

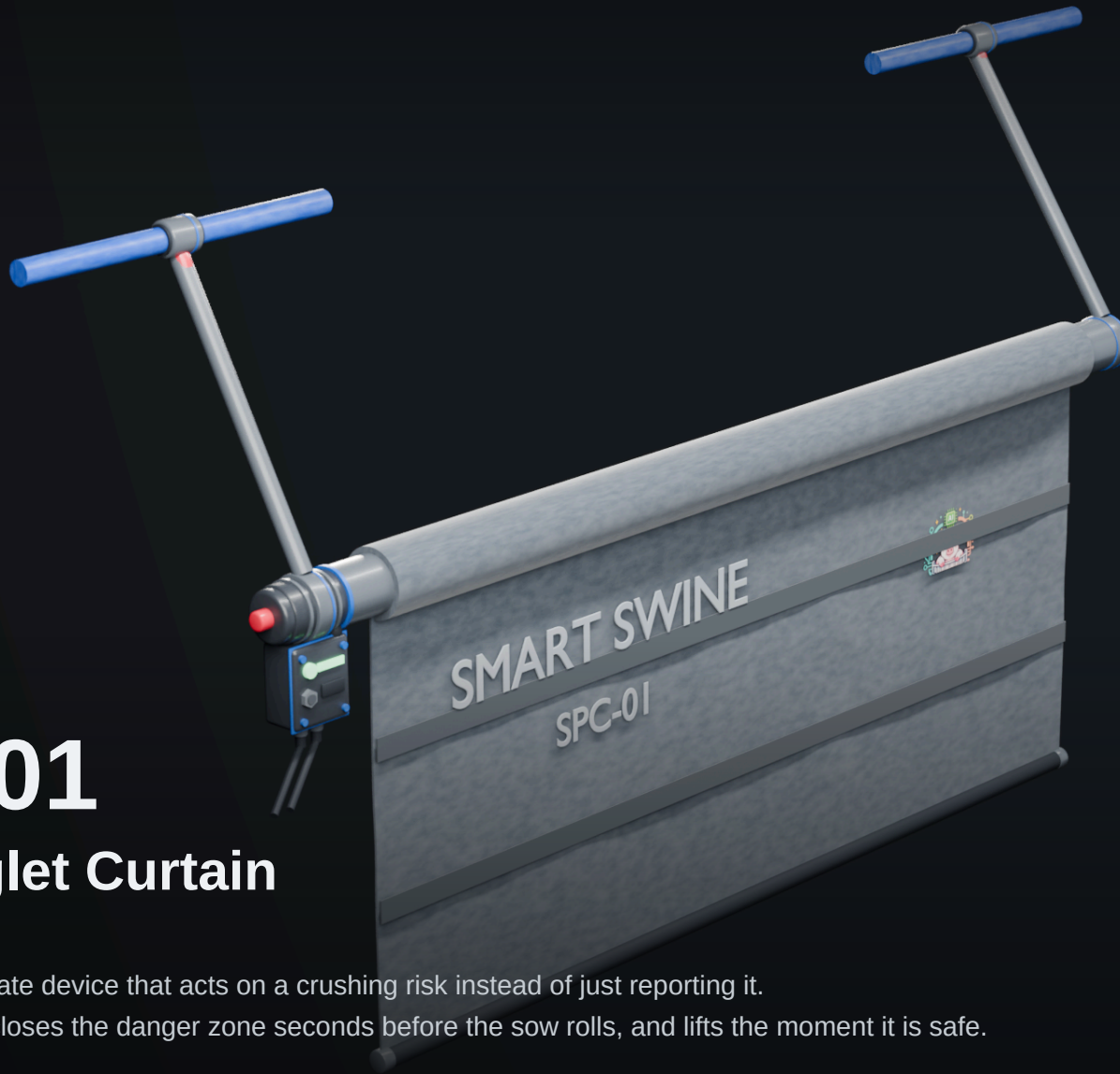


SMART SWINE

SPC-01

Smart Piglet Curtain

The first farrowing-crate device that acts on a crushing risk instead of just reporting it.
A motorized curtain closes the danger zone seconds before the sow rolls, and lifts the moment it is safe.





Three seconds, one direction

Crushing kills more piglets than any disease. It is not random. 68% of crushing deaths happen during one specific event, the sow rolling from sternal to lateral lying, and the roll goes to one side that is knowable in advance. The window is about three seconds long. An alert cannot cross a farrowing room that fast, but an actuator that is already mounted on the crate can.

~30%

of preweaning loss is crushing, the single largest cause

80%

of crushing deaths happen in the first four days after farrowing

68%

happen during the sternal-to-lateral roll

~3 s

duration of the roll — too fast for any human response

Why alarms are not enough

A posture monitor can flag a sternal-lying sow with piglets in her roll path, but the fastest stockperson is minutes away and the roll takes seconds. Detection without an actuator leaves the last meter of the problem unsolved.

Why a curtain works

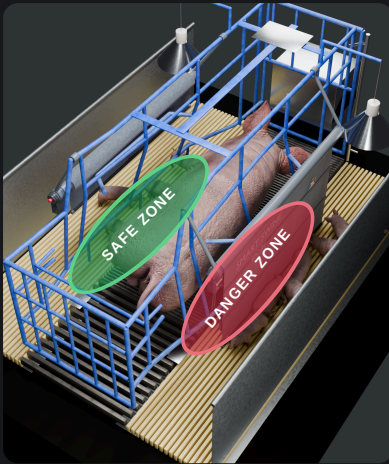
The curtain never has to stop a 250 kg sow. It only has to keep 2 kg piglets out of the strip of floor she is about to occupy. That is a light fabric barrier, closed early and lifted as soon as she settles, so nursing access is restored within seconds.

Crushing shares and roll statistics from published preweaning-mortality literature. SPC-01 is a concept industrial design, not production hardware.

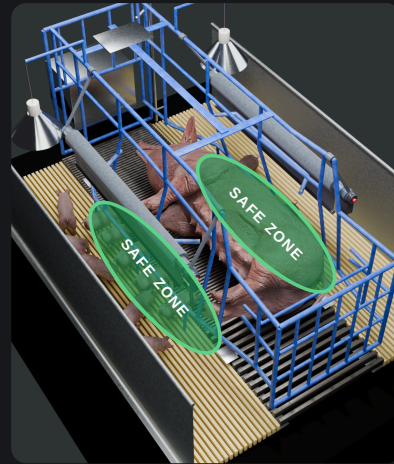


Four postures, one rule

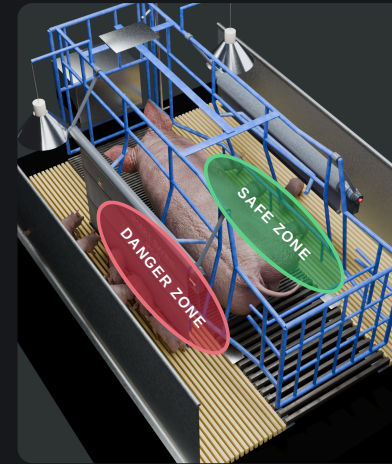
Crushing is a one-way transition. A standing sow keeps both strips closed. From sternal lying she can roll to exactly one side without getting up, so only that side stays curtained while the safe strip opens, and the roll lands on empty floor. Both lateral postures are terminal, no further roll is possible from them.



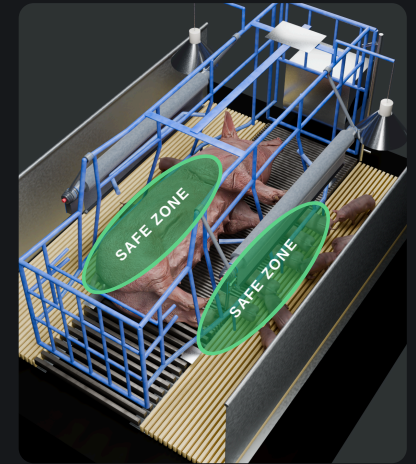
→
one roll,
~3 seconds



✗
cannot reach
from Sternal-
Left



→
one roll,
~3 seconds



Sternal Lying, Right

She **can** roll straight into Lateral Lying-Right. That roll lands on the right strip, so any piglet there is in the crush path.

Right curtain holds, left lifts

Lateral Lying, Right

Terminal posture. No further roll is possible and piglets are under **no crushing threat** anywhere in the crate.

Both curtains lift, nursing begins

Sternal Lying, Left

The mirror case. She **cannot** reach Lateral-Right from here, so the right strip stays safe while the left strip is the crush path.

Left curtain holds, right lifts

Lateral Lying, Left

Terminal posture, mirrored. Piglets are under **no crushing threat** and traffic is free on both strips.

Both curtains lift

THE RULE, IN FOUR LINES

SOW POSTURE	REACHABLE BY ROLLING	SPC-01
Sternal Lying, Right	Lateral Lying-Right	Right curtain down
Sternal Lying, Left	Lateral Lying-Left	Left curtain down
Lateral Lying, either side	nothing, terminal posture	Both curtains up
Standing, sitting, unclassified	anywhere, posture unresolved	Both curtains down

INSIDE THE THREE-SECOND WINDOW

Sternal lying begins

She folds down and settles onto one flank. The lean is established well before the roll.

Side named, safe curtain lifts

SPM-01 classifies and SPC-01 lifts the safe side in about two seconds. The roll path stays closed.

The roll happens

About three seconds, onto a strip that is already empty of piglets.

Lateral lying, curtains lift

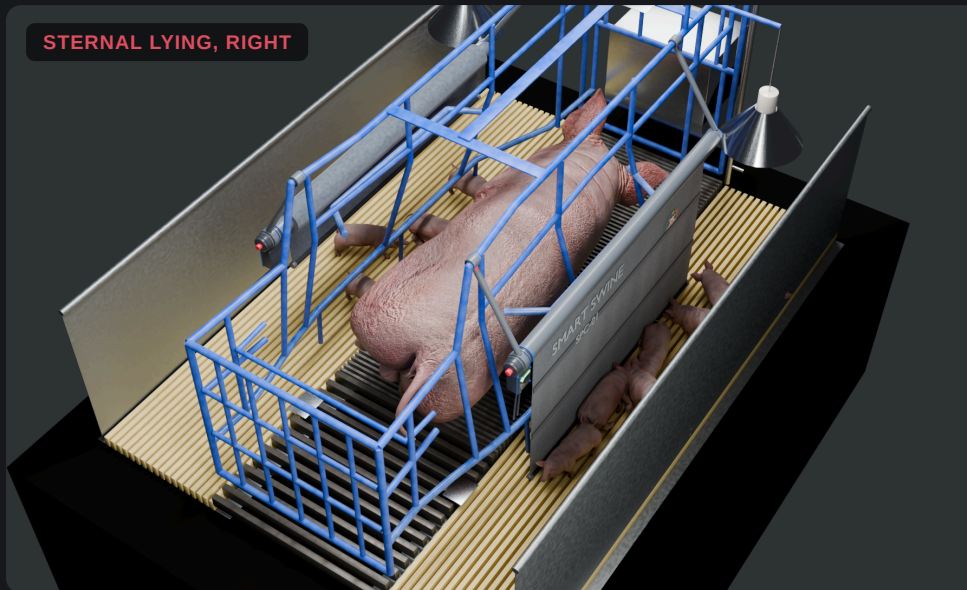
Terminal posture reached. Both sides open and the litter returns to the udder.



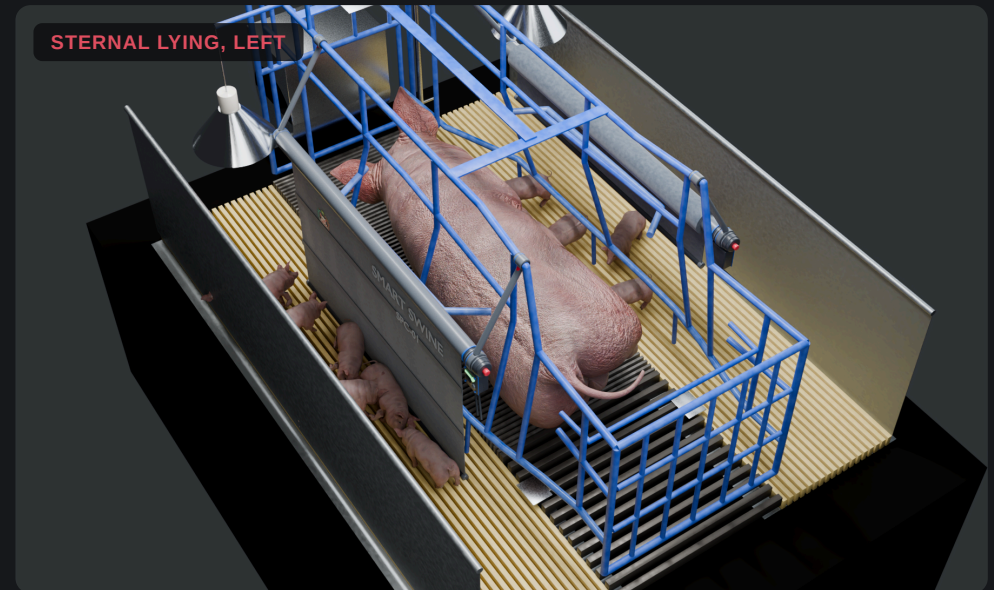
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Sternal lying opens the danger window

Resting on the sternum with the legs folded under is the posture a sow returns to between every nursing bout. It is also the only posture she can leave by rolling. The roll goes to exactly one side, the side her weight is already loaded onto, and that lean is visible in her back line seconds before she commits.



Right curtain holds. Her weight is loaded onto her right flank and the teat line swings away from it. The right nursing strip is the strip she is about to occupy, so its curtain stays down while the left one lifts.



Left curtain holds. The mirror case, read from the same signals. The left strip stays closed and the right curtain lifts the safe strip open.

How the side is read

SPM-01's stereo depth head watches the dorsal midline from behind. In sternal lying the midline shifts off the crate axis toward the loaded flank, and that offset names the rollable side without wearables or floor sensors.

What closing costs

Nothing is taken from the litter. In sternal lying the udder is pressed against the floor, so there is no nursing to interrupt. The curtain only keeps piglets from bedding down in the strip she will land on.

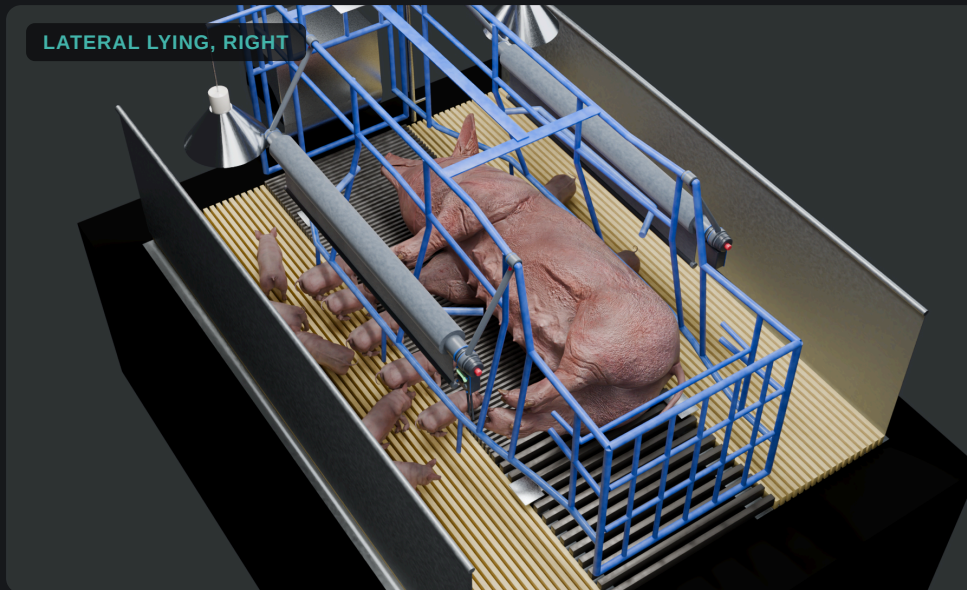
What a piglet meets

A soft fabric wall arriving on a weighted hem, on a torque-limited drive that reverses if it touches anything on the way down. Piglets are eased out of the strip, never pinned under it.

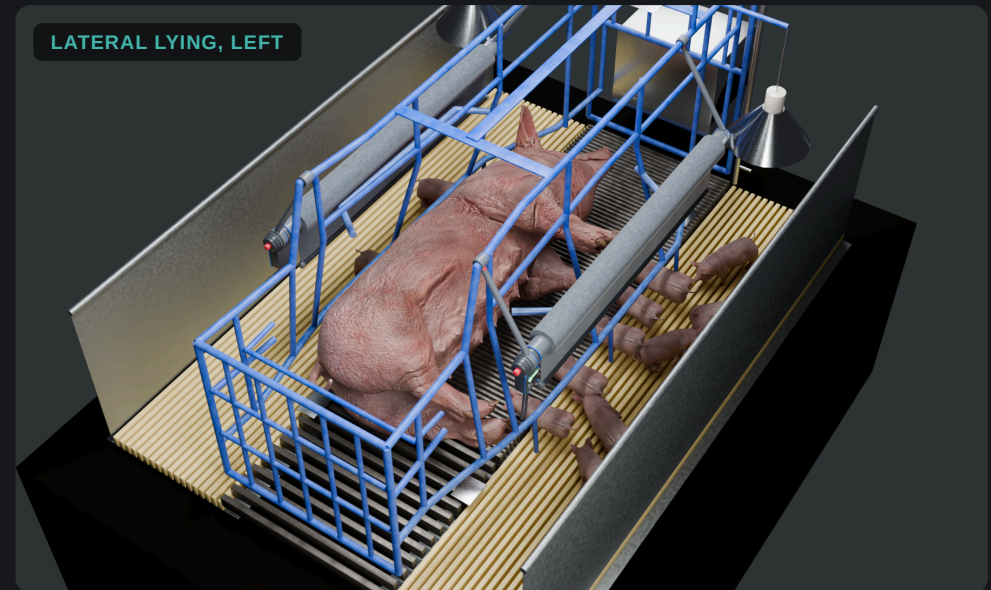


Lateral lying is the all-clear

Flat on her side with the udder presented is the posture the litter needs most, and the safest one there is. A sow cannot roll onward from lateral lying, she has to come back up through sternal first, and the system would see that transition the moment it starts. So lateral lying means both curtains lift and stay up.



Both curtains up. The udder faces the right strip and the nursing row forms within moments of the curtains clearing.



Both curtains up. The mirror case. The litter reaches the udder from the open strip and the far strip stays free for traffic.

Nursing is restored in seconds

Full travel takes about two seconds, so the gap between the sow settling flat and the litter reaching the teats is shorter than her own letdown cycle. Closure never costs a feeding.

Standing closes both sides

A sow on her feet can step or drop anywhere, so both curtains stay down until her posture resolves. Only the two terminal lying postures open the crate fully.

Ambiguity fails open

If the posture cannot be classified, the link drops or the power fails, both curtains lift. The crate then behaves exactly like a crate without an SPC-01, never worse.



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A roller, and nothing else

The whole product is one overhead roller assembly. No posts on the floor, no rails, no moving parts at piglet height.

FABRIC

TPU-coated barrier

A 1.0 m curtain of coated polyester drops to the creep floor on a weighted hem. It stops a piglet, wipes clean under a pressure washer and weighs almost nothing.

DRIVE

Tubular motor, sealed

The motor lives inside the tube, the way awning drives do. Full travel takes about two seconds, quiet enough not to startle the room.

FAIL SAFE

Open by default

Power loss, signal loss or a manual pull on the coral release all end the same way, curtain up and the crate behaving exactly like a crate without an SPC-01.

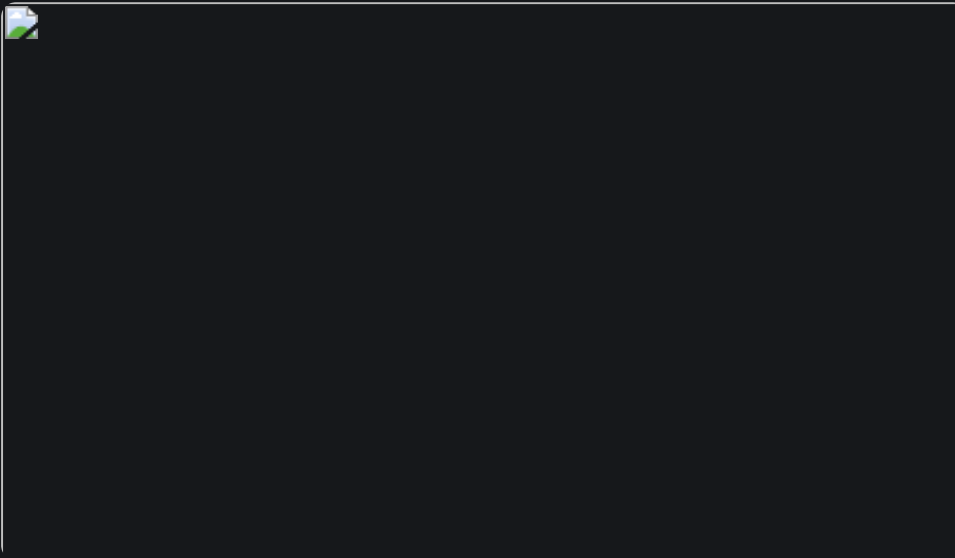




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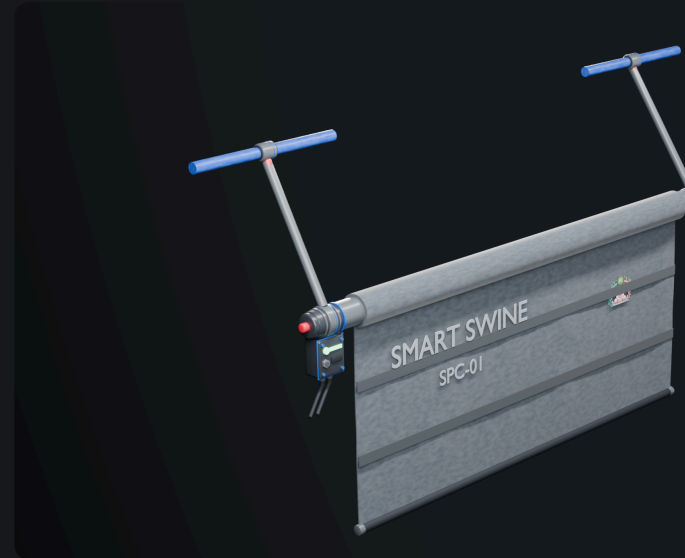
Half of a closed loop

SPC-01 is the actuator half of the Smart Swine farrowing system. The eyes belong to SPM-01, the dual-axis monitor already watching the crate from the rear. Its forward stereo-depth camera classifies the sow's posture in real time, and the moment she settles into sternal lying it knows which side she can roll to. That call goes to SPC-01 over the sealed wireless link, and the matching curtain is closed before the roll can start.



SPM-01 · Smart Piglet Monitor

Detects. Stereo depth reads posture and respiration, 99.15% posture classification in a 10-sow farm trial.



SPC-01 · Smart Piglet Curtain

Acts. Two independent curtain units close the danger zone SPM-01 has named, and lift when it clears.

01 · DETECT

SPM-01 reads the sow

The forward depth head classifies standing, sternal and lateral lying continuously, with no wearables and no floor sensors.



02 · DECIDE

The danger side is named

Sternal lying resolves to a rollable side. That side's nursing strip becomes the danger zone until her posture changes.



03 · ACT

SPC-01 closes one side

The matching curtain drops in about two seconds and holds. When she commits to lateral lying or stands, both curtains lift and nursing resumes.



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Two brackets, half a turn each

Every fastener goes to the crate and nothing touches the floor, because the floor is pressure washed and scraped.

SADDLE CLAMP

Hangs on the top rail

A rubber-lined saddle snaps over the crate's top rail and a captive thumb screw closes it. No drilling, no welding, no tools, and removal is just as fast.

END BRACKETS

Grip only what never turns

The two drop arms hold the static motor housing and the idler pin, exactly like a roller blind's end brackets, so the winding fabric is never obstructed.

FITS THE FLEET

Standard NA crates

The bracket span matches the common North American farrowing-crate top rail, and both curtain units install from the aisle in minutes.





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Sealed for the washdown

Everything electrical lives at one end, in one sealed stack, speaking the same waterproofing language as SPM-01.

DRIVE HEAD

Ribbed, O-ring sealed

The finned motor housing closes the tube behind a blue compression O-ring, with the coral manual release on its nose.

CONTROL POD

Status at a glance

RUN indicator, sealed antenna dome, membrane pressure vent and twin cable glands with strain reliefs, behind a perimeter-sealed lid on captive screws.

WASHDOWN

IP69K design target

Every seam that faces the hose is a compressed seal, and the fabric itself is the same coated polyester used in barn curtains that are washed for years.





Designed to be harmless first

A device that acts inside a farrowing crate has to be safe against its own mistakes. Three behaviors are part of the design brief, ahead of any performance figure.

Safety behaviors

The hem carries no cutting edge and the drive is torque-limited, a curtain that meets a piglet on the way down reverses and retries. Both units fail open on any loss of power or signal. The manual release needs one hand and no tools, and always ends with both curtains up.

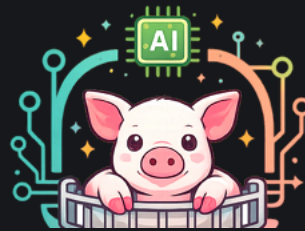
Honest limits

SPC-01 is a concept industrial design under active development. The mechanism, mounting and materials shown are design proposals, not a production build, and no field performance is claimed for the curtain itself. The posture detection it relies on is the validated SPM-01 pipeline.

Design parameters

Curtain span	1.0 m per side, two independent units per crate
Curtain plane	outboard of the anti-crush bar, out of the sow's reach
Travel	creep floor to full open, about two seconds
Drive	sealed tubular motor inside the roller
Mounting	two saddle clamps on the crate top rail, tool free
Floor contact	none
Sealing	IP69K design target, washdown safe
Link	sealed wireless to SPM-01, each device also operates alone

Renders are concept industrial design built to real North American farrowing-crate dimensions.



SMART SWINE

SPM-01 watches. SPC-01 acts.
One farrowing system.

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