



**Why invest in autonomous cleaning?**



## A guide to determining your readiness for autonomous cleaning, calculating your total cost of ownership, and identifying the most beneficial features when selecting a solution

If your business could benefit from:

- Adding members to your janitorial team without increasing your payroll
- Maximizing your cleaning efficiency while also lowering associated costs
- Improving the reliability, consistency, and quality of your floorcare routine

...then autonomous solutions are a logical step into the future of intelligent cleaning.

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For many businesses, labor shortages impede the ability to maintain a high level of cleanliness – and cleanliness matters more than you might realize. A [recent Ipsos poll](#) found that 92% of consumers consider cleanliness to be an important factor when deciding whether to become repeat customers.

### **Other findings from the same survey:**

- 95% of consumers agreed with the statement: “To me, cleanliness can elevate a good business into a great business.”
- 90% said that if they read a negative review about the cleanliness of a business, they would “seriously consider not going there/ using their services.”
- 77% consider stains on flooring or carpeting to be disturbing.

## The value of clean across industries

**Airports:** A 2017 report by Airports Council International identified cleanliness as a “threshold need,” meaning that it is a must-have for passenger satisfaction. This is important because [satisfied passengers spend 45% more money](#) in a terminal than disappointed passengers.

**Education:** [88% of students say that insufficient cleanliness distracts them from learning](#), according to a national survey by researchers at APPA and BYU.

**Healthcare:** Cleanliness is not only a consistent driver of patient satisfaction in the [Hospital Consumer Assessment of Healthcare Providers and Systems Survey](#), but if patients believe a hospital is unclean, [they will assume they're at greater risk of developing associated infections](#) – an assumption that is often correct. In addition, they won't recommend the hospital to others.

The bottom line is that cleanliness impacts your bottom line. That's why many organizations, from shopping malls and airports to schools and hospitals, are incorporating autonomous equipment into their cleaning fleets.

This guide will help you decide whether an autonomous solution is right for you. The following pages describe:

- Advantages of autonomous cleaning solutions
- An assessment to help you determine if autonomous cleaning is a good fit for your business
- Tips for calculating the total cost of ownership (TCO) and return on investment (ROI) for autonomous cleaning equipment
- Recommendations for features to consider

### Facilities That Are Ideal Fits for Autonomous Cleaning

- Airports
- Shopping centers
- Retail establishments
- Educational facilities
- Office buildings
- Expo centers
- Hotels
- Hospitals

# 01

## Advantages of autonomous cleaning solutions

Compared to traditional cleaning equipment, autonomous machines represent a significant initial investment, but they instantly enhance the quality of clean you can achieve by boosting the productivity of your labor force. The result is improved performance, both immediate and long-term. For example, in a recent pilot study, one school district concluded that an autonomous floor scrubber would provide a high school with the equivalent performance of an additional custodian, while saving the district \$200,000 in wages over a 10-year period.



## 01 Advantages of autonomous cleaning solutions

The job market for janitorial workers is growing quickly. The Bureau of Labor Statistics predicts that through 2028, [employment for janitors and building cleaners will grow 7%](#), which is faster than the growth expected across other occupational markets. This growth will exacerbate the current labor shortage within the janitorial industry, where teams often work at a staffing rate of only 70-75% and employee turnover is frequently cited at levels as high as 200%.

### Free up personnel for higher-value tasks

The foremost challenge facing janitorial departments is tight scheduling, especially when teams are understaffed; boxes on cleaning checklists are frequently left unchecked.

A related problem is that human resources are often used ineffectively. If it takes 4 hours to scrub a floor, that means a team member is typically required to push or ride a scrubber for all 4 of those hours, during which they could instead be handling tasks that need a human touch.

Autonomous cleaning solutions can handle the same tasks as additional team members – and they don't mind boring work. They perform repetitive, time-consuming tasks, such as large-area floorcare, without supervision – allowing personnel to focus on higher-value tasks like restroom sanitation. Their ability to deliver consistent performance enables cleaning teams to handle a greater number of tasks, and deliver a higher standard of clean, all on a regular basis.

### Achieve consistent, reliable cleaning results

People aren't perfect. Research shows that whether operators use manual or automated floor-cleaning equipment, they typically miss close to 15% of a space, be it on account of skipping aisles or overlooking corners.

By comparison, autonomous solutions use advanced technology to deliver between 98%

and 99.5% coverage. Your on-site operators can easily program cleaning routes by driving around the perimeter of an area to be cleaned, after which a machine will repeat the given path until directed otherwise. Alternately, they can let the machine calculate the most efficient cleaning path on its own, which not only guarantees full coverage, but also eliminates double-cleaning.

### **Lower your operational costs**

Autonomous solutions do require a higher up-front investment than user-operated equipment, but the payback period is short, and your cleaning-operation costs will decrease as a result.

The two factors that determine your payback period are your cleaning frequency and your full-burden labor cost, which can account for [as](#)

[much as 90%](#) of cleaning costs. The more you clean, and the higher your associated labor costs, the faster an autonomous machine will pay for itself – you have effectively added a team member without adding any labor costs. For facilities that are cleaned every day – like shopping malls, airports, and big-box stores – the payback period typically ranges from 14 to 24 months.

### **Support sustainability initiatives**

Sustainability is increasingly important for businesses across all industries. A plethora of research shows that consumers care about a company's environmental impact, and that they spend their money accordingly. In [the CPG space](#), for example, consumers are not only willing to pay more for products that are environmentally friendly – they are also willing to boycott products that are not.

Autonomous cleaning machines can support your sustainability initiatives in a variety of ways, leveraging advanced systems to save on resources like water and chemicals, or saving electricity by operating in complete darkness.

For more information about these features, please consult the final section of this guide.



## 02

# Is autonomous cleaning right for you?

The [industrial-robot market](#) is expected to be worth [\\$60 billion by 2026](#), and autonomous machines are making their way into environments ranging from high schools to the largest distribution centers.



## 02 Is autonomous cleaning right for you?

The short questionnaire below will help you determine whether autonomous cleaning is right for you.

If you answered “yes” to most of these five questions, then an autonomous cleaning machine would be a boon for your cleaning program.

### Autonomous Cleaning Solution Readiness Questionnaire

- Is a high standard of clean critical for your business?
- Does your cleaning team struggle to complete all of their tasks on a regular basis?
- Would your facility benefit from an extra janitor?
- Do you have large, open areas (e.g., atriums, walkways, hallways, gymnasiums) that require frequent cleaning?



## 03

# Calculating TCO and ROI for autonomous cleaning equipment

Autonomous cleaning equipment is an investment, and you need to be confident you're your investment will pay off. This section provides guidelines to help calculate your total cost of ownership (TCO) and your expected return on investment (ROI).

### 03 Calculating TCO and ROI for autonomous cleaning equipment

#### Determining your TCO and ROI

Over the past year, prices for autonomous cleaning solutions have declined significantly. Machines were previously considered practical for only the largest, most cleaning-intensive facilities, are now considered cost-effective for locations ranging from high schools to airports.

The specifics of your TCO and ROI depend on your facility's needs, your staff, and your cleaning goals. As mentioned earlier, your cleaning frequency and full-burden labor costs determine the time to ROI for autonomous equipment, which typically falls between 14 to 24 months. To put that into context, the expected lifespan of the equipment is 10 years.

The following table shows the major costs and savings associated with purchasing new autonomous equipment.

#### Factors to Consider When Calculating Total Cost of Ownership

Costs	Savings
– Initial price	– Labor/productivity
– Operation	– Equipment lifespan
– Maintenance/ replacement parts	– Water/detergent usage
– Repairs	– Flooring lifespan

#### Floor Scrubber Productivity\*

Cleaning method		Square feet per hour (est.)
Walk-behind scrubber	20" scrubber	9,740
	28" scrubber	13,009
	38" scrubber	17,655
Rider scrubber	28" scrubber	17,963
	32" scrubber	20,408
	36" scrubber	22,989
Autonomous scrubber	20" scrubber	up to 18,000

*\*Note: These are just a few examples of equipment frequently used for cleaning facilities; there are many other options available. A Nilfisk cleaning expert can help you calculate ROI according to your unique needs.*

Since labor accounts for 90% of cleaning costs, the greatest savings will come from more efficient use of your human resources. The following table shows some guidelines for equipment productivity, which you can use to estimate your labor savings.

Purchasing an autonomous cleaning machine equates to hiring an extra member for your janitorial team – one that never calls in sick. The amount of money this will save you, over time, depends on your full-burden labor cost, which varies according to several factors (e.g., the state where you are located, the benefits you offer, etc.).

### 03 Calculating TCO and ROI for autonomous cleaning equipment

Here is a hypothetical example of how to calculate ROI:

- Area to be cleaned: 45,000 ft<sup>2</sup>
- Time to clean: 3 hours
- Cleaning frequency: 5x/week
- Full-burden labor cost = \$22.50

Labor required for an employee, using a walk-behind or ride-on scrubber to clean this area for a full year:

3 hours x 5 cleanings	15 hours/week
15 hours x 52 weeks	780 hours/year
780 hours x \$22.50	\$17,550
<b>Total annual labor costs</b>	<b>\$17,550</b>

**The labor cost for cleaning this single area is \$17,550 per year.**

As the table above makes clear, an autonomous machine can clean this area in roughly the same amount of time as a person using a standard floor scrubber. In essence, you can essentially double your cleaning productivity during those 780 hours, while maintaining the same labor costs as you would with a single team member. If this is the only area where your autonomous cleaner works – meaning you only use it part-time – your time to ROI will be roughly 3 years; each additional hour worked will shorten your payback time.

## Do Autonomous Cleaning Machines Replace Human Workers?

There is concern that autonomous machines will take jobs away from human workers. In truth, operational digitization has changed the jobs performed by employees, but it hasn't taken them away.

Example: Amazon recently deployed around 200,000 robots in their warehouses and distribution facilities. At the same time, they hired 300,000 more people, and committed over \$700 million to training their existing workforce in preparation for the digital age.

Jeff Wilke, the company's worldwide consumer CEO, [commented](#):

"What's happened is...we've added more... [jobs] that require more human work and judgment in certain areas, but we can add robots to do some things that humans would just have to repeat over and over again."



This same pattern is apparent in the cleaning industry. For various reasons, be it a shortage of workers, high employee-turnover, or rising absenteeism, the world's cleaning workforce is chronically understaffed. Companies struggling to achieve their desired level of cleanliness can use autonomous solutions to enhance the productivity of existing teams. As an example, an autonomous scrubber can take over a 4-hour task previously assigned to an employee, allowing them to spend those 4 hours accomplishing a different task, such as deep-cleaning of restrooms, classrooms, or concessions areas.



## 04 What to look for in autonomous cleaning equipment

Thanks to advances in robotic technology, autonomous cleaning equipment has come a long way since the first machines started to appear on the market. Today's best-in-class solutions provide high-quality cleaning results, easy use, and features that help companies meet business initiatives like sustainability goals.

## 04 What to look for in autonomous cleaning equipment

### Multiple modes with easy on-site programming for consistency and flexibility

In the past, autonomous equipment was fairly rigid in terms of accessibility; programming or reprogramming a route would require an engineer, and sometimes the facility itself would need to be modified. This is no longer the case; today's autonomous scrubbers can easily be programmed and reprogrammed, on site, by the operator.

The Nilfisk Liberty SC50 autonomous scrubber is a unique market solution, because it offers three different cleaning modes:

- **CopyCat:** The operator programs the cleaning path by performing a single manual ride-through, after which the machine replicates the path across subsequent cleanings.
- **Fill-in:** The operator rides once around the perimeter of the cleaning site, and then the machine fills in the middle. The Liberty SC50 is the only autonomous scrubber on the market that can automatically calculate the most efficient cleaning path for a given area.
- **Manual:** The operator uses the machine like any other, performing manual and ad hoc cleaning tasks (e.g., picking up spills).

Together, these modes provide flexible, efficient cleaning for any environment.

### Long runtime with minimal supervision

Nilfisk believes autonomous machines should be truly autonomous; once operation is initiated, they should be able to accomplish a job without constant oversight by an operator. The Liberty SC50 can operate independently for up to 6 hours on a single charge, which is long enough to clean even the largest spaces without interruption. When the job is done, or if the machine needs assistance, it sends the operator a text message.

### Third-party certified safety features

Although autonomous scrubbers clean floors on their own, they can often be required to work in areas where people are present. This means that they must be certified for safe operation.



In January 2018, the first safety standard intended specifically for robotic floor-cleaning solutions came into effect. Developed by the American National Standards Institute (ANSI) and the Canadian Standards Association, this standard requires all robotic floorcare machines sold in the United States and Canada to meet certain safety requirements related to the following functions:

- Parking brakes
- Maximum speed
- Stopping distance
- Obstacle detection
- Abrupt surface-fall detection
- Critical-zone detection
- Obstacle avoidance
- Machine-start audio signal

The Liberty SC50 is the only autonomous floor scrubber that is third-party certified to both North American and EU safety standards.

[Learn more about safety standards and third-party certification from Nilfisk senior vice president Torben Lund Andersen.](#)

### Green cleaning features

Your floor scrubbing equipment can play an important part in your sustainability initiatives by minimizing use of energy, water, and chemical detergents.

The Liberty SC50 has several environmentally-friendly features:

- **Low-/no-light cleaning** – Because it uses infrared sensors, the machine can clean in the dark, saving energy during night cleaning.
- **SmartFlow™** – Most scrubbers apply the same amount of water and detergent, regardless of vehicle speed or cleaning location. This typically results in excess solution being dispensed when the machine moves more slowly, such as during turning movements. SmartFlow technology changes the flow rate based on the machine's speed, which reduces usage of water and chemicals, ensuring the machine doesn't leave behind any wet areas that could be slippery, and extending runtime by as much as 67%.
- **REV™ Random Orbital Scrubbing Technology** – REV is the only scrubbing system that uses distinct orbital and rotational motions, which allow it to clean more effectively with less solution. This feature further lowers cleaning costs by extending the life of the pad by as much as 250%.
- **EcoFlex™** – EcoFlex allows the operator to control how much detergent is used, so you never use more than is needed. It provides options for "water only," "ultra-low detergent," and "standard detergent." There is also a "burst of power" option, providing 60 seconds of maximum-power cleaning for jobs requiring extra effort.

[Learn more about the technologies in this section, and other innovations, at Nilfisk.com.](https://www.nilfisk.com)

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We hope this guide has provided you with ideas and tools for deciding when to invest in autonomous cleaning equipment. If you'd like to learn more, [visit our website](#). Our team is available to help you assess your needs, calculate your total cost of ownership and return on investment, and join the intelligent cleaning revolution.



