

Minuteman RoboScrub Method Bulletin

Powered by BrainOS®

Maximizing Efficiency. Minimizing Costs.



INTRODUCING YOUR ROBOTIC SCRUBBER

A SMART, SAFE, AUTONOMOUS FLOOR CARE SOLUTION

Minuteman represents the next generation of robotic floor care. Minuteman is an advanced vision-based scrubbing system capable of navigating complex, real-world environments. Minuteman has partnered with leading commercial software companies to create best in class, self-driving floor care machines.

WHY A SELF-DRIVING SCRUBBER

- Allows janitorial staff to focus on higher value cleaning tasks
- Maximizes efficiency and lowers operational costs
- Ensures greater reliability and more consistent floor cleaning performance
- Elevates janitorial skills by offering a robot operator certification program

HOW YOUR ROBOTIC SCRUBBER WORKS NAVIGATING COMPLEX ENVIRONMENTS DESIGNED FOR THE REAL WORLD

Minuteman's revolutionary AI floor care technology delivers a reliable and consistent clean, helping address labor shortages.

This process guide serves as a training and reference manual to help you achieve a good understanding of your robotic scrubber and the deployment process. This document details the process and best practices for getting the most out of your Minuteman robotic scrubber. This guide also provides tips and tricks to keep in mind when working with your Minuteman scrubber.

ROBOTIC SCRUBBER ON-SITE INSTALLATION

SITE DEPLOYMENT AND SETUP

Please carefully review the outline below, as this document prepares you for a successful deployment.

YOUR DEPLOYMENT TEAM

Your deployment team will provide routine communication and updates as the deployment progresses. Once the deployment is complete and your **robotic scrubber** is fully operational, there will be an official hand off from the deployment team to service and support.



PROCESS OVERVIEW

Your deployment team will contact you prior to delivery to coordinate logistics and answer any questions.



- Deployment and training ranges from a 3-5 day process, depending on the size of your facility.
- The instruction process is designed as a “Train the Trainer” program. That is, we will train your staff to train other robot operators. Please be sure to identify your in-house trainer(s) prior to the start of deployment.



- Your **robotic scrubber** comes with 10 Home Location Codes. These need to be affixed to a wall or other flat surface. All cleaning routes start and end at these codes.



- Home Location Codes are required for use:
 - » Up to 6 cleaning routes can be associated with each Home Location Code. 10 Home Location Codes are included with each robotic scrubber, giving you a total of 60 possible cleaning routes.



- Your deployment team will train you on how to optimize routes.
- Best practices for your environment will be reviewed.
- Once training has been completed, a signature confirming receipt of the robotic scrubber is required.

TIMELINE AND AGENDA

Below are the steps that make for a successful deployment at your facility.



1. Identify the area where you plan to house and charge your **robotic scrubber**.
2. Un-crate, set up and test your **robotic scrubber** to ensure proper operation.
3. Trainee introductions and overview.
4. Walk the areas targeted for cleaning and discuss scope of work (cleaning routes and optimal times).
5. Product overview.
6. How to pair a phone for alerts.
7. Begin mapping and teaching cleaning routes.
8. Test routes to ensure best operational performance.
9. Observe and recap best practices.
10. Discuss workflow considerations with staff including working in parallel.
11. Administer Robot Operator Certification quiz on-site.
12. Review service and preventative maintenance.

The deployment process includes follow up by phone and possibly a return visit to ensure proper usage.

TEACH CLEANING ZONES

If your **robotic scrubber** will be cleaning a particularly large space, such as a warehouse, large retail store or distribution center, it's best to create multiple, smaller cleaning zones within the space, rather than one long route encompassing the entire space.

This approach creates more manageable cleaning routes. It also allows for effective planning and space usage and prevents unnecessary low water alerts. By creating multiple cleaning zones, you can ensure that the zone your **robotic scrubber** will be cleaning on a given day or time is free of obstacles and clutter, while leaving other areas fully functional.



PLAN FOR SPACE AND FREQUENCY

It's important to consider space type when planning cleaning routes. For instance, it's a good idea to identify spaces that might need to be cleaned more frequently or on an ad-hoc basis and create individual routes for such spaces. Examples include an entrance way, lobby, or heavily traveled artery that might need to be cleaned more frequently. This warrants its own separate cleaning route, versus being part of a big route that is not used as often.

CONSIDER DIFFERENT TYPES OF SPACES

Some spaces, such as offices or schools, will not necessarily divide into cleaning zones in the same manner as a store or warehouse. In such cases, review the entire space before starting to teach cleaning routes and develop an efficient and logical plan that's easy to complete and predictable for the operator.

For example, when there are multiple buildings to be cleaned or multiple wings in a building, use separate Home Location Codes for each floor building or wing. This allows your robotic scrubber to start and stop closer to the area it is cleaning, minimizing long traverses across a space.

In addition, when cleaning large or unusually shaped spaces, it's best to divide the space into smaller, more manageable routes for optimal robotic scrubbing.



WHY PLAN AHEAD?

- Teach manageable cleaning routes
- Effective planning and space usage
- Prevents unnecessary low water alerts
- Frees up any obstacles and clutter giving maximum floor coverage

OPTIMIZING WORKFLOW WITH YOUR ROBOTIC SCRUBBER

Your robotic scrubber is reliable and consistent, autonomously cleaning floors and freeing up valuable staff time. By using a Brain OS-powered robotic scrubber, your staff is able to focus on higher value work or special projects. This section is designed to help you think about how to optimize workflow and create efficiency within your cleaning routine.

CONDUCT WORK IN PARALLEL

Think of your **robotic scrubber** as a teammate. One of the best ways to maximize the efficiency of your new robot is to conduct work in parallel. After users start the **robotic scrubber** on its designated cleaning route, they can edge clean at the same time or even move onto other tasks such as dusting, cleaning windows, etc., while the **robotic scrubber** works nearby.

- ✓ OPTIMIZE WORKFLOW
- ✓ EFFICIENT CLEANING ROUTING
- ✓ MULTI-TASKING



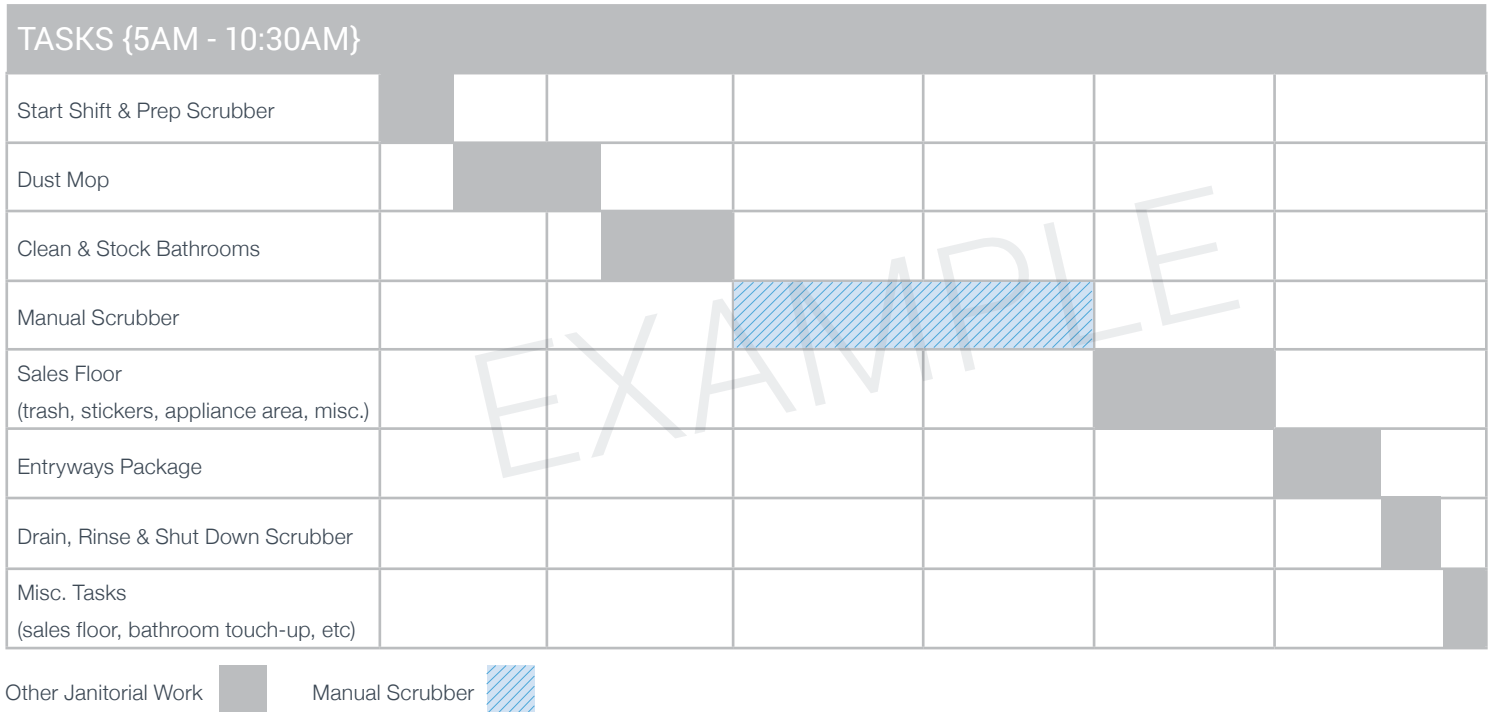
REORGANIZE CLEANING TASKS

For best results, you may need to consider reorganizing the order of cleaning tasks while your **robotic scrubber** cleans the floor.

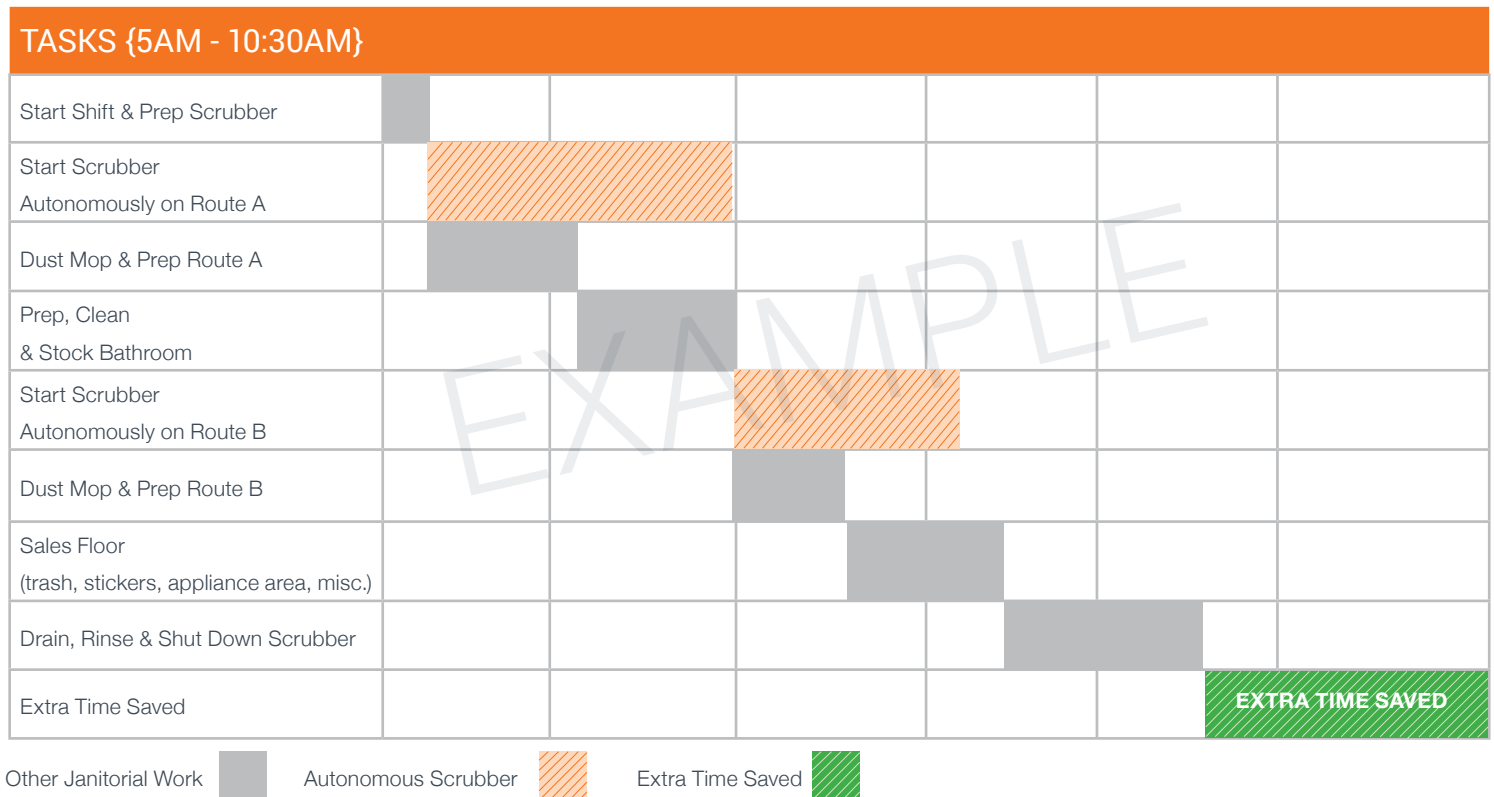
For instance, you may want to prep or dust mop the floor just ahead of the **robotic scrubber**, allowing two steps of the cleaning process to be completed at once.

For safety reasons, the robotic scrubber will slow down when people are around. If floor cleaning is typically performed when the facility is busy, consider shifting this task to another time of day. Doing so may improve area coverage and performance.

EXISTING WORK-FLOW WITHOUT A **ROBOTIC SCRUBBER**



OPTIMIZED WORK-FLOW WITH A **ROBOTIC SCRUBBER**



ROBOTIC SCRUBBER

PERFORMANCE/USAGE DATA

REPORTS OVERVIEW

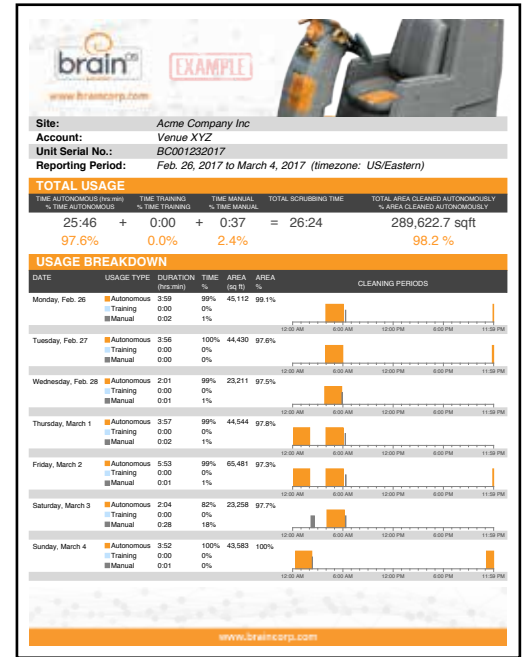
One of the most powerful benefits of your new Brain OS-powered robotic scrubber is provided by the data reports, which includes information about performance and utilization. The information in each report provides key insights regarding your robotic scrubber's operations and usage.

REPORTS

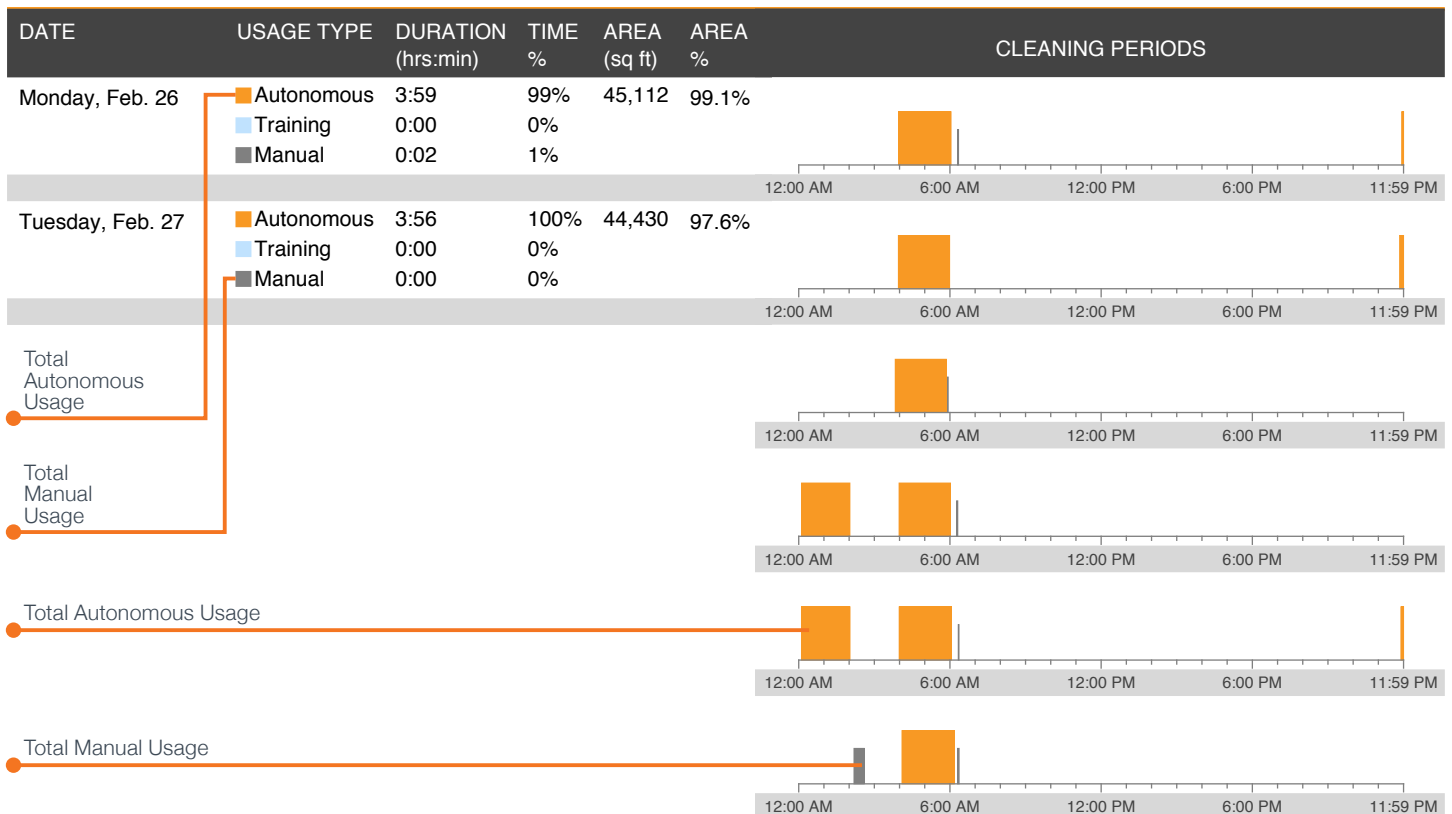
Reports include information regarding total manual and robotic usage. In addition, reports detail the time of day the robotic scrubber is being used and for how long. A percentage complete for each route is also included on the heat map.

Know exactly how your robotic scrubber was used based on data not anecdote. Usage data allows your team to quantify how your floors are being cleaned. This data can help drive budgetary and operational decisions.

Data and reports allow you to identify trouble spots, confirm compliance and determine if your staff may need additional training on proper use and maintenance.



UNDERSTANDING THE REPORT



ROBOTIC SCRUBBER HEAT MAPS

OVERVIEW

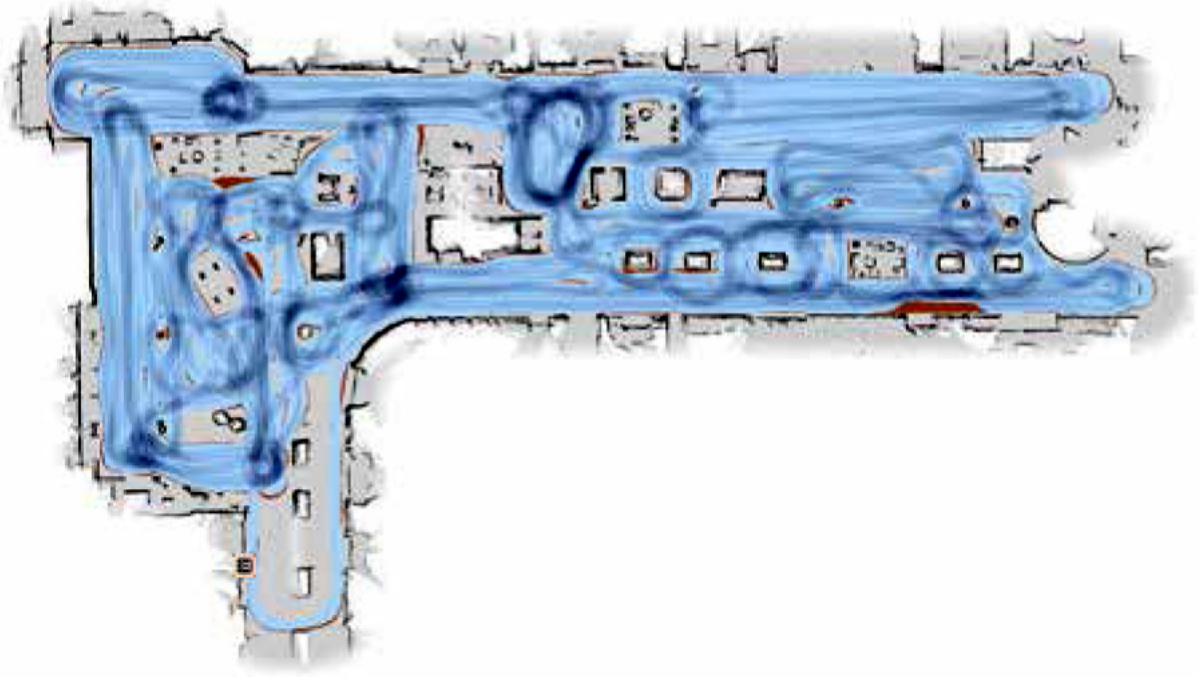
Each time your robotic scrubber cleans a route, the robot's sensors record the path and map the space that's being cleaned. These maps are available as a report and provide valuable insights into how much of your space was cleaned. For example, the maps can highlight areas where the robotic scrubber consistently encounters obstacles, allowing you to make changes in your environment or workflow to improve performance.

HOW TO READ THE MAPS

The maps show the layout of your facility along the cleaning route from the perspective of the robotic scrubber. The map's appearance is similar to what a construction floor plan looks like.

There are two colors used to illustrate cleaning paths on the maps.

- Blue shaded areas represent the actual route cleaned by the robotic scrubber.
 - Orange shaded areas represent the original path where the robotic scrubber was trained to clean.
- Allows for performance comparisons over time



HOW TO UTILIZE MAP INFORMATION

Heat maps illustrate the overall consistency of your cleaning routes. Maps also help identify spaces that your robot may have missed or avoided due to obstacles. Should your map show more orange areas (original route), this is an indication of areas missed. Workflow changes, better preparation of the environment or retraining routes may be possible solutions to consider.

ROBOTIC SCRUBBER SAFETY INFORMATION

SMART & SAFE PERFORMANCE

When used properly, your **robotic scrubber** can provide many benefits. Outlined below are some of the important performance features that help provide safe, consistent and predictable operation.

SENSORS

Your **robotic scrubber** was designed with advanced sensors to prevent collisions and help stay clear of obstacles, people, or abrupt changes in floor height such as stairs. To deter unauthorized use, while in self-driving mode the robotic scrubber will stop if anyone attempts to ride or operate the robotic scrubber.



SIGNALS AND ALERTS

The robotic scrubber is equipped with a variety of visual and audible alerts that help ensure safe operation. Turn signals, beeps, and warning lights help convey information while the robotic scrubber is in use.

Robot operators can pair a phone to wirelessly receive notifications and alerts about the robotic scrubber's performance during its operation. These same alerts can be viewed on the on-board touchscreen.



WHAT TO DO IF YOUR ROBOTIC SCRUBBER NEEDS HELP

Sometimes your robotic scrubber can get stuck. If your robotic scrubber is stopped with blinkers flashing, this means your assistance is needed. You can help by moving the obstacle out of the way. Simply press the blue button once the obstacle is removed and the robot will continue on its path!

BRAKING DISTANCE

The stopping distance for the robot is approximately half that of a human operator, ensuring maximum safety at all times.

Average Human
Stopping Distance



Robotic Scrubber
Stopping Distance



Thinking Distance

Braking Distance

PAUSING OR STOPPING THE ROBOTIC SCRUBBER

If you need to stop or pause your **robotic scrubber**, approach from behind and press the blue button at the back of the robotic scrubber. You can resume operation by pressing the button again. If necessary, the robotic scrubber can be driven around an obstacle should it be too large or heavy to move. The touchscreen UI will help guide you on the robot's path. Once around the obstacle, press the blue start/pause button to resume.



EMERGENCY SHUTDOWN

If there is an emergency and you need to stop your **robotic scrubber** immediately, this may be done by pressing the red emergency stop button (**e-stop**). Keep in mind that stopping the machine with the e-stop may result in water leakage. Note, the button must be twisted to release it. Check the floor and vacuum any residual water near or under the machine.

NAVIGATION

Your **robotic scrubber's** navigation system includes a variety of features to ensure safe operation.

- Your **robotic scrubber** is never in a rush, minimizing mistakes or safety issues tied to hasty performance.
- When your **robotic scrubber** encounters moving objects, the robotic scrubber will stop and wait, proceeding once the path is clear.
- Your robot will also adjust and slow its speed based on the complexity of the environment. The robot will slow around blind corners or when going around obstacles.
- Your robot scrubber approaches people and static objects differently. When near people, the robot will pause and wait for them to pass.
- Your robot has a frontal view of about 25 meters or 82 feet.
- Speed is limited to 2.5 mph in an obstruction free space (1 m/s). In complex or dynamic areas, speed is adjusted and can average 1.45 mph (.65 m/s) with a variable range of 0-2.5 mph, depending on type and number of objects in its path.

ROBOTIC SCRUBBER BEST PRACTICES

ESTABLISH PERMANENT HOME LOCATION(S)

Home Location Codes must be in the exact same location each time your robotic scrubber is used.

- Home Location Codes must be fixed to a wall or flat surface, at the height of the side 2D camera. See your Operations Manual for the specification.
- Home Location Codes should be placed in an area with enough light for the camera to see the code. A flashlight may be used in a lights-out building.
- Home Location Codes should never be photocopied, laminated, placed in a sleeve or cover. Doing so may prevent the robot scrubber's camera from reading the code.

TEACHING ROUTES

- Teach routes when the area is most clear of obstacles and people that may block the scrubber's path. This may require teaching routes outside of your normal cleaning times.
- If a route is taught in an area with obstructions that are later removed, the scrubber will not clean any areas previously occupied by those obstructions.
- When teaching a route make smooth wide turns, avoid narrow aisles, and do not drive in reverse.
For best performance, follow the turn parameters for your robotic scrubber as outlined in the Operational Manual.
- Knowing the turn parameters will help prevent the robot from getting stuck in tight spaces.
- U-turns slow the robot down and should be used as minimally as possible. Try to circle around or alternate aisles wherever possible.
- Avoid routes over 1.5 hours in length – break up your space into cleaning zones based on the capacity of your water tank.
- To traverse a non-scrubbable area, lift the scrub deck about ten feet prior to reaching it.

TESTING ROUTES

- Test all routes to ensure the unit can run them successfully. Monitor the scrubber during testing and note any areas of difficulty. In general, the robotic scrubber requires more space than a standard manual scrubber. Your robot has a "safety bubble" around it making the footprint slightly larger, ensuring safe operation.
- If you notice the unit calling for many "assists" when testing your route, assess the environment and remove any obstructions. If the assists persist after obstructions are removed, the route you trained may include maneuvers that it cannot replicate robotically. The best solution is to retrain the route.

RUNNING ROUTES IN ROBOTIC MODE

- Preparing the environment during dust mopping is key to successful robotic operation. It is essential to remove obstructions like boxes, new "movable" features (e.g. end-caps), and to push back any protruding merchandise or items.
- Run routes when the area is most free of people and freight. Identify the best times to run different routes based on how the environment changes throughout your shift.
- Stay clear of the front of the robotic scrubber and sensors
 - » Do not crowd or stand in front of the robotic scrubber especially while choosing routes at the home location.
 - » Keep people behind the robotic scrubber.

RUNNING ROUTES IN ROBOTIC MODE (CONTINUED)

- During the first 30 seconds of a robotic route, monitor the robotic scrubber's side and rear squeegees to make sure they are properly adjusted. Pause the robot by pressing the blue button and adjust the squeegees if necessary.
- Remember to pair your phone to receive alerts from your **robotic scrubber**.
- Optimize power usage
 - » For daily floor maintenance, use lower water and pressure settings for longer battery life when possible (ex: daily cleaning routes that have minimal dirt).

WHEN TO TEACH NEW ROUTES

- If the environment changes significantly (e.g. remodeling, significant new features, obstructions, etc.) it may be necessary to teach a new route.
- A new route will be needed when the dimensions of the space have changed so much that the scrubber is having trouble navigating and is calling for frequent assists.
- Some common examples of changes that can necessitate new routes include:
 - » New wing stacks added to the ends of aisles in retail spaces and can narrow the width of the aisle entrances to less than the required turn parameter for your robotic scrubber. Extremely narrow aisles should be excluded from robotic routes.
 - » New merchandise displays in the racetrack areas of retail stores, blocking its intended path.
 - » Merchandise displays switched out, with new displays having different dimensions that the scrubber has trouble navigating.
- Also, if dimensions change revealing new floor space that was previously covered, new routes may be desired to include that area in a robotic route.

INSPECT & MAINTAIN THE ROBOTIC SCRUBBER

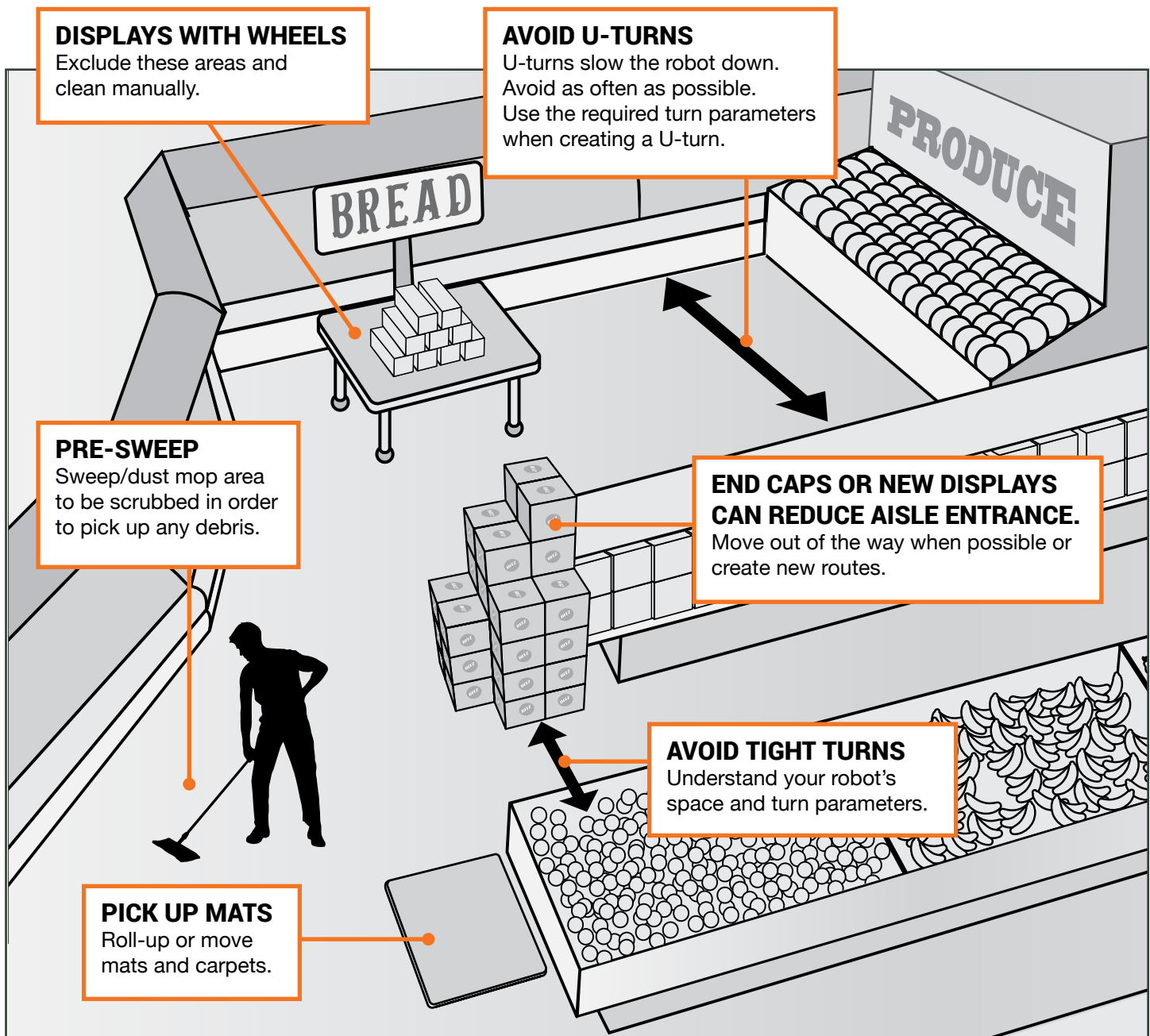
Ensure optimal performance by performing the following maintenance steps.

- Visually inspect the sensors and wipe down each day.
- Dirty sensors can affect the performance of your robot. Inspect the LIDARs and 3D sensors to ensure they are free of dust, dirt and smudges. Use the microfiber cloth provided. Do not apply water to the sensor.
- Inspect pads, brushes & squeegees.
 - » As brushes wear down, the scrub deck gets lower. Ensure the side squeegees are adjusted properly and raise them as needed.
 - » Replace worn brushes and pads.
 - » Inspect rear squeegee for wear and flip or replace if necessary.
- Park your **robotic scrubber** with the sensors and front of the robotic scrubber facing the wall. Having the sensors face out can potentially expose them to being struck and damaged by other equipment.

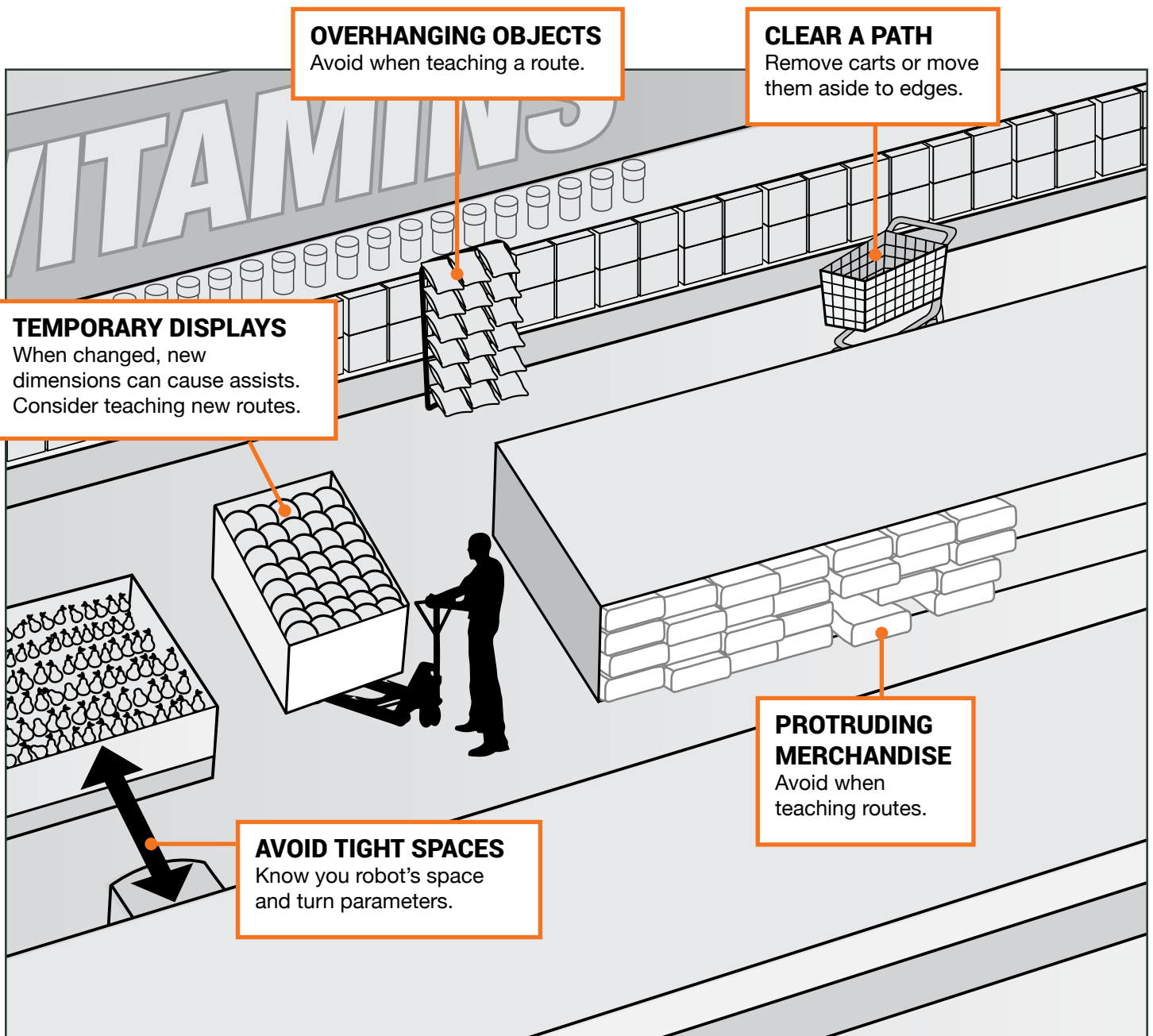
ENVIRONMENTAL CONSIDERATIONS RETAIL

During robotic scrubbing, this type of environment is often shared with employees restocking shelves. Route prep is vital. Before teaching or running a route move boxes, pallets, shopping carts, and other movable objects out of the robot's path.

- Segment the space.
- Create multiple routes to account for other workflows at the site.
- When possible adjust other task and workflow to accommodate robotic scrubbing.



ENVIRONMENTAL CONSIDERATIONS RETAIL

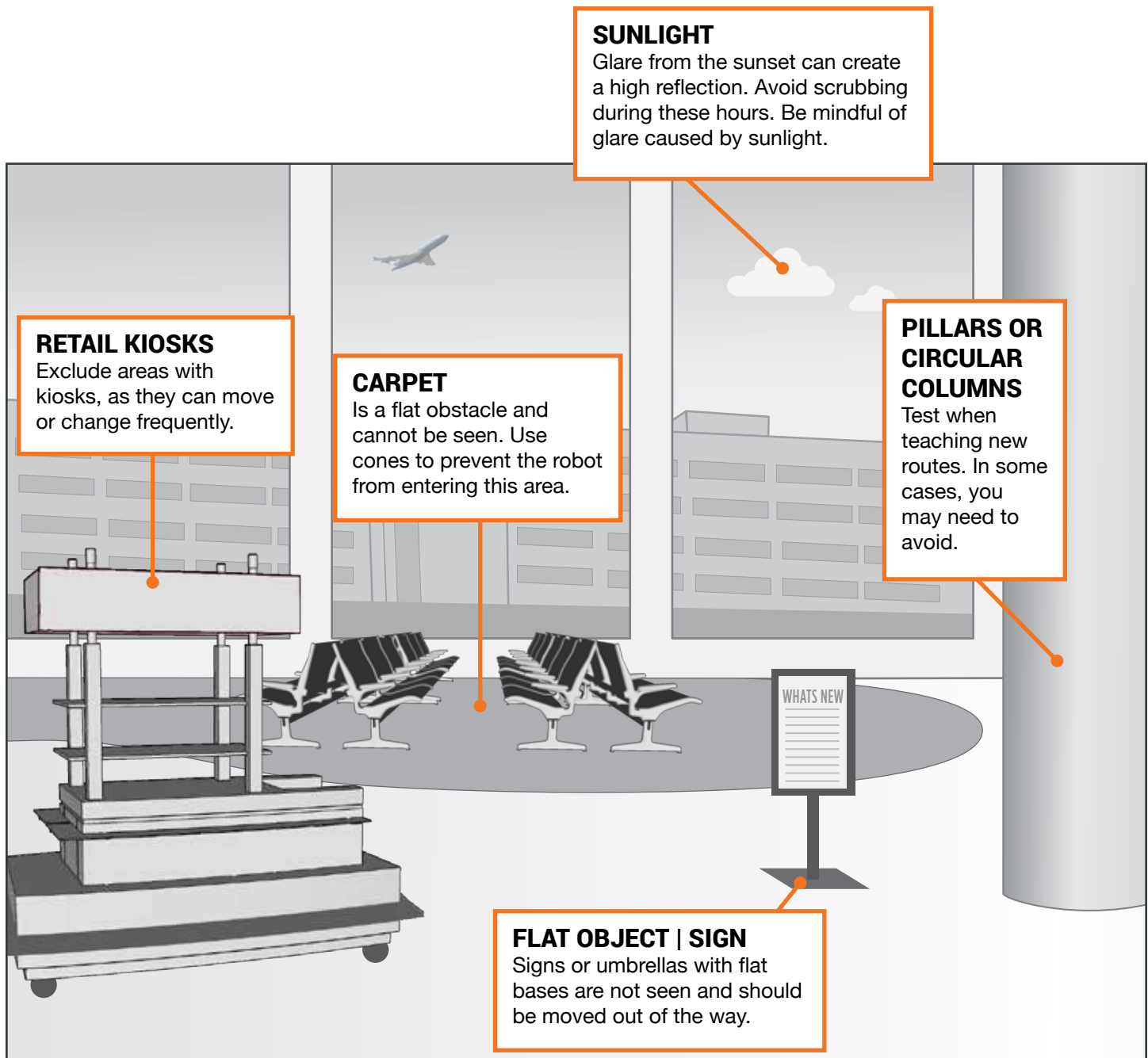


ENVIRONMENTAL CONSIDERATIONS

AIRPORT | MALL | TRAIN STATION

Large open spaces are usually less complex and have fewer objects to maneuver around. This allows you to teach longer routes.

- Base routes on water tank capacity to avoid low water alerts.
- Avoid uneven flooring.
- Raised area less than 4" are not seen by the robotic scrubber.
- Vinyl floor stickers cannot be seen and should be avoided to prevent damage during scrubbing.



ENVIRONMENTAL CONSIDERATIONS

AIRPORT | MALL | TRAIN STATION



SEASONAL DECOR AND DISPLAYS

- Holiday decorations significant in size change the environment infrastructure. Seasonal routes are recommended.
- Small objects such as fake snow or temporary carpet are not seen. Use cones to avoid these items.

LEAFY PLANTS

As plants grow they can extend into the robot's path. Leave a 2-foot buffer between cleaning path and plant.

FOOD COURT AND CAFE AREAS.

Chairs and tables move too frequently. Clean these areas manually

FLOOR TO CEILING GLASS

When teaching new routes keep 18" to 24" away.

CONSTRUCTION FACADES

Frequent assists may occur when facades are added or removed. Consider teaching new routes.

BIG BURGER

COFFEE & SWEETS

Dress Up Time

Coming Soon

RAMPS AND SLOPED FLOORING

Your robot cannot navigate up and down slopes. Use ramps as a natural barrier when dividing space into cleaning zones.

FLAT OBJECT | MATS

All weather mats are not seen and should be moved out of the way.

ROBOTIC SCRUBBER FAQs

FREQUENTLY ASKED QUESTIONS AND ANSWERS

Some of the most frequently asked questions can be found below with answers.

Q: How long of a route can I teach?

A: Routes should be based on the capacity of the water tank and speed of the robot. As a rule of thumb, it's best to limit most robotic scrubbers to route-training (teach mode) to 45 minutes. A route that takes 45 minutes to teach takes a robot approximately one hour to run. It is also easier to monitor and control the environment if your space is divided into smaller areas.

Q: How do I pair my phone?

A: On the robotic scrubber's UI, navigate to "Settings" and select "Notifications". Follow the on-screen instructions to pair your phone by texting the code to the phone number displayed on the screen.

Q: I paired my phone yesterday but today I'm not receiving any notifications.

A: You have to pair your phone each day you use the robotic scrubber. This is to ensure only an on-site operator will receive the notifications.

Q: My robotic scrubber gets stuck in the same place every day. There is nothing obstructing the robot, but it always stops and asks for help.

A: There could be an environmental factor such as a strong reflection causing the robotic scrubber to think there is an obstruction. For safety reasons, the robot errs on the side of caution. To help resolve the issue, contact your service provider. Make note of the route letter, the Home Location Code number, the area of concern, and the date. Photos of what the robot sees are also helpful. In some cases, we may be able to remotely adjust the route to improve performance.

Q: How many routes can I train?

A: You can teach up to 6 routes per Home Location Code, and there are 10 codes provided. This gives you a total of 60 routes per facility.

Q: My robotic scrubber is supposed to turn (or turn around) but often stops and asks for help. Is there minimum space needed to operate or turn around?

A: Please follow the **TURN PARAMETERS** as outlined in your Operational Manual. There are three numbers to know when creating a route that is specific to your robotic scrubber size.

1. When the robot is on a straight path (passing between two objects or the width of an aisle)
2. When turning into an aisle
3. When making a U-turn.

Please note the turn parameters and create routes accordingly.

ROBOTIC SCRUBBER CUSTOMER SERVICE KEEPING YOUR ROBOTIC SCRUBBER HEALTHY

From preventative maintenance to warranty service and support, the goal of customer service is to keep your robotic scrubber running smoothly.

SERVICE AND SUPPORT

If you have questions about your robotic scrubber or are having technical issues, start by contacting Minuteman. BrainOS software is supported by the ROC (Robot Operations Center) where robot performance is monitored. New updates will be downloaded periodically making sure your robotic scrubber has the most up-to-date version of software available.

FOR IMMEDIATE ASSISTANCE

If you require service or maintenance, are having technical issues, or otherwise need immediate assistance, a customer service representative can help.

You can contact us either by email or telephone.

- Toll-free customer support: 1-800-323-9420
- Technical assistance: 630-570-2501
- Email: customerservice@minutemanintl.com



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