spruce up
INDUSTRIES PVT. LTD.



STRATUS

Clean air and clear drains start on the road.

The science and technology of the Stratus air-blast vacuum sweeper

THE PROBLEM · THE METHOD · THE MACHINE · THE EVIDENCE

SCIENCE AND TECHNOLOGY · INDIA · 2026



AT THE KERB

The sweeper that takes fine dust off the road.

A broom-type sweeper pushes fine dust along the road and leaves most of it there. The Stratus blasts it loose with air and vacuums it into the hopper. These pages show how it does it, and why it matters.

Stratus 330 at work. The gutter broom brings the kerb's debris to the pickup head, and the suction hose behind it carries the dust up to the hopper.

STRATUS AIR-BLAST VACUUM SWEEPER · SCIENCE AND TECHNOLOGY

Clean air and clear drains start on the road.

Fine dust and silt lie on every road and in its pores. Traffic grinds them finer and throws them into the air people breathe. Rain washes the rest into the drains. So the dust has to leave the road. This brochure shows where it goes under three kinds of sweeper, and how the Stratus takes it away.

Known to engineers as a regenerative air sweeper. Designed in the USA and India. Built in Pune.

THE CHAIN OF CAUSE

Dust lies on the road.
On the surface and packed into its pores.

Traffic lifts it. Rain carries it.
Into the air in the dry months, into the drains in the monsoon.

So it has to be removed.
Taken off the road, not pushed along it.

THE ANSWER IN THE METHOD

A broom moves dust.
Bristles ride over the pores where the fine dust sits.

Air removes it.
A blast of air lifts it out. A vacuum carries it away.

The same air goes round again.
A closed loop, with water sprays and no filter cartridges.

320+ km/h	1,980 mm	3.3 cum	29	1,500 L	0
AIR-BLAST SPEED	WIDTH CLEANED BY AIR	STAINLESS-STEEL HOPPER	SPRAY NOZZLES	STAINLESS-STEEL WATER TANK	DUST-FILTER CARTRIDGES

IN THIS BROCHURE

Four questions an engineer asks.

01	**The problem**	Why does the dust on the road matter?	04
02	**The method**	Where does the dust go under each kind of sweeper?	06
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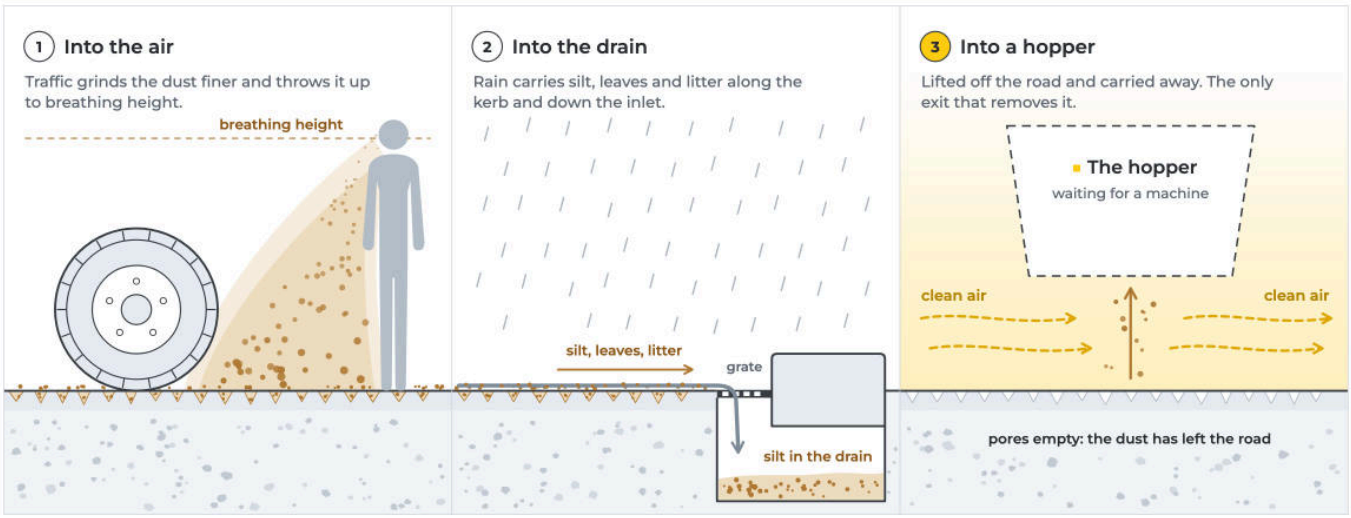
Built in Pune 12 · Dust control 14 · Keeping a road clean 15 · After sales 16 · Specification 18 · Ask for a demonstration 19

Figures in the strip are for the Stratus 330 Diesel. **Every figure in these pages comes from a published study, a regulator, a Spruce Up specification sheet, or Spruce Up's own planning.** A short list of sources is on page 19.

01 THE PROBLEM

Why does the dust on the road matter?

Because it does not stay there. India's own source studies name road dust as a leading source of PM10, the coarse particles its cities emit. The road is the one place where that dust can still be collected.



Drawn in principle. Road texture enlarged.

ROAD DUST: ITS SHARE OF WHAT EACH CITY EMITS

PM10 PM2.5

Delhi
IIT Kanpur, 2016

56%
38%

Lucknow
TERI, 2024

86%
72%

In Delhi, road dust is the largest single source of the PM10 the city emits: more than half.

Each figure is from that city's own source study.

> "Road dust is a dominant contributor to coarse particulate pollutant (PM10), and remains significant contributor in fine particulate matter (PM2.5) also, particularly during the drier months."
>
> Commission for Air Quality Management, Delhi-NCR, 10 February 2026

The same dust rises again and again.

Every vehicle that passes grinds the dust on the road finer and throws it up. It settles, and the next vehicle lifts it again. It stops only when the dust is taken off the road.

Sweeping is the named remedy

The regulator calls it essential.

The Commission calls effective mechanised road sweeping "an essential air pollution abatement intervention" for the National Capital Region.

First on the list of controls

Vacuum sweeping of major roads.

IIT Kanpur's study of Delhi put vacuum sweeping of major roads first in its list of road-dust controls. What matters is whether the dust leaves the road.



Stratus 330: a gutter broom works the edge of the road.

IN THE MONSOON

Rain washes the rest into the drains.

What is left on the road in May is in the drain in June. The first heavy shower carries silt, leaves and litter along the kerb and down the inlets. The silt settles in the drain, and a drain part full of silt carries less water.

Desilting treats the drain. Sweeping treats the source.

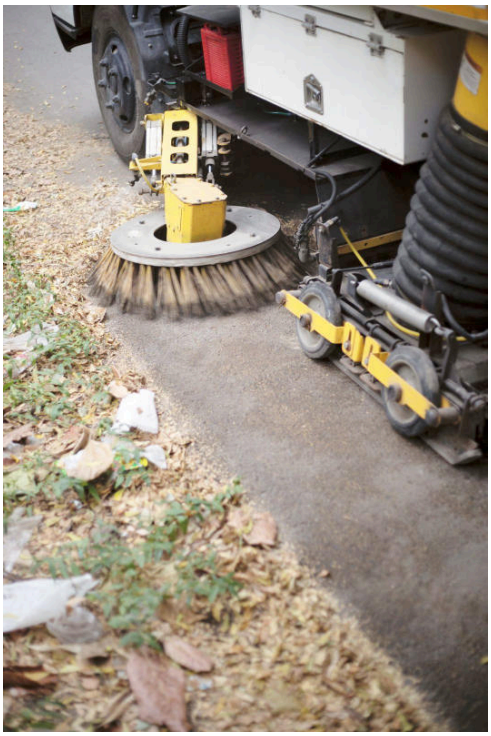
Cities desilt their drains before every monsoon, and the silt comes back off the road. What is swept up today is not washed into the drain tomorrow.

The kerb channel is where it gathers.

Two gutter brooms, 850 mm across, reach into the channel along the kerb and bring its silt and leaves to the pickup head, before the rain carries them to the inlet.

One dust, two problems.

The dust in the air in the dry months is the silt in the drain in the wet ones. Take it off the road and you answer both.

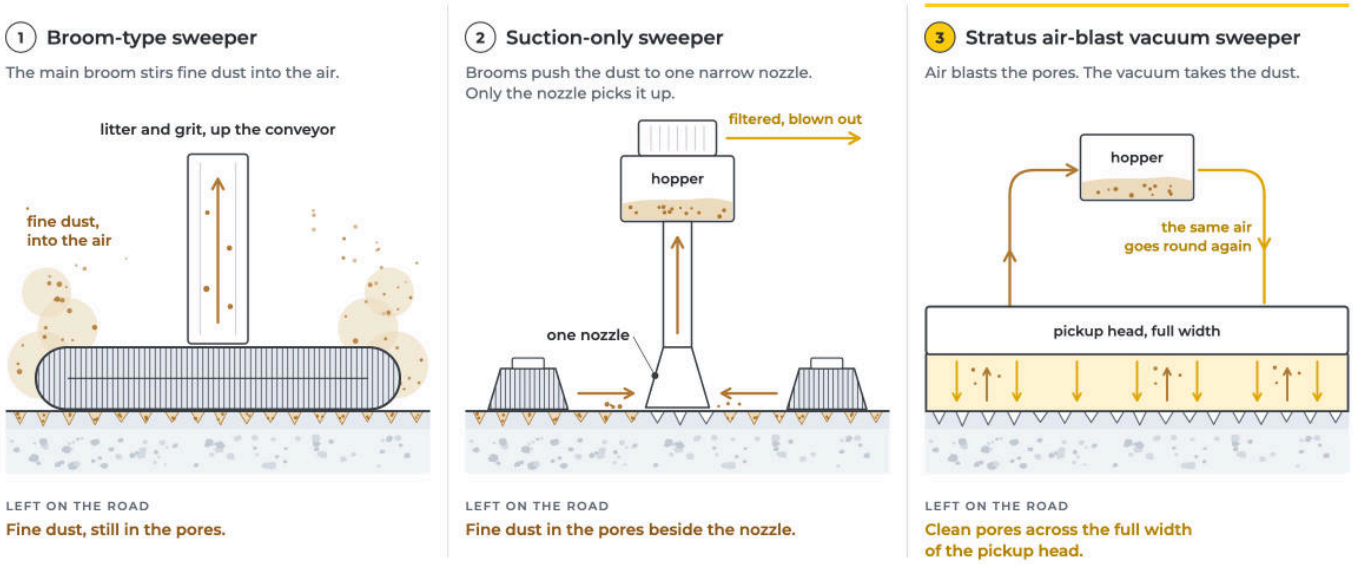


Stratus 330 at the kerb. Ahead of the head: leaves, litter and dust. Behind it: a clean strip.

02 THE METHOD

Three ways to sweep a road.

Street sweeping has been mechanised for nearly two hundred years. A sweeper lifts dirt from the road in one of three ways: a broom, suction, or regenerative air, the newest of the three. Regenerative air blasts air onto the surface and draws it straight back in a closed loop.



Drawn in principle, not to scale. Road texture enlarged.

HOW SWEEPING GOT HERE

1840s

Mechanical broom

Horse-drawn rotating brushes sweep city streets; motorised in the 1910s.

Around 1960

Vacuum

Suction, first tried on city streets in the early 1900s, becomes an established product.

1960s

Regenerative air

A closed loop of air: the newest of the three pick-up methods and among the most effective on fine dust.

The broom sweeper is still the most common type on the road. The Stratus is a regenerative air sweeper.

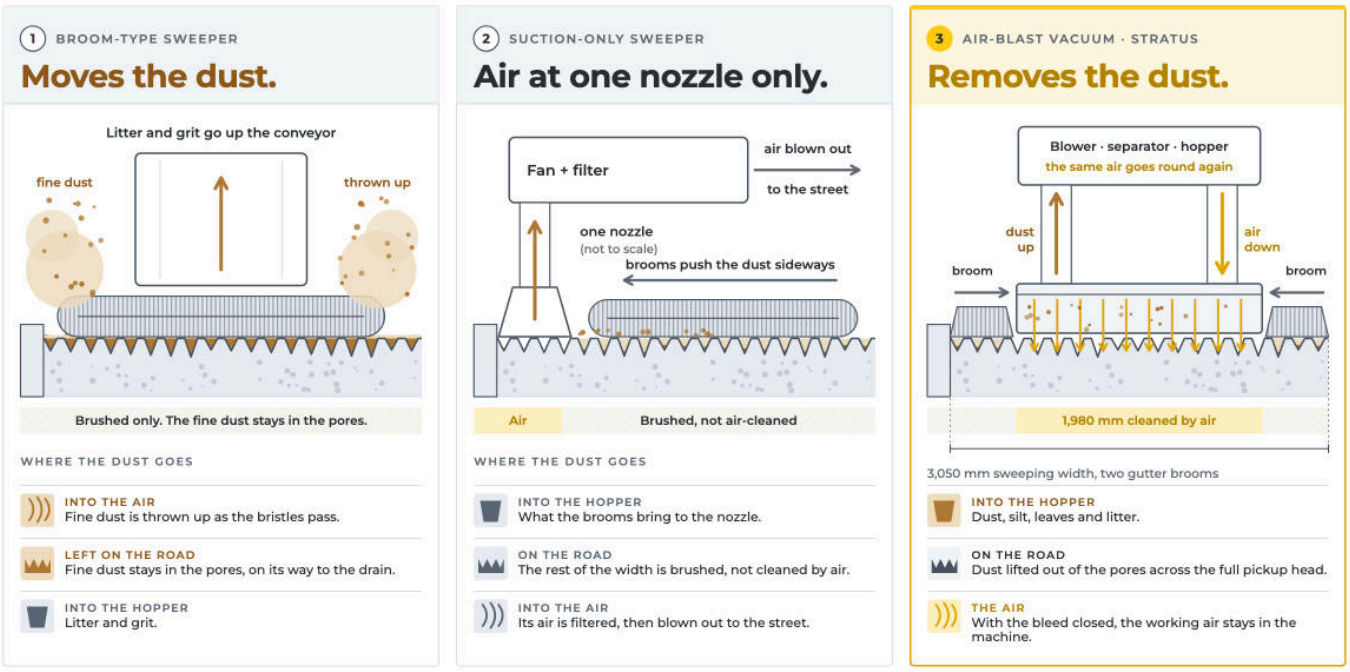
US EPA GUIDANCE

US EPA guidance finds regenerative-air and vacuum sweepers much more effective than broom sweepers at removing fine particles, down to PM10. Broom sweepers, it says, cannot effectively remove fines and often loosen them from cracks.

THE SAME ROAD, THREE MACHINES

Where does the dust go?

Three kinds of machine sweep India's roads, and they do three different things with the fine dust. Here is the same strip of road under each of the three.



The Stratus column is drawn from the Stratus 330: pickup head 1,980 mm inside a 3,050 mm sweeping width, to scale. The other two methods are drawn in principle, not to any maker's dimensions.

	BROOM-TYPE	SUCTION-ONLY	STRATUS AIR-BLAST VACUUM
How it picks up	A main broom throws material onto a conveyor.	Brooms push material sideways to one narrow nozzle.	**An air blast and a vacuum across the full pickup head.**
Fine dust	Thrown into the air, or left in the pores.	Brushed across most of the width.	**Lifted out of the pores and carried to the hopper.**
Width cleaned by air	None.	The nozzle only.	**1,980 mm of a 3,050 mm sweep on the Stratus 330. 2,250 mm of 3,500 mm on the 600.**
The air it works with	Not used for pickup.	Filtered, then blown out to the street.	**Goes round again. With the bleed closed it is not blown out.**
The result	**The dust is moved.**	**Most of the width is brushed.**	**The dust is removed.**



Stratus 330.

03 THE MACHINE

How does the Stratus take it off the road?

It blasts the dust loose with air and vacuums it away. One stream of air does the work: a blower drives it down to the road, it lifts the dust into the hopper, drops it there and goes round again. Engineers call this regenerative air.

Stratus 330 Diesel
AVAILABLE

3,050 mm SWEEPING PATH	1,980 mm CLEANED BY AIR	3.3 cum HOPPER
6 CAMERAS, STANDARD	1,500 L WATER TANK	88° TIP, HIGH DUMP

Stratus 600 Diesel and 600 CNG
ON SALE NOW

3,500 mm SWEEPING PATH	2,250 mm CLEANED BY AIR	6 cum HOPPER
6 CAMERAS, STANDARD	3,000 L WATER TANK	55° TIP, LOW DUMP

09 The closed loop
One stream of air, from the blower to the road and back.

10 The air knife
How the blast lifts dust out of the pores.

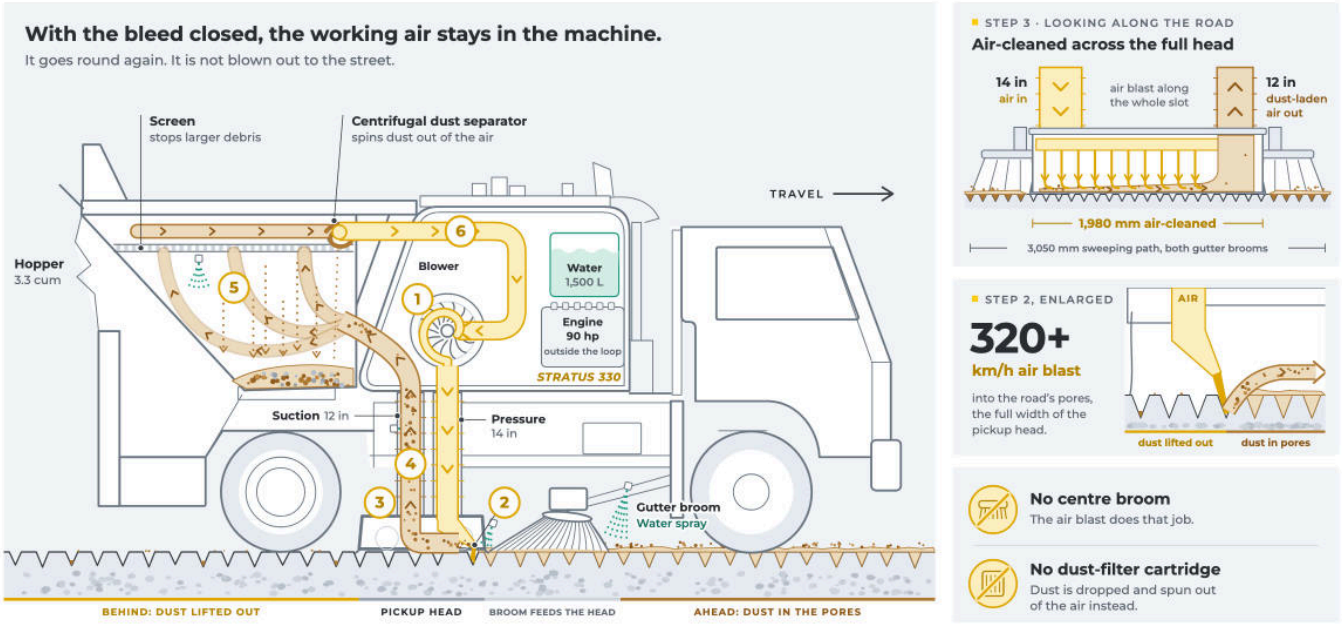
11 The hopper
Dust out of the air, and out of the machine.

12 Built in Pune
The materials, where the dust grinds and the water sits.

THE CLOSED LOOP

One stream of air, used again and again.

A blower pushes the air down to the road. It lifts the dust, carries it into the hopper, drops it there and goes round again. Follow it from the blower: each number on the drawing is a step below.



Yellow: working air. **Ochre: dust-laden air.** Teal dots: water spray. Schematic cutaway of a Stratus 330, not to scale; the inside layout is simplified to show the air path. On the machine the two hoses sit on opposite sides; here they are drawn side by side. Shown with the air bleed closed.

1

Blower drives

A Hardox blower drives the air down the 14 in pressure hose to the pickup head.

2

Air knife blasts

One slot, the full width of the head, sends a thin, fast sheet of air into the pores.

3

Vacuum lifts

Air, dust and debris leave the head by the 12 in suction hose, up into the hopper.

4

Hopper drops

The air slows and turns. Heavy material settles. A screen stops leaves and litter.

5

Separator spins

A centrifugal separator spins finer dust out of the air. Water sprays wet it down.

6

Air returns

The cleaned air goes back to the blower, and down to the road again.

ZeroExhaust mode

With the bleed closed, all the working air returns to the air knife. None of it is blown out to the street.

No filter cartridges

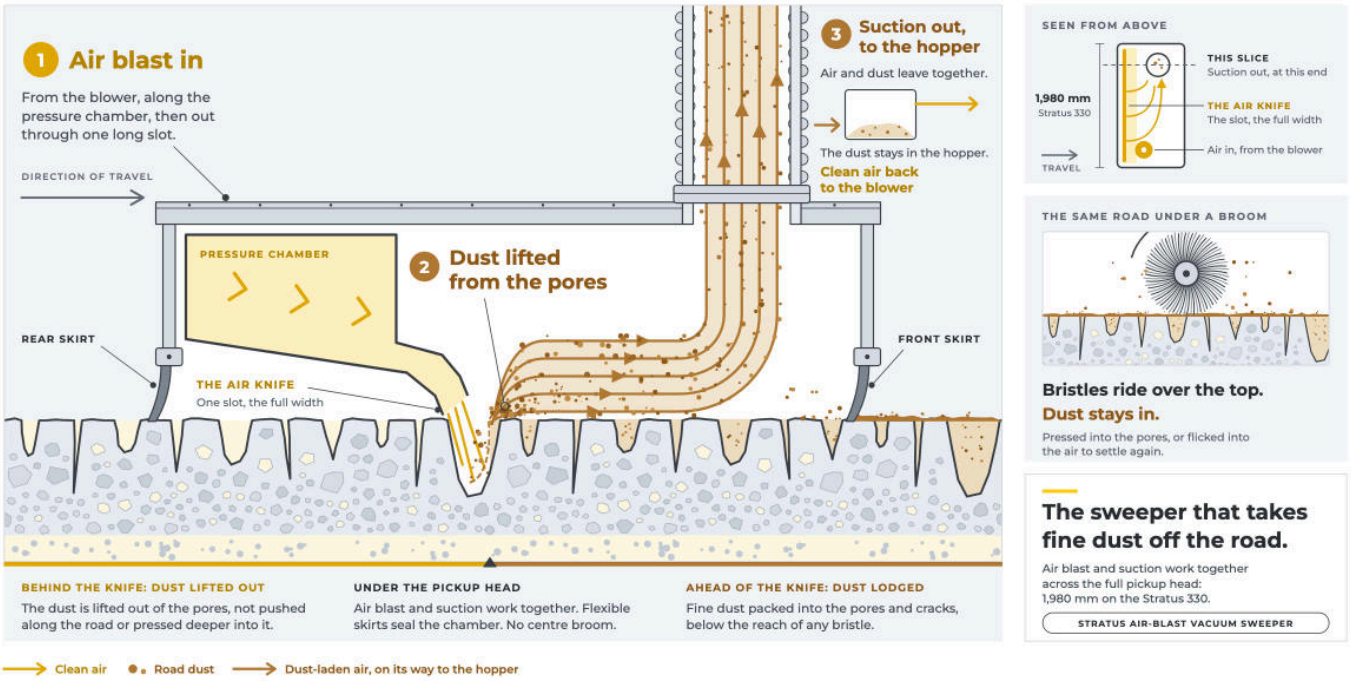
Nothing in the loop to load up with dust through a shift, or to soak in the monsoon.

No centre broom

The air blast does the job of a centre broom, so there is none to wear out or to throw dust up.

AT THE ROAD SURFACE · THE AIR KNIFE

A sheet of air at 320+ km/h, into the pores of the road.



Drawn in principle, not to scale: the road texture is enlarged, the head is shortened and the slot is drawn wider than it is. The slice is cut at the suction end of the pickup head. Pickup head width from the Stratus 330 specification.

StormForce air-knife pickup

The air lifts the dust out of the pores.

The blower feeds a chamber the width of the pickup head. Its only way out is one slot, about half an inch (13 mm) wide. Squeezed through it, the air becomes a thin, fast sheet aimed into the road.

SuperFine finish

Air goes where bristles ride over the top.

A broom is made to move what it can touch. Fine dust sits below the bristles, packed in the pores. The air sheet drives in and throws it up into the stream.

Sealed to the road

The blast and the dust stay inside the head.

Flexible skirts front and rear seal the head to the road. The stream crosses under the full width and leaves by the suction hose. The head works forward and in reverse.

Broomless sweeping mode

Where the kerb is clear, brooms up.

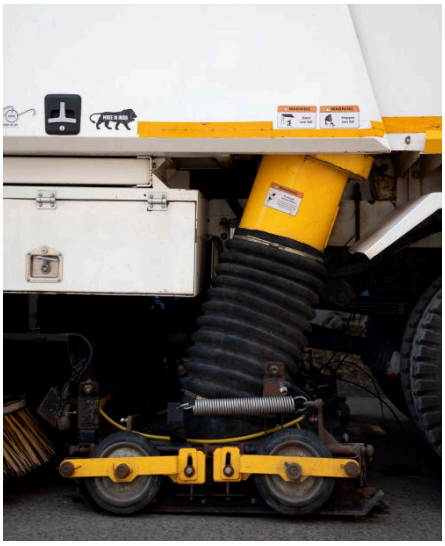
Broomless mode can be activated when wanted: gutter brooms raised, the head sweeping on air alone across 1,980 mm on the 330 and 2,250 mm on the 600.

The bleed, set from the cab.

Full blast for dust and silt, a gentler setting for leaves. The operator sets the air bleed anywhere from 0 to 100% from the cab. At 0% all the working air returns to the air knife; opening the bleed lets some out, and the blast at the road is softer.

IN THE HOPPER · SEPARATION AND UNLOADING

Dust out of the air, without a filter cartridge.



Stratus 330: the suction hose and transfer duct, on the way to the hopper.

HOW THE AIR IS CLEANED, WITHOUT A FILTER

1. **In through a Hardox duct**
   Air, dust and debris come up the 12 in suction hose and into the hopper.
2. **It slows, and the heavy material drops**
   The hopper is wide, so the air slows and turns. Grit and silt settle on the floor.
3. **A screen stops the litter**
   Leaves, paper and litter are held back in the hopper.
4. **A separator spins out the fine dust**
   A centrifugal separator throws finer dust out of the air. Water sprays wet it down.
5. **Clean air goes back to the blower**
   And down to the pickup head again. The dust stays in the hopper.

PowerHold sustained suction

No filter cartridges in the air path.

A dust cartridge loads up as the shift goes on and starves the airflow. The Stratus has none to clog: the air is cleaned by settling, a screen, a centrifugal separator and water.

MonsoonReady all-weather sweeping

Sweeps wet roads as well as dry ones.

There are no dust cartridges to get soaked. The machine works through the monsoon, when the silt on the road is on its way to the drain.

AT THE END OF THE SHIFT

Tip it, shake it, wash it.

Tip high, or low

The 330 tips its 3.3 cum hopper to 88° and discharges 8 ft from the ground, into a tipper or a container. The 600 tips 6 cum to 55°, at 1,650 mm (Diesel) or 1,500 mm (CNG).

PowerShake clears the floor

The main door opens itself as the hopper rises. A shaker motor, worked from a pendant button, shakes wet, sticky silt loose so it slides out with the rest.

Wash at the dump point

A 100 bar washer is on board. Its lance sits beside the dumping controls, so the crew washes the hopper and the machine where it unloads.

Three doors, one session

The hopper, the screen and the centrifugal separator open through three access doors and are cleaned together. A bottom drain lets the wash water out.



Stratus 330: the hopper tipped high to unload.

THE ENGINEERING BEHIND IT

Every surface chosen for what it has to suffer.

The Stratus is engineered by Spruce Up's teams in the USA and India and built in Pune, for Indian roads, dust loads, monsoon and heat. Where the dust grinds, where the water sits and where the parts wear, the material is picked for the job.



DuraBuild: Hardox where dust grinds

The blower is Hardox wear-resistant steel, and a Hardox duct carries the stream from the suction hose into the hopper. Shown: the blower.



Stainless steel where water sits

The hopper and the water tanks are stainless steel. Spray water is filtered in stages before it reaches the nozzles. Shown: the hopper's side door.



Parts replaced one by one

Skids, skirts, liners and broom bristles are changed singly, without scrapping the assembly around them. Shown: a gutter broom.

SPRUCE UP NORTH AMERICA · NEW JERSEY

Designed in the USA and India. Built in Pune.

Spruce Up North America, in New Jersey, is the US side of the Stratus design team. Design, components and benchmarking draw on the USA; the machine is engineered with the team in India and built in Pune.

04 THE EVIDENCE

The method is proven.

Independent tests of regenerative air sweeping, the method the Stratus is built on, show that it takes fine dust off the road. They weighed the dust on the road before the sweeper passed and after.

UNIVERSITY OF TORONTO · FIELD STUDY

76%

of road dust under 10 µm removed

On five main roads, one pass removed on average 76% of the dust finer than 10 micrometres lying on the road: the size counted as PM10 once it is in the air.

CITY OF TORONTO · CONTROLLED TEST

90%+

of a fine test dust removed

Eight sweepers on an enclosed track. The regenerative air sweeper removed the most fine dust and put the least back into the air and onto the footpath.

Both are independent tests of regenerative air sweepers made by other manufacturers.

How the Toronto study measured it.

01

Before

A 2 m by 2 m patch by the kerb is vacuumed just before the sweeper passes.

02

After

A neighbouring patch is vacuumed just after one pass.

03

Dry and weigh

Each sample is dried, so water adds no weight, and weighed in grams per square metre.

04

Sieve and compare

The dust is sorted by grain size, down to under 10 µm. Before minus after is what one pass removed.

To see the Stratus sweep, ask for a demonstration (page 19).

DUST CONTROL · WATER AND AIR

Water holds the dust down at every stage.

The air blast takes the dust off the road. Water keeps it from rising on the way: 29 spray nozzles, in zones from the kerb to the hopper, each zone switched from the cab.



Behind a Stratus 330: one swept strip, and no dust hanging in the air.

Economy or Max, zone by zone

Only the water the road needs.

Each spray zone is set high or low on its own switch. A heavy, dry stretch gets Max at the brooms while the other zones stay on Economy.

ClearFlow filtered water

Clean water keeps nozzles spraying.

Water passes a bag filter with two mesh and two screen filters before any nozzle, and is held in stainless-steel tanks: 1,500 L on the 330, 3,000 L on the 600.

AirPause

No blast when it is not sweeping.

The fan's discharge is closed while the machine starts, stops or unloads, so the head does not stir up dust between runs.

Water that protects itself

The pump shuts off before the tank runs dry.

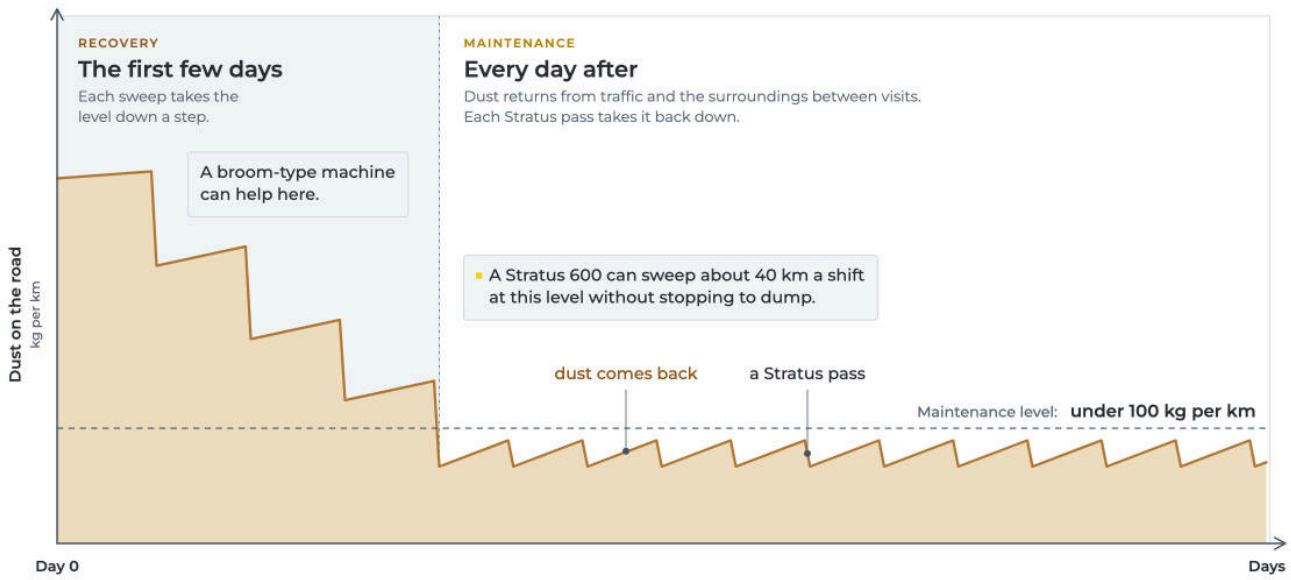
An automatic low-water cut-off protects the pump, and the water level shows in the cab, so the sprays are not lost halfway through a run.

Designed to the world's strictest sweeper dust standard, the tunnel test used in California, with water suppression and a closed air loop instead of filter cartridges.

RECOVERY, THEN MAINTENANCE

First bring the road under control. Then keep it there.

A road that has gone unswept takes its first few days to come down. After that, an air-blast vacuum sweeper keeps it there, pass after pass.



Planning picture, not a measurement. The line is drawn in principle. Under 100 kg of dust per km and about 40 km a shift on a Stratus 600 without dumping are Spruce Up's own planning figures, not test results.

Recovery: the first few days

Take the heavy load off, a step at a time.

An unswept road carries silt, grit and litter as well as fine dust. Each sweep takes the level down a step. A broom-type machine can help here, with the heavy material.

Maintenance: every day after

Keep the fine dust from building up again.

Traffic and the surroundings bring dust back between visits. Each Stratus pass takes it back down, fine dust included, so the road stays under the maintenance level.

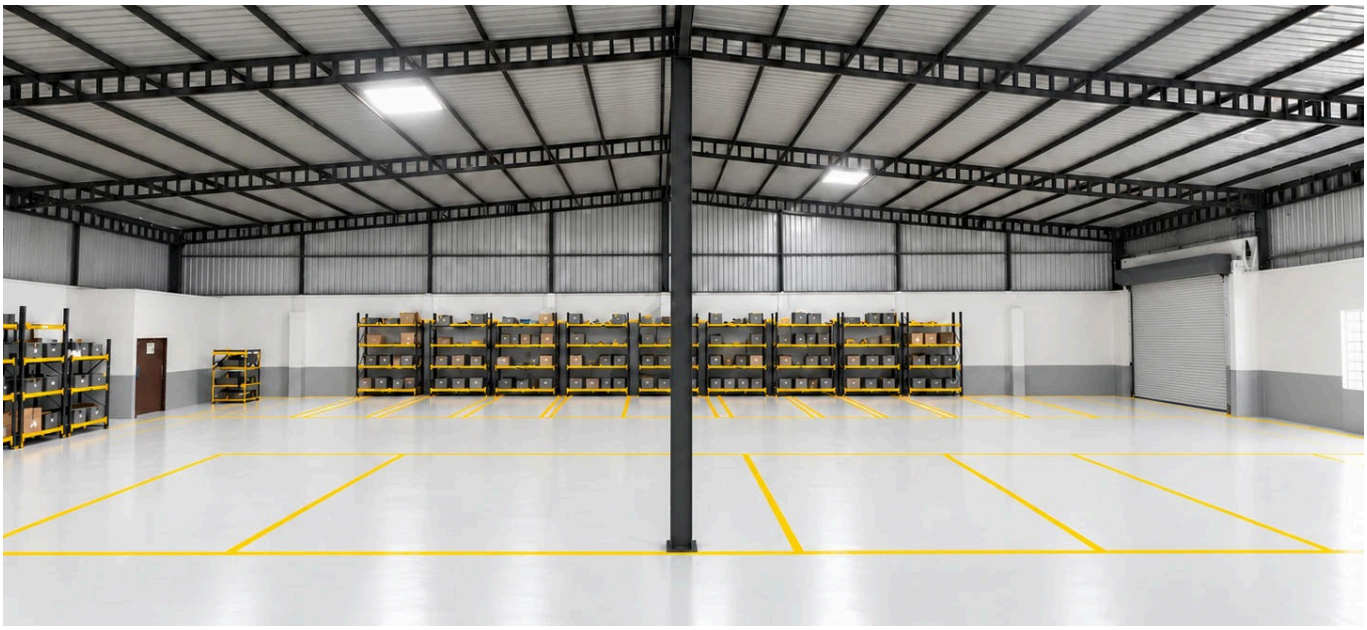


Stratus 330: the operator runs the sweep from the cab, shift after shift.

AFTER SALES · MADE AND SUPPORTED FROM PUNE

Your machines. Our commitment.

A sweeper earns its keep on the road, shift after shift. We build the Stratus in Pune and support it from here: parts on the shelf, our own engineers, and help on a video call.







Spruce Up factory and parts store, Pune

PEOPLE

Operator training with every delivery

Your operators learn the machine from the people who built it.

We service what we build

Spruce Up's own service team looks after the machines it builds.

Video-call support

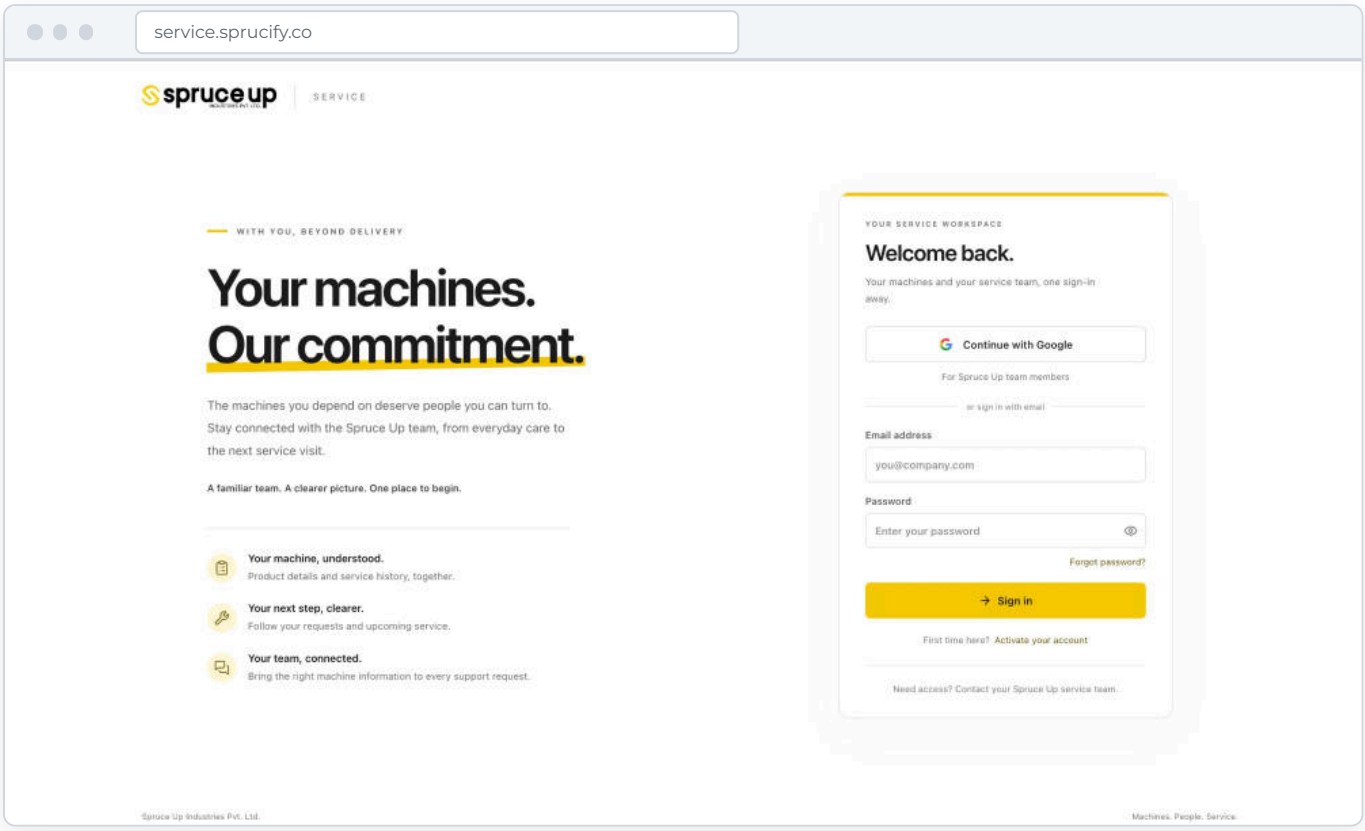
Our engineers look at the problem with your team on a video call.

Support from India

Our engineers and parts are here, so there is no wait for imports.

OUR AFTER-SALES SYSTEM

The Spruce Up Ready System.



ReadyConnect at service.sprucify.co

AVAILABLE

ReadyConnect

ReadyConnect: service.sprucify.co

Our support layer: an online platform where each client books service, views machine logs and scheduled servicing, buys parts and reaches our team, with video-call support from our engineers.

AVAILABLE

ReadyParts

The right part, in stock

We stock parts in Pune and ship them across India, ready to go. Order through ReadyConnect or the parts shop.

COMING

ReadyGuide

Practical operating and service guidance for operators and technicians, matched to the machine.

COMING

ReadySense

Early warning of developing problems, so the team knows what to do next.

Warranty and annual maintenance contracts are as set out on spruce-up.com.

SPECIFICATION

The figures behind the method.

	STRATUS 330 DIESEL	STRATUS 600 DIESEL	STRATUS 600 CNG
Sweeping path, two gutter brooms	3,050 mm	3,500 mm	3,500 mm
Width cleaned by air	1,980 mm	2,250 mm	2,250 mm
Suction hose / pressure hose	12 in / 14 in	12 in / 14 in	14 in / 14 in
Blower	Hardox, 80 mbar suction	Hardox, 80 mbar suction	Hardox, 80 mbar suction
Hopper	3.3 cum, stainless steel	6 cum, stainless steel	6 cum, stainless steel
Dump height, tipping angle	8 ft from the ground, 88°	1,650 mm, 55°	1,500 mm, 55°
Gutter brooms	2 × 850 mm, hydraulic	2 × 850 mm, hydraulic	2 × 850 mm, hydraulic
Water and spray nozzles	1,500 L stainless, 29 nozzles	3,000 L stainless, 29 nozzles	3,000 L stainless, 29 nozzles
Sweeper engine	Perkins diesel, 90 hp	Perkins diesel, 90 hp	Ashok Leyland CNG, 144 hp
Cameras	6 on 2 screens, standard	6 on 2 screens, standard	6 on 2 screens, standard
Sweeping speed	5 to 10 km/h	5 to 10 km/h	5 to 10 km/h



Stratus 330



Stratus 600, rendering

Figures from the Spruce Up specification sheets for the Stratus 330 Diesel, Stratus 600 Diesel and Stratus 600 CNG. Photographs show the Stratus 330; the Stratus 600 is shown in a rendering.



NEXT STEP

Ask for a demonstration.

A drawing explains a method. A demonstration shows it. Watch the Stratus sweep, then judge it on four things.



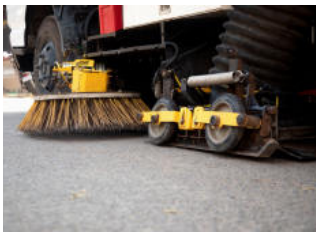
01 The road behind it

Look at the swept strip and the kerb channel after one pass. The road surface should look clean, not a smear of dust pushed along.



02 The hopper

Open it after the run. You should find dust, silt, leaves and litter in it, wetted down, and not only the large pieces.



03 The air at the head

Stand beside the pickup head as it works. The dust should go up the hose, not out from under the skirts.



04 The water

Ask for each spray zone to be switched from the cab: brooms, pickup head, suction tube, hopper. Watch the water hold the dust down where the brooms work.

SPRUCE UP INDUSTRIES

Talk to Spruce Up.

See it sweep · We service what we build · Operator training with every delivery

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Stratus 330 sweeping in dry, wet and rainy conditions
Spruce Up on YouTube · 7:05

SEE IT IN ACTION

Watch the Stratus 330 at work

Scan, or visit youtu.be/H6QVljeCDMk

The Stratus range: Stratus 330 Diesel (available) · Stratus 330 CNG (coming) · Stratus 600 Diesel and Stratus 600 CNG (on sale now; the 600 CNG runs truck and sweeper on CNG) · Stratus 600 Airport and Stratus 900 (coming). If you need help choosing, we can carry out a road site analysis and give you a report.

Sources. IIT Kanpur, source study of Delhi's air, 2016 · TERI, source study of Lucknow's air, 2024 · Commission for Air Quality Management, Delhi-NCR, 10 February 2026 · Das and Wiseman, University of Toronto, Environment International 187 (2024) 108697 · City of Toronto, Clean Roads to Clean Air, 2004 · US EPA, Parking Lot and Street Sweeping fact sheet, EPA-832-F-21-030J, December 2021 · History of sweeping: US patent 3,512,206 (1970), Science Museum Group, US EPA · Machine figures: Spruce Up specification sheets.



spruce up
INDUSTRIES PVT. LTD.

Machines that Spruce Up the world.

We design and build state-of-the-art machines for the problems that matter: garbage, dust, air pollution, water-logging.

2015	350+	60+	24	5
BUILDING MACHINES SINCE	MACHINES DEPLOYED	MUNICIPALITIES	STATES	COUNTRIES

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