

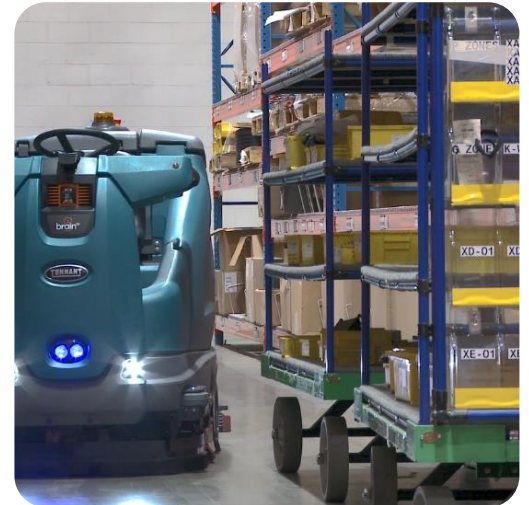
# ENVIRONMENT CONSIDERATIONS

## WAREHOUSE, LOGISTICS, MANUFACTURING

### Wheeled Shelving and Pick/Parts Carts

Be careful when creating autonomous routes in areas with wheeled shelving and other mobile storage. If the environment is already very tight, slight movements to wheeled shelves can create spaces that are too small for the scrubber to navigate. If you move the wheeled shelving, you must make sure that it is back to its original spot from when you mapped it.

Make sure pick carts are cleared from the aisle ahead of autonomous cleaning or the robot has enough clearance to move around the obstacle. Coordinate timing of autonomous cleaning with picking crew.



### Reflective materials/Floor to ceiling windows

When the robot is scrubbing close to floor to ceiling glass or windows, such environmental features may cause the robot to perceive a false obstacle due to sensor interference and come to a stop. When teaching an autonomous route stay 1-2 feet away from such features to prevent assists from occurring.

Aisles filled with reflective surfaces may need to be scrubbed manually as the robot's sensors will detect reflections near these objects that it senses as obstacles.

### Uneven Flooring

Uneven flooring or areas with raised flooring less than 4 inches are undetectable by the robot's vision system. The scrubber may be able to drive over the uneven flooring manually but running autonomously can present issues with the robot's ability to see the depression or raised portion of the floor. If this happens while the robot is running autonomously, it may recognize the depressed area as a cliff and the raised area as a wall. Avoid uneven flooring while training routes keeping in mind that the robot sees the environment differently. You can place objects like cones or wet floor signs over the area you'd like the robot to avoid.



# ENVIRONMENT CONSIDERATIONS WAREHOUSE & LOGISTICS

## Flat Objects

The robot cannot detect objects less than 4 inches from the floor and will run them over in autonomous mode. If they appear in the robot's route, move them out of the way or retrain routes to avoid such objects.

- Steel plates under racking
- Fork life tines
- All-weather entrance mats



## Floor Stacking

Areas with floor stacking and other dynamic environments may not be best suited for autonomous cleaning. Objects move around frequently and there may not enough space for the machine to clean in between pallets. It is possible where there is enough space and dimensions remain the same day to day, but it would require thorough preparation each night to ensure all the areas are clear.



## Ramps and Sloped Flooring

The robot cannot navigate up and down slopes. When making autonomous routes do not attempt to go up or down ramps and other sloped areas.

Sloped areas can serve as a natural barrier when segmenting a space between several different autonomous routes.



# ENVIRONMENT CONSIDERATIONS WAREHOUSE & LOGISTICS

## Low to Ground Objects

Raised areas less than 4" may not be seen by robot. If they appear in the robot's route, move them out of the way if able or train routes to avoid such objects.

Common Examples:

- Floor Guards
- Floor Scale



## Protruding or Overhanging Objects

As the robot's sensors extend above the height of the robot itself, it may read an overhanging item as an obstacle. The robot may see these objects too late to navigate away from them and call for an assist. Proper prep includes attending to protruding items ahead of autonomous cleaning or such objects should be avoided when creating autonomous routes.

## Support Columns

These cannot be cleaned around in the same manner as commonly done by manual scrubbing. Often the driver will make several circles around the beam. When this maneuver is replayed in autonomous mode, the robot may detect it's rear wheel is close to the column and calls for an assist.

You may want to avoid the columns or beams all together, however, if the column is large enough to make wide turns around the structure, the robot may navigate the area without issue. Test first.

