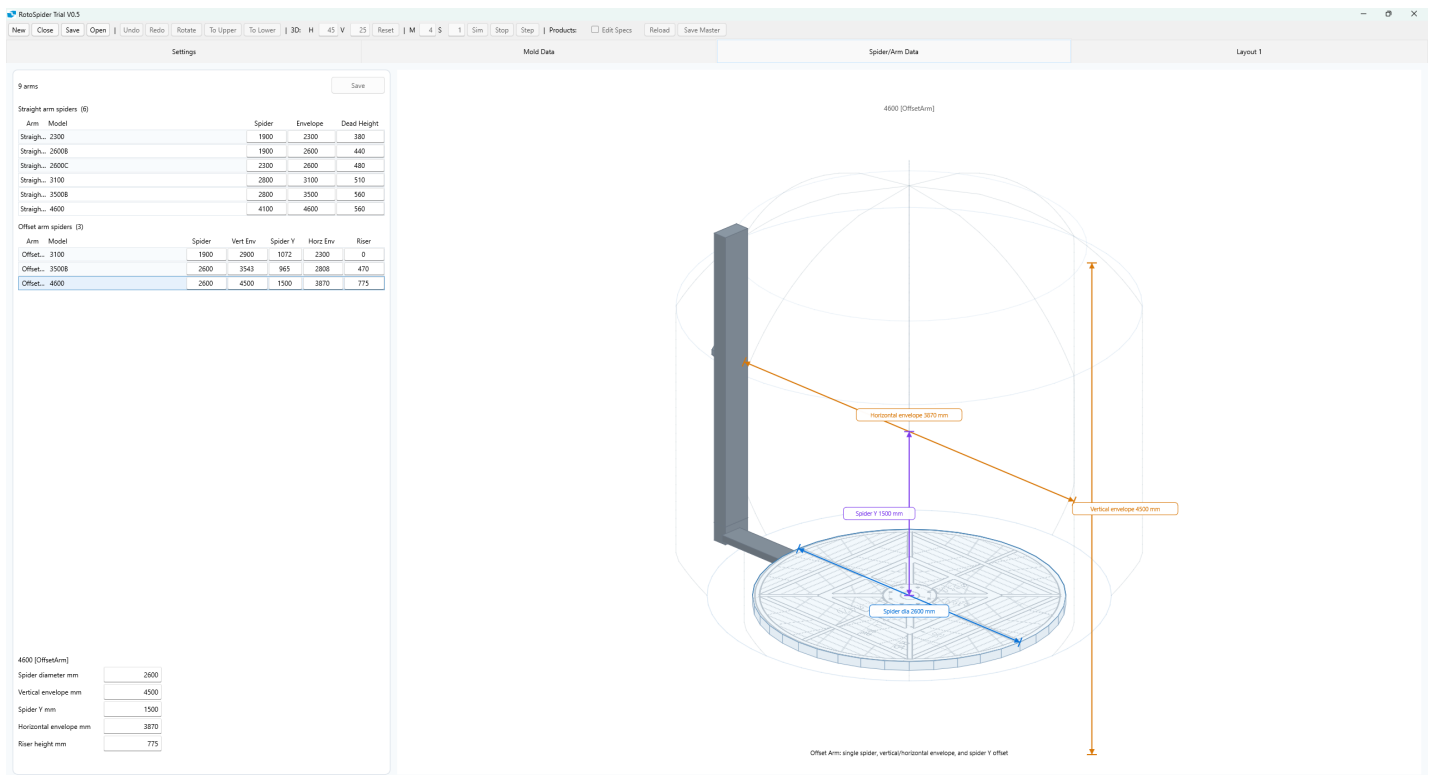
Straight-arm rows use:

- spider diameter
- rotation envelope diameter
- center dead height between the upper and lower mold-mounting surfaces; the drawn spider-plate thickness extends into this gap and does not reduce the rotation envelope again

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
Seq	sequence number used as a stable display id	integer
Name	mold display name	text
LengthCm	mold footprint length	cm in workbook, shown as mm in app
WidthCm	mold footprint width	cm in workbook, shown as mm in app
HeightCm	mold height	cm in workbook, shown as mm in app
WeightKg	mold weight	kg
Color	mold display color	hex color such as #6E6EB6; blank values are auto-filled by the app
Size	optional size text; a diameter prefix (Ø, ø, φ, Φ) marks a cylinder mold, read as diameter x height	cm, such as Ø120x200; leave LengthCm/WidthCm/HeightCm empty for that row

Trial rows **RT-121 (Ø120x200)** and **RT-122 (Ø80x70)** use the cylinder form.

The **Machines** sheet uses these columns:

Column	Meaning	Unit / format
Model	machine model shown in the machine list	text
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
MaxLoadWeightKg	optional maximum total mold weight on one arm; when set, the solver loads molds only up to this weight	kg; the trial sets a 600 kg demo value on the 2300 machine

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.

Control	What it does
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.
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

Column	Meaning
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.

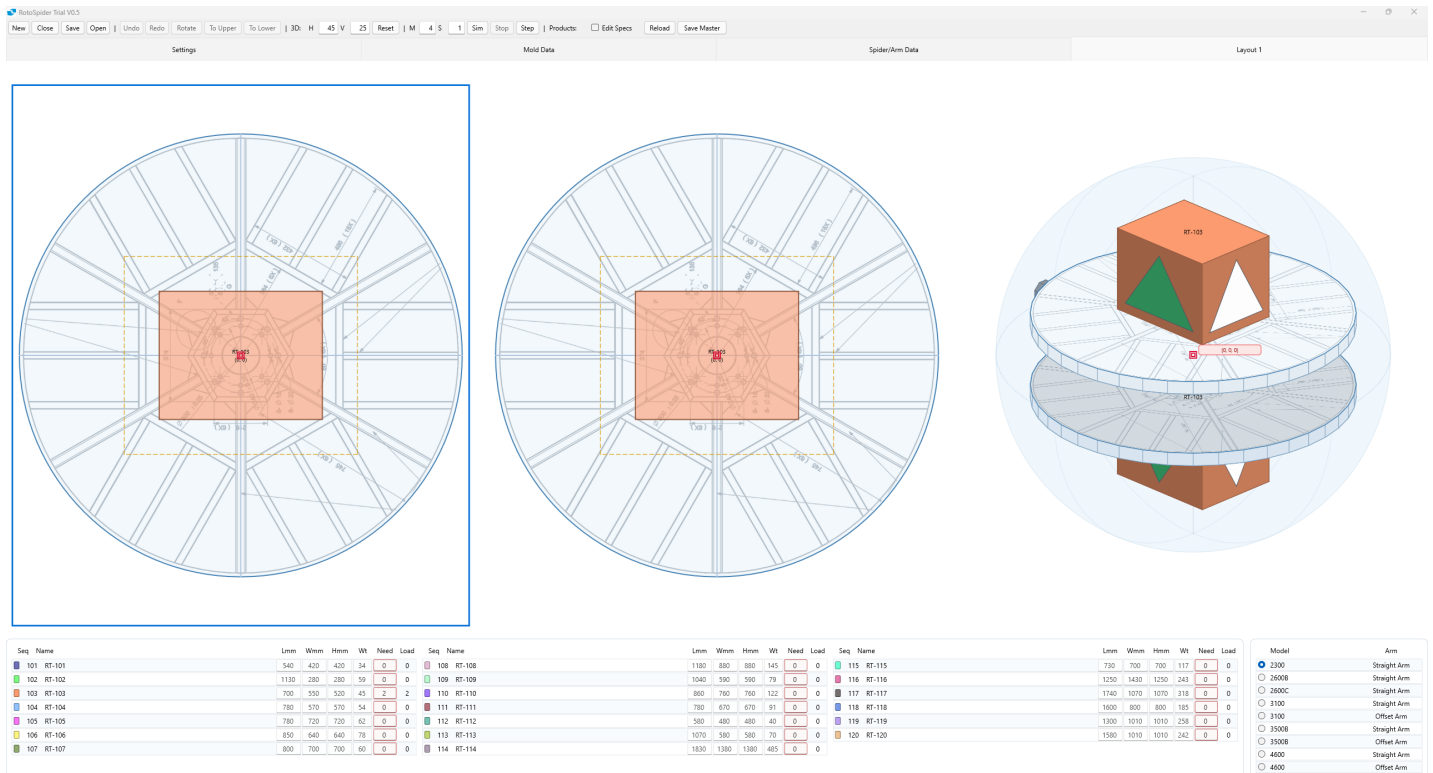
Manually adjust a layout

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

V0.6.1

- Corrected straight-arm geometry so **StraightDeadHeightMm** is treated as the gap between the two mold-mounting surfaces; visual spider-plate thickness is no longer subtracted from usable rotation-envelope space.

- Updated the 3D straight-arm plates to extend inward into the center gap while molds remain mounted on the two specified surfaces.
- Added regression coverage for four RT-102 molds on the 2300 straight arm (two per mounting surface) and retained five RT-101 molds on the 2600B straight arm (four plus one).

V0.6

- Added cylinder molds: diameter-prefixed `Size` text such as `Ø120x200`, drawn as circles in 2D and cylinders in 3D; trial molds `RT-121` and `RT-122` added.
- Added ring layouts: three or more copies of the same mold can be arranged in a ring around the spider center when that is at least as good as the standard arrangement.
- Split the clearance setting into `Minimum allowed clearance mm` and `Target clearance mm`, with a `Clearance` selector offering relaxed alternatives when the target does not fit everything.
- Added optional `MaxLoadWeightKg` per machine arm with weight-limited partial loads; the trial 2300 machine carries a 600 kg demo value.
- Trial validity extended through September 30, 2026; package version `RotoSpider Trial V0.6`.

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.