

## Cyber Toilet: Designing Restrooms to be Cleaned and Stay Clean

A restroom is not a tourist stop. You do not admire it. You do not call your friends to come and see the faucets. You do not hang out in there. It is for one legitimate purpose only, to deal with bodily waste. We want a clean, safe, nice smelling place to go about our business and we want good infrastructure for doing so. For businesses, restrooms are mostly a cost. They cost money to supply. They cost money to clean. Both business and customer could benefit if bathrooms were designed with dirt defensiveness in mind.

**Consider the toilet. It is poorly designed for easy cleaning and is not grime defensive.**



The complex angles and many faces here again make it hard to clean from backsplash or men missing.

The area under the seat often traps backsplash and urine from men who point at the sides. Men who are seated and pee often shoot over the edge and onto the floor as well.

Where urine from men who miss and backsplash from the toilet accumulates. Wipe this area on any toilet and you get a disgusting yellow cheeselike substance with brown flakes. The many curves and sharp corners make this area hard to clean. Take off the seat of a toilet that has not been cleaned for a week. There is a ton of stuff that gets under and inside the mechanisms like the hinges.

Takes a lot of extra wipes for the cleaner to effectively wipe every surface as there are so many angles and so many faces.

This area is often unsealed, causing urine that has dripped down to get below the edge and between the toilet and the floor.



To fix the toilet, you want something very boxy with as few angles and faces as possible and when those angles and faces are required, they should be as curved (for angles) and flat (for faces). Ideally there would be no seat with a rim underneath but rather just one component to prevent pee and poop flakes from finding an easy place to hide. The mockup looks like a Tesla Cybertruck, but that is the point. A Cybertruck would be very easy to clean. We can call this concept the Cyber Toilet, especially because a computer to track data could be installed in the box. Because typical commercial toilets do not have bowls, the computer could be used to add cleaner or at least odor reduction to every flush which would also help contain the smell.

The seat is also bolted to the base or at least has a covering panel as well as an inside one to ensure that all pee and splash stays inside the bowl or at least does not get where the hinges and mechanisms are (as those are intricate and accordingly hard to clean).

**Consider the typical public bathroom floor. It is not smell or liquid defensive.**



The worst public bathrooms have floors that cannot easily be cleaned. One of the ones I hate the most is tile, particularly tile with deep grout that has not been properly sealed. Unsealed grout retains smell, particularly the smell of spilled urine.

You want to choose a flooring material that does not have cracks and crevices where urine can seep in or can avoid being wiped away by even a casual cleaner. If the bathroom is near the outdoors, you want a material that does not develop cracks when exposed to hot and cold

temperatures (temperature differentials cause cracking with many materials). If the bathroom is in a stadium, the floor should be resistant to things like beer stains and ketchup being ground into the floor. To prevent falls and facilitate cleaning, the floor should be a colour that does not hide liquids on the ground and ideally rather displays them vibrantly. White and light grey tile is especially bad about this as it hides any shadow that might be cast by the liquid on the ground.

**Consider the typical public bathroom trashcan. It is not smell/splash defensive.**

It would be nice if people just put toilet paper and paper towel into the waste baskets. Unfortunately this does not happen, so these waste baskets can get anything from banana peels and diapers to used tampons and condoms. These things can smell and very badly if the bathroom waste is changed infrequently. Most garbage cans do nothing to try and manage smells. Many also accumulate smells from the liquids that get splashed on the side or contaminate the bottom as the bag breaks and nobody properly wipes it out.

The best way to deal with this is probably to put deodorants inside the bag itself to try and handle the smell. The can should also be easy to clean and made with materials that are hard to scratch, destroy, damage, or for things like gum or beer to adhere to.

**Consider the typical public bathroom wall.**

Eventually you are going to get a drunk in the bathroom and this is especially true if the bathroom is on a university campus or a stadium. There are two types of bathroom walls. There are the typical drywall/tile ones, which easily absorb bad smells and the restroom partitions, which are basically just easy to install barriers that are put up between urinals and around stalls. Many of these partitions are hollow and they collect dust or people stick toilet paper or poop or gum or all manner of garbage into them. That cannot be easily removed and tends to stay inside and smell. When I was in university people would hide notes in there for tests. If you are going to make partitions, at least seal the edges.

For walls in areas where they are likely to have things spilled on them or get peed on because of drunk people, it would be ideal to develop some kind of lining that prevents liquids and smells from becoming embedded into them and instead allows them to be washed off. This lining could also be useful for areas of the floor where liquids accumulate.

## Other ideas:

- Just remove the main door. That should do a lot to allow air to flow and reduce the smell. Many malls do not have doors on the entrance to their washrooms for this reason. Also helps accessibility and ensures users do not need to dirty their hands with a handle.
- Try to create a better garbage bag or at least one that is made to a higher standard. My parents have a garbage pail that requires specific bags because it is a specific size, but the bags are thick and hard to tear and are designed so that the corners aren't torn getting them onto the pail. Think defensively.
- Faucets can have the same issue of hard to clean creases. Try to reduce the number of edges. Same with soap dispensers.
- Many sinks are too shallow to wash hands in without splashing water everywhere. Make sure there is enough depth to the sink. Otherwise, soap scum or whatever was on their hands gets everywhere.
- Many hand dryers are too weak so people just fling water off their hands instead. If you want people to use the dryers, get ones with force. Many are little better than a desk fan.
- Restaurants and food courts should choose soaps that wash off cleanly. Think foams rather than liquids and gels. The residual can change the taste of food they are touching.
- Use copper or brass finishings for things like stall door locks. Copper and brass have chemical properties that kill any diseases that linger on the surface.
- This is more of a stretch but say that you could make a toilet seat perfectly flat or at least perfectly curved, curved enough that a bar with a wipe could clean the toilet seat after every use. It could even be built into the lid along with a UV sterilizing mechanism that ensures a highly sanitary experience for every user.
- Choose white or stainless steel for the interior IF and only IF it is to be regularly maintained. Otherwise choose dark colours that hide dirt.

- Choose deadbolts over turn locks. The panels used in the partitions tend to shift from loose screws and eventually stop working over time. Locks were frequently unusable when I was in university because of the age of many of the buildings.
- Bulk in the trashcan can be reduced by choosing highly absorbent paper towels or high-speed air dryers. One of the reasons they seem to fill quickly is that companies buy discount paper towel where you need 6 feet of their thin paper towel to get your hands dry.
- Cleanliness could be verified by requiring the cleaner to take samples of certain locations with a cotton swab and sending those swabs in for verification. The results could be posted on a cheap tablet at the entrance to the bathroom.

### **Wild Idea: The Integrated Hand Washing Unit for High Frequency Handwashing**

Most people do not wash their hands as recommended. Only 66% of people always use soap. 23% just wet their hands. Only 5.3% of people spent the recommended amount of time handwashing. [Everything included, 95% of people studied in a Michigan State research paper failed to properly wash their hands.](#)

As an engineer, I have long learned to treat humans as largely immutable. We can tell them to wash their hands and spend more time doing it, but everyone already knows they are doing it wrong. What we can do is reduce the burden of handwashing by building an integrated handwashing unit.

I want to be able to stick my hand in a (relatively transparent) box and have water jets filled with soap spray my hands and blow the dirt away like in a car wash and then blow the water away like a Dyson Airblade. No scrubbing all the cracks and crevices. No waiting impatiently under a weak hairdryer pretending to be suitable for drying hands. The process should feel like sitting in front of a hot tub jet, just with a few seconds of soap and a drying cycle at the end.

While this probably would not work in general use as many people have things like fake nails that could be damaged by this, it would be a speciality item for food service or hospital settings, where employees should be constantly handwashing. It may not be as good as perfect handwashing, but it would probably perform much better in real world use.