

# Designation

## RSC-CS “Course Spider”

One walking vehicle with three jobs:

1. Carry shell-mix or fill in the dorsal hopper
2. Pour through a short chute
3. Climb and stand only on **capped** RSC lids using rim-clamp feet

It is not the ground-only mold pourer and not the light wall mason. It is the heavier spider that is allowed onto the structure after a course is sealed.

## What this airframe is

From the locked image:

- Open **grated hopper** on the back (abdomen), charged with soil/mix
- Forward **stereo head** on a short mast
- Body **radiator**
- Underside **pour chute** (stowed or short while climbing)
- One arm holding a **square plate** (lid / core / cap)
- Four long articulated legs
- Feet hooked on **lid rims and box corners**, not on open mouths

Climb mode assumes the wall under it is already **lidded**. Open cells are forbidden footholds.

## Why climb at all

A ground mold-spider can make shells. A lid-clamp mason can fill a course. RSC-CS exists so you do not need a crane to get mix, lids, and a pourer onto the *next* course.

Climbing is for:

- Placing empty shells on the course above
- Pouring **fill** into those shells once placed
- Capping them
- Walking to the next sealed patch

It is not for walking across a field of open boxes.

## Dual-mode feet (the feature that makes this model distinct)

Each foot has two faces:

| Mode      | Contact                                  | Used when                |
|-----------|------------------------------------------|--------------------------|
| Soil pad  | Wide shoe on raw regolith                | Ground travel, mold work |
| Rim clamp | Hook + inner shoe on lid lip / box arris | Structure climb          |

Clamp load path is the **lid rim and vertical wall corner**. Center span of the lid is not a step.

**Gait interlock:** at least three clamps closed on sealed cells before any foot releases. Vision must classify the cell as `CAPPED` or the foot will not commit.

## Mass and lid strength (hard constraint)

This robot is heavy because of the hopper.

| State                   | Mass (target)    |
|-------------------------|------------------|
| Dry                     | 90–130 kg        |
| Hopper empty, climb     | ~90–130 kg       |
| Hopper full of mix/fill | +50–120 kg extra |

In 1/6 g a 200 kg Earth-weight stack is ~330 N. That is acceptable **only if** four rims share it and the lid was designed for a point clamp, not a belly flop.

**Climb rule:** dump or keep the hopper under a set limit before a vertical move. Full hopper is for standing on a finished deck or on the ground, not for a four-box scramble up a steep face.

## Tools on this body

### Hopper + grate

Rejects cobbles. Can be charged with either:

- shell-forming mix (ground / mold work), or
  - raw fill (on-wall pour)
- Do not mix those batches in one charge.

### Pour chute

Short enclosed trough under the belly. For wall work, the chute must reach an **open** cell while the feet stay on **closed** neighbors. That sets the body length: span at least one closed cell plus the open target.

### Plate arm

The square plate is a lid in climb/fill mode (press-on cap). On the ground it can be the mold core. Same end effector, two programs.

## Climb CONOPS

1. Finish a course: every cell filled and capped.
2. RSC-CS dumps to climb mass if needed.
3. Clamp onto the sealed deck, walk like a four-point climber.
4. A setter (this arm or a sibling) parks empty shells on the new course.
5. Recharge hopper from a ground hose or from a bin on the sealed deck.
6. Stand on capped cells, pour into the adjacent open shell, cap, step.
7. Repeat until the new course is sealed; only then climb again.

Night park: four clamps on a sealed patch, hopper empty, heaters on clamp actuators.

## Notional specifications

| Item              | Target                                          |
|-------------------|-------------------------------------------------|
| Dry mass          | 90–130 kg                                       |
| Hopper            | 40–80 L                                         |
| Climb payload     | $\text{hopper} \leq \sim 30 \text{ L}$ or empty |
| Power, climb      | 200–400 W                                       |
| Power, pour       | 300–800 W                                       |
| Foot registration | $\leq 5 \text{ mm}$ to lid rim                  |
| Allowed foothold  | CAPPED only                                     |
| Wall slope        | stepped bond, not a sheer unkeyed face          |
| Environment       | vacuum, thermal cycle, abrasive dust            |

## Structure interface (cartridge must be designed for this robot)

RSC-CS only works if the sealed RSC is a climbing brick:

- Recessed lid with a **hookable rim**
- Corner strength for clamp pinch
- Fiducials on every lid
- Bond pattern so a foot always has a rim, not a joint gap
- Lid rated for clamp load + 1/6 g robot + residual hopper

If the lid is a flat unreinforced plate, this model punches through. The brick and the spider are one product.

## Failure modes unique to this airframe

- Climbing with a full hopper
- Treating an open cartridge as a step
- Pouring while a foot is on the cell being filled

- Hook slip on a dusty rim (need a positive inner shoe, not friction alone)
- Green (uncured) shells in the wall used as footholds

## **What this model is not**

Not a bulk excavator. Not the stationary press. Not a free-climber on raw stacked dirt.

**One-line spec:** *RSC-CS is a hopper-fed four-leg spider that pours and caps RSCs and may traverse the wall only by clamping the rims of already sealed cartridges, with hopper mass limited during climbs.*