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Kathryn Kochanowski

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A Thesis Submitted to the Faculty of The College of Fine and Applied Arts in Candidacy for the Degree of MASTER OF FINE ARTS

BATHROOMS CAN BE EASIER TO USE!

by

Kathryn Kochanowski
March 10, 1990
Approvals

Craig McArt - Adviser
Professor - Industrial, Interior & Packaging Design

Toby Thompson - Associate Adviser
Professor - Industrial, Interior & Packaging Design

Charles Lewis - Associate Adviser
Professor - Industrial, Interior & Packaging Design

Philip Bomartha
Special Assistant to the Dean for Graduate Affairs

Dr. Robert H. Johnston
Dean, College of Fine and Applied Arts

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Introduction

While developing my industrial design thesis, I realized that the research and ideas I was gathering about bathrooms should be passed on to somebody who would benefit from the information. That person is you, the consumer, the user and improver of residential bathrooms. Many new products have been manufactured for the residential bathroom, but few efficiently meet the needs of the user. This article was written to address these problems and to educate you as a consumer. As an educated buyer, you will be able to identify bathroom products that are well designed.

Well designed products are easy and comfortable to use. These products give us little reason to concern ourselves because they do their job without much of our attention. For example, we seldom think about the roll of toilet paper that spins on its holder. The paper sails out effortlessly as we pull at the first sheet. We pull the sheet and tear it off when we have enough paper. We usually don't think twice about it, unless of course it is time to change the roll. We are relieved of having to cut sheets or pull them out of boxes. This is a great example of good design.

On the other hand, most people go through their daily routines without even realizing the aggravation caused by poorly designed products. Some examples of poor bathroom design include: faucets that are hard to adjust, puddles of standing water on the vanity and a floor behind the toilet that never gets cleaned.
Well designed fixtures for the bathroom should meet three basic criteria, they must be: 1) comfortable to use, 2) safe and 3) easy to clean. Throughout the following article, fixtures will be evaluated according to these guidelines. The majority of this thesis will concentrate on the toilet, sink and shower areas. Shower design warrents more attention than bathtub design for two reasons. More adults prefer to shower than soak and because of this, most bathtubs with shower fixtures are grudgingly coerced into functioning as showers for most of their lives.

As you read the following sections, keep in mind that this process of analyzing product design extends beyond bathroom fixtures. It is reasonable to apply these same three criteria to other products, along with evaluations of reliability, cost of use, warranties, test reports and of course your own aesthetic reaction to the product.

Now you may be asking yourself what are industrial designers and what qualifies them to evaluate bathroom fixtures? Industrial designers are trained to develop new products. They are usually the ones who are sensitive to the needs of the consumer. Although market research may dictate what is designed, it is the industrial designer who is at the round table defending the needs of the consumer.
It is typically the designer (not the engineer, the advertising or sales executive or the product development manager) who is arguing in favor of better materials, nicer finishes, improved human factors and functions, or the touch of whimsy that makes products both useful and wonderful....As a group, designers tend to exhibit an extraordinary sensitivity to materials and processes and an ability to make even commonplace objects delightful. Whether they focus on push pins, baby gear, lamps, personal computers, even wastebaskets, designers can bring the unexpected dimension to products which make them special.1

It is the industrial designer who can transform an idea for a product into an actual three-dimensional object. Designers can make sketches and models to show exactly what a concept might look like. They literally bring to life what before was only an idea.

1Larry Keeley, "The Road Not Taken...Choices for the 90's," Innovation 8 (Fall 1989): p. 2-3.
I. An Abbreviated History of Hygiene

How did the bathroom evolve into what it is today? Let's go back in time to when there were no flushing toilets or hot and cold running water. How did people keep clean? What did they do with their waste?

Keeping clean was not a problem when man was a nomad. People camped near rivers and always had access to fresh running water. It was easy to bathe and wash in the stream or river. All sewage was literally washed away. Instead of cleaning a campsite, the people would move farther upstream.

As humans began to develop agrarian lifestyles, it was necessary to stay in one place for a longer period of time. Campsites became more permanent and gradually grew into settlements. Clean water became a precious commodity. Chief priests and tribesmen claimed clean water holes to be sacred. People believed that interfering with the water supply would invoke the wrath of the gods.2

Some civilizations advanced very quickly in their hygiene habits. One of the first bathrooms in history was developed on the island of Crete almost 4,000 years ago. A large palace built for King Minos at the city of Knossos was built with latrines, personal bathing areas and underground plumbing. "The Minoan

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skill in hydraulic and sanitary engineering far surpasses that of the Chaldeans, the Egyptians or the Greeks. The Minoans fit tapered terra-cotta pipes together to form elaborate systems to fill and drain bath tubs and toilets. With the exception of a "short-lived water-closet of Elizabethan times, England had nothing comparable with this until the eighteenth century."

Egyptians washed and perfumed their bodies on a regular basis. Egyptian artworks show water being poured from a vase onto a person's head. This was a very simple form of a shower. The run-off water was saved for the garden along with the waste from the latrines. The latrines had limestone seats with a removable vase underneath.

The Greeks bathed very quickly and with cold water. Bathing was seen as a stimulating plunge usually done in conjunction with athletic games. Baths were not leisurely or relaxing like the Roman version.

The Romans were famous for the bath. As early as 312 B.C. water was brought 20-30 miles via aqueducts for the very popular public baths. Bathing usually began at 1:00 in the afternoon. These public baths were favorite gathering places where people could listen to a speaker, play an athletic game and then relax in the hot and cold pools. Sweat was scraped off the skin of the bathers using blunt metal instruments. The water was

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3Ibid., p. 4.

4Ibid., p. 7.
perfumed and after bathing it was common to rub the body with fragrant ointments and perfumes. The baths were huge and the Baths of Diocletian could accommodate over 3000 people at one time.\(^5\)

These centuries of cleanliness and casualness about the human body were to abruptly change with the onset of Christianity. This was the beginning of a time when Europe did not take a bath for almost a thousand years.\(^6\) It was believed that to clean the body was the beginning of moral and spiritual decay. Priests discouraged bathing partly because it had to be done in groups for the lack of private facilities. The public bath was seen as a hotbed of sin. St. Boniface prohibited mixed bathing in 745.\(^7\) Although the church forbade bathing, the monasteries were the keepers of sanitation knowledge. They were the "post-Roman pioneers of water-supply and drainage."\(^8\) Their elaborate bathing and latrine facilities were almost incomprehensible compared to the non-existent facilities of the peasants. The efficient water systems of the monastaries could explain their being spared from the Black Death in 1349.\(^9\)

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\(^5\)Ibid., p. 14.

\(^6\)Ibid., p. 24.


\(^8\)Wright, p. 24.

During the Middle Ages, it was not unusual for a peasant to have only three baths in his lifetime: at birth, marriage and death. There were many skin diseases from wearing unclean wool clothing. Wool was very irritating to the skin and hard to keep clean without good soaps. A written account of the era commented on "how the fleas hopped in a peasant's blouse when the wearer was beaten!"\textsuperscript{10} The washing of hands was emphasized more than bathing. Washing hands was done publicly before and after meals. This showed others that one's right hand was clean and ready to dip into the common food pot. Forks were not used until the end of the 17th century and a slice of bread often served as a plate. Those who could bathe often did it as a family affair. Hot water was carried to the wooden tub and everybody jumped in. Sometimes a tray was put across the tub and the meal was eaten while soaking.

Medieval castles used a waterless latrine called a garderobe. It was located in a tower with an open shaft dropping down to the moat. Groups of shafts were built into walls like chimney flues.\textsuperscript{11} It could be assumed that the moat was offensive to not only the castle's enemies but to the residents.

Domestic latrines were often placed over or near waterways. In cities where there were no streams, garbage and sewage were thrown into the streets from windows. Disease and

\textsuperscript{10}Hallock, p. 50.

sickness were rampant. "If some wise man, ahead of his time, had traced an outbreak of sickness in castle or town to a polluted well, he would have been a voice crying in the wilderness." 12 Isolation was the only way in which the plague and leprosy could be avoided.

During the Renaissance, the starving peasant class continued to dress in rags. The lords and ladies of the wealthy classes were always careful to carry their scent boxes to perfume themselves and cut down on body odors. Christopher Columbus risked his life to find perfumes and oils for the wealthy so that they could keep themselves fragrant. Soap was finally manufactured in England and France in the late 14th and early 15th centuries. It was considered a luxury item and taxed by England until 1853.

As time progressed, the public bath became more obsolete because of the fear of disease. Gradually, individual bathing areas became popular especially with the aristocracy. The Palace of Versailles boasted at least 100 bathrooms. The Great Exhibition of 1851 displayed many sheet metal baths that were affordable to the middle classes. 13 Also in 1851, a bath was installed in the White House in Washington, D.C. A survey of city dwellers in the United States in the 1880's showed that only

12 Hallock, p. 50.
13 Conran, p. 194.
one in six had a bath.\textsuperscript{14} During the 18th century, a water flushing bowl or toilet became popular in France and England. In 1759 the ball-valve was introduced and in 1782, John Gaillat, patented the stink trap which made the indoor air a lot less odorous.\textsuperscript{15}

The toilet and bathtub gradually evolved over the next two centuries to become what we know today in western culture as the bathroom. The bathroom is a place where we go to shower and bathe, use the toilet, wash hands, hair, etc. It is usually where we prepare ourselves to meet the new day and also where we prepare ourselves to meet the night. Recently, there has been renewed interest in giving bathrooms additional functions. They have become places for spas, exercise rooms, and relaxing whirlpool baths. The bathroom, regardless of its additional roles, is still used daily. It should be a place that is safe, easy to use and easy to clean.

\textsuperscript{14}Conran, p. 194.

\textsuperscript{15}Conran, p. 224.
II. Don't blame yourself for getting the vanity wet when you wash your hands. How often have you dripped water around the sink, onto the vanity, and had a very difficult time getting it all back into the sink? Don't fret, it is not your fault. It is the result of poor design. In the case of the bathroom sink, good ergonomic design is often forsaken for posh fixtures that are difficult to use and impossible to keep clean. Many of today's sinks and fixtures are designed to be viewed and not to be used. The standard sink height is too high for children and short people and too low for tall people. This is a serious consideration when you see tall people with bad backs pulling a chair up to the sink to wash their faces. Or even worse, when they bend over the sink and then can not stand back up. Children can be seen pulling up stools and standing on them so that they can reach the sink. This can be a precarious situation if their footing is not stable and they are trying to stretch for their toothbrush in the medicine cabinet. Ideally, the sink top should be 2 to 3 inches below a person's elbows.16 The height of most bathroom vanities is 30". This would be an ideal height for a person that is 4'8" tall. It does not work very well for the rest of the population.

The mirror is often on the front of a medicine cabinet and is often placed too high for short people to use. Along with the mirror is the storage which again is too high or too low to use.

Faucets have a wide range of functionality. Some work well and some don't. They range from expensive 14K gold-plated spheres to less expensive chrome plated levers (Illus. 1). The most important value is whether or not the faucets are easy to use, safe and easy to clean. Imagine washing your hands. Your fingers are covered with soap and you want to adjust the water temperature. If you try to turn the spherical shaped faucets it will be difficult to get a good grip. Your fingers will slide over the slippery spheres. If you have arthritis you will find it very hard to hold and turn. If you are a young child whose hands are much smaller than an adults, you will have a difficult time grasping the sphere. The lever shaped fixture will be much easier because you can hold it with your fingers and apply pressure. You are actually using leverage to turn the handle, thus it requires less force and less grasping. You need to only apply pressure in the proper direction. This is a good example of a less expensive faucet working far better than a more luxurious version.

Controlling the faucet is usually done in one of three ways (Illus. 2). The first version, not in use very often today, has a separate control and spigot for the hot and cold water. A second type uses a separate control for hot and cold but both water streams are mixed and come out of one spigot. The third type has one lever that controls both the hot and cold water. The water is mixed and comes out of one spigot.
Illustration 1  Two types of faucets  
  a) Sphere handles compared to b) lever-type handles

Illustration 2  Three types of faucet controls  
  a) Separate controls and spouts for hot and cold,  
  b) Separate controls with one spout, and  
  c) One control and one spout
In all of these faucets it is important that instructions be clear and understandable from the visual appearance of the faucet. For example, on the lever-type control, does the lever rotate, move up and down or push in and out? The method of operation should be clearly indicated on the faucet. Trial and error is not an efficient method of figuring out how to operate a faucet. It is a good way of getting splashed, burned and frustrated.

Being able to easily clean the faucets is another important consideration. Most faucets on the market are attached to the basin so that a right angle is formed where the two connect (Illus. 3). This creates crevices that are very difficult to clean. It would be better if all joints were softer and the radius was no smaller than a finger. Cleaning a radiused corner is as simple as wiping the surface with a sponge and a good cleaner.

The basin part of the sink is formed in one of three ways (Illus. 4). First, the entire sink and vanity is molded out of one piece. There are no seams in this method so therefore all water on the vanity should flow towards the basin and down the sink. In this design it is important that the top of the vanity be sloped towards the basin. Many of these sinks are not designed with enough slope for drainage.

A second type of sink has a laminated vanity with a hole cut out for the basin. The basin is dropped in from the top and has a large rim that holds it in the opening. Some basins are designed so that the rim is flush with the top of the vanity. However, this method usually creates an area where water is prevented from draining into the basin because of the high rim or molding strip.
Illustration 3  Two types of faucet connections to sink
   a) Right angled intersections compared to
   b) Smooth, radiused transitions

Illustration 4  Three types of sink construction
   a) Seamless one piece vanity and basin,
   b) Free standing pedestal, and
   c) Sink set into vanity top
The third type, a pedestal sink, has no vanity and is free standing. These are usually cast porcelain and are typical of the sinks installed in homes during the early part of this century. Many of these are easy to clean because the surfaces are soft and flowing. The molded in soap dishes usually have sloped drainage that allow the water and scum to flow back into the basin.

A major problem with most basin areas of these sinks is that they are too small to do any serious washing. Bird baths are made larger than many bathroom basins! Some sinks are so small that if you tried to wash your face you would end up with more water on the floor than in the basin. Splashing can happen too easily with a basin that is small. There just is not enough room to wash all the way up to your elbows, to wash your hair, to wash a baby or to fill up a large pan under the faucet. Today's bathroom basin is not much of an improvement over the pitcher/bowl combinations used in the 18th century. Although today we do have better methods of getting water in and out of the bowl, the bowl itself has not changed very much.

The ideal sink would be much different from our present fixtures (Illus. 5 & 6). First, the sink should be vertically adjustable to accommodate people of different heights. Gas-pneumatic tubes support the weight of the plastic sink and allow for precise, continuous verticle positioning. A lever on the front is pulled to lower the sink. This lever is moved in the opposite direction to raise the sink. It operates the same as some
Features

Contoured front edge is comfortable to lean against.

Faucet moves UP, DOWN, ROTATES and is attached to a retractable hose.

Hand sized radii in corners for easy cleaning.

Sink can accommodate people of various heights.

Entire sink moves by pulling UP or pushing DOWN on lever.

Illustration 6 - Proposed sink design
Orthographic View
adjustable office chairs. Flexible tubing is used for the hot and cold water inlets and drain. Children can pull the sink down to their height and adults can pull it up to a height comfortable for them. The lever is never so high that a child can not reach it. The sink can be pushed all the way to the floor and used as a foot bath. Behind the sink is a mirror that extends down behind the sink. This enables all users to have a mirror available to them.

The faucet is also a hand-held sprayer that is connected to a retractable hose. It can be moved vertically on the back of the sink or pulled out and used as a flexible sprayer. It is covered with a soft vinyl and will flex if bumped by your head or hand. The controls are electronic push buttons. These are clearly labeled and located on the sprayer. The faucet connects to the sink so that there are no hidden crevices or sharp corners to clean. Everything can be wiped with a sponge or cloth.

The wash basin is a real delight. It is large enough to do some serious baby, hair or elbow washing! It is one piece of molded fiberglass with sides that come up and surround the user. It is large enough to catch most splashes so you do not have to worry about cleaning up the floor. The front is concave and beckons the user to come close to the water source. All surfaces curve and flow gracefully into the basin. There is an aura of cleanliness about the sink but yet it is not a sterile surface. It is warm and inviting.

The basin is easy to keep clean. All surfaces drain into the basin and there are no corners smaller than a finger radius. The
entire area can be sprayed with detergent, wiped and then rinsed with the sprayer. There is no need to be concerned about standing puddles of water in this sink.

An additional feature of this sink is the storage units that are installed on either side of the sink. Horizontal partitions create several vertically stacked cubicles within each unit. Cubicles near the top are used by tall people and those near the bottom are used by shorter people. This eliminates a lot of searching and stretching for toothbrushes, shampoos and other items. Tambour doors are used so that they are completely out of the way of bumping heads.

Overall, this new sink design looks and functions very differently from the sinks that we are accustomed to seeing and using. It enables us to wash and bathe ourselves safely and more easily. As consumers, we should not support designs that may look good but function poorly. We should not purchase vanities that will always be wet, faucets that will be hard to turn and basins that are too small to do any serious washing.
III. Everybody who enjoys cleaning behind the toilet, raise your hand!

One item that no bathroom, powder room, 1/2 bath or roadside rest-stop is ever without is a toilet. The toilet is our cultural and sanitary answer to relieving our bodies of waste. As this section title suggests, cleaning the toilet is one of the least favored jobs in the house. There is always that mysterious area behind the toilet base where no mop can fit and every human hand is afraid to touch. Pour on the Lysol cleaner!

During the 20th century, the toilet has not changed very much mechanically. It has changed cosmetically and is ecologically safer because it uses less water. The ergonomics dictated by the throne-type seat structure have not changed. Men, women and children still sit with their backs toward the wall on a bowl that is 15" from the floor. How well does this work with our human physiology?

"Medical and design research, so admirably embodied in the book The Bathroom by Alexander Kira, have shown that squatting is the best position for humans to adopt when defecating."17 While squatting, the human physique is positioned so that the lower intestinal organs and rectal muscles can work together to expedite the removal of body waste. Our present method of evacuation hinders this process and actually inhibits

17Conran, p. 226.
our bodies from working properly. So what is the answer? Do we propose, as some cultures do, using a simple hole in the floor with handrails to hold onto while we squat? No. Our bodies may be ready for squatting but culturally we are not. We have spent too many generations with a throne-type seat that, at least symbolically, elevates the process of defecating. It would be very difficult to convince people how beneficial it is to squat.

There are a number of possible design options. The toilet could be designed so that it is actually closer to the floor. This would require a person's knees to be brought up higher and therefore into a semi-squatting position. But moving the seat too close to the floor would make it difficult to get up and out of that position. It could become almost impossible for the handicapped and elderly. It might be possible to raise and lower the seat mechanically.

Another option would be to put a foot rest on the toilet. The seat height could remain the same but while sitting, people could bring their legs up onto the foot rest. This would also bring the user into a semi-squatting position. A problem with this is that the footrest becomes a nuisance when getting on and off the toilet. The footrest could be rotated out of the way but then it would probably never be used.

A fourth approach, and the one chosen for this toilet design, is to lower the height slightly and slope the seat so that it is less cramping to the thighs (Illus. 7&8). This would automatically change the user's position to semi-squatting without making it too difficult to get on and off the toilet.
Illustration 7  Proposed toilet/bidet design
Perspective View
Features

Fixture fits flush against wall eliminating hidden crevices and hard to clean areas.

Elongated bowl allows for easier use of bidet feature.

Retractable hose and sprayer for cleaning perineal area.

Flush button is large and easy to locate.

Smooth surfaces allow for easy wiping and draining.

Illustration 8 - Proposed toilet-bidet design
Orthographic View
During the next century, bathroom manufacturers might consider gradually lowering the height of toilet seats. This would make the cultural and biological transition to squatting more gradual.

Besides ease of use and safety, another consideration in toilet design is ease of cleaning. Present toilets are connected to the floor with exposed bolts and right angles that collect dirt and scum. As previously mentioned, there is that mysterious space behind the toilet that is hard to reach with a mop and scary to touch with your hand. The new toilet design interfaces smoothly with the floor and wall so that there are no hidden crevices for scum to hide. A simple plastic shroud is fabricated to fit over the mechanical mechanism of the toilet thus eliminating any hidden dirt hideouts. The transition between the toilet, the wall and floor is radiused so that there are no sharp edges. This makes cleaning around the toilet a snap!

All of the top surfaces of the toilet are smooth and sloping. Since there are no right angles, only curves and radii, cleaning is a rather quick operation. Spraying with a cleaner and wiping with a sponge are all that is necessary.

The water tank is vertically mounted and slanted on top. This eliminates the accumulation of dust and debris. The top of the tank has an elongated flush button which is much easier to see and operate than a tiny lever hidden off to one corner. For easier nighttime use, the flush button is internally illuminated and functions as a night light for the bathroom.
Incorporated into this toilet is a bidet-like feature that enables one to cleanse the genital area. A pull out sprayer is located near the front rim of the toilet. It is kept sanitary behind a hinged push panel and can be accessed while sitting on the toilet. The sprayer is attached to a retractable hose and the controls for water pressure and temperature are located on the sprayer head. A water spraying feature makes it easy to wash the perineal area. Washing the genital area using a bidet has always been very popular in Europe. Presently available bidets require that you sit on them facing the wall. To sit in that position requires you to remove all of your clothing from the waist down. However, a simple sprayer device that allows you to wash the area while sitting on the toilet in a normal position provides a definite advantage for quick cleaning.

Although the new toilet design does not completely solve the physiological and cultural problem of squatting, it does give us many advantages over the present design. The new design can be cleaned more easily and it can also help us to keep our bodies clean.
IV. Did you ever wonder why the shower spray never gets you wet in the right places?

Did you ever feel that you could spend an hour taking a shower and still never be wet in all the right places? That question will be answered shortly. First, what is a shower? A shower is a place and a process through which most of us cleanse ourselves on a regular basis. Some like to take a shower first thing in the morning to help wake up. Others enjoy a shower in the evening or after a long, hot day. Water splashing all over our bodies is most refreshing and a very efficient way to get clean. Fundamentally, in a shower water is splashed on the body, soap is used to create a lather and then the lather is rinsed off along with dirt and perspiration. A shower could be as simple as a garden hose rigged in a corner of an outside deck. Or it could be as complicated as a multi-nozzled shower/tub of the 19th century. All that is required is a water source and some sort of receptacle for collecting the water and draining it.

Bathroom showers are a little more complicated. There is a faucet that regulates hot and cold water. There is a sliding/swinging door or curtain to keep water from going out onto the floor. It also might include a shelf for keeping soap and shampoo. Often the owner has installed a rubber mat to keep from slipping on the tub bottom.

Let us go through the process of taking a shower. First we adjust the water temperature. If it is a tub/shower, the water can be tested as it comes out of the lower faucet. If it is a shower
stall, the water will come directly out of the shower head. In both instances, this process can take a few minutes depending on the quality of your plumbing system. While adjusting the water in the shower stall you must be careful not to get yourself wet before getting into the shower. It is very easy to get the water dripping down your arm onto your clothes. Finally, you have adjusted the water. It is the perfect temperature. It is steamy and so inviting.

Now for the big step into the shower. If you are stepping into a shower/tub, the giant leap over the side of the tub is about 14". If you are going into a shower stall, it is only about 4" high. In either circumstance, the leap is into a dark area which has a slippery surface on the bottom. There is nothing to hold onto for stability and the water is spraying into your face. Hopefully you don't lose your footing and the mat does not fly out from under your feet. As you can see, stepping into the shower can be a real acrobatic plunge.

After you are in the shower, the water spray hits you directly in the face. You would like to adjust it but you can't reach the shower head. Even if you could adjust it, the range of motion of the shower head is so limited that it doesn't really matter. Children have a difficult time because the water spray just grazes the top of their heads before it bounces off the opposite wall. Tall people must bend at the waist to get their heads wet. Most of the time the spray just hits them in the face or chest.

Just as you are wetting yourself down, somebody flushes the downstairs toilet. Oh, what a feeling as hot, hotter, scalding water comes pouring down on you. If you are in a tub/shower
you can back up to the opposite end and try to avoid the boiling lava. If you are in a shower stall, you are going to have to scream and bear it. Once the water returns to normal, you get on with your task of lathering your body. All is going relatively well but every so often you drop the soap trying to put it into the soap holder. When you go to pick up the soap you sometimes kick it across the tub and have to chase it around. When you drop the soap in a shower stall, the soap doesn't go very far, but it is very hard to bend over to pick it up. When you bend at the waist your head and hips get wedged in between the walls and your fingers never quite reach the soap. So you try a knee bend and hope that you don't lose your balance on the way back up.

Finally as you are ready for that final rinse, somebody decides it is time to run the clothes washer. The shock of artic water screaming down on your body sends you dancing around the tub again. This time you try to adjust the water temperature because you know it takes a long time for the washer to fill up. Just as you get it corrected, the washer stops filling and you get scalded. Now you think that you probably should have waited for the cold water to pass.

As you are rinsing, you find yourself doing a native ritual dance in front of the shower spray. You are only trying to get your whole body rinsed off. It is very difficult to aim the water spray at parts of your body that are 6' feet away from the shower head. You find yourself doing a twist and turn dance in the water spray and maybe even bouncing the water off your hands to get the spray to go in all the right places.
Now that you are finally scrubbed, rinsed and refreshed, you shut the water off, open the curtain and search for your towel. In those few seconds, you feel winds that are cold enough to make you shiver. The air blowing in that little opening under the bathroom door feels like wind from the North Pole. Well, now that you are finally dry and cozy, let us look at some improvements that might make taking a shower a little less traumatic.

In designing a shower, it is important to again consider the three basic criteria. It must be 1) safe, 2) easy to use and 3) easy to clean. Let us take a shower again in a new shower design (Illus. 9 & 10). As we adjust the water temperature, we notice that the controls are off to one side of the shower. We can adjust the temperature without having to get wet. While adjusting the controls, we notice that the water can never be extremely hot or cold. Temperature programmable plumbing fixtures are already on the market and have been installed in this shower. The homeowner can pre-set the hottest and coldest shower temperature by simply removing a cover plate and entering the temperature range into the temperature control unit panel. When we take a shower we can choose among water temperatures that are never too cold or too hot. This eliminates the shock of being hit by freezing or scalding water and thus increases the comfort and safety of our shower.

As we step into the shower, we notice that there is no ledge or sidewall to step over or around. We can just walk right onto the drainage grid over the sloping floor of the shower! Under foot
is a non-slip, removable rubber grid that is easy to clean and distinctly marked for safety. For those that must use a wheelchair, it is easy to roll right into the shower. The shower area is well lit. Above the shower a waterproof light and infrared heater provide light and heat to the bather. A secured hand rail is located along the wall to make it easier to navigate in the shower. All of these features make it more comfortable to use the shower and they decrease the chance of accidents.

There are three shower heads located vertically above each other. Positioned at various heights, these allow people of different statures to find a nozzle that is within their reach and easy to adjust. Each shower head rotates and can be independently turned on or off. The bottom nozzle is attached to a retractable cord and can be used as a sprayer. Finally we have the answer to getting every area of our bodies wet without having to do a dance around the shower! Other features of the shower include a seat that can be folded up when not in use. It is safer and more comfortable to sit down while washing one's feet or, for women, shaving one's legs. It is also easier and safer for children, older adults and wheelchair-bound people to wash themselves in a sitting position. A few sailboat heads use sit-down showers because they lack the stand-up space. These are actually quite comfortable and relaxing to use. Having a seat in a shower would eliminate the acrobatic balancing act that happens when you have to stand during the whole process.
Illustration 9  Proposed shower design
Perspective view
Features

Top, middle and bottom shower heads are controlled by the corresponding push-buttons.

Nozzles can be rotated to various positions.

Controls can be reached from outside and inside the shower.

Slim profile and "soft" modelling reduce accidental bumping and brusing.

Bottom nozzle is a pull-out sprayer.
There is also a covered semi-dry area for storage. A plastic-tambour door rolls down over a shelf that can be used to keep soaps, shampoos, razors, rubber ducks, etc. This is especially useful for keeping soaps that tend to dissolve quickly when they are being pelted by water. The door can be rolled down over the items when not in use.

The shower described and illustrated here is much safer and easier to use than the conventional shower. It also serves the purposes of the handicapped and elderly without looking like it was "designed for the handicapped." A shower can be beautiful and functional. We should not be so distracted by fears of slipping and falling in a dark and drafty cubicle that we miss the pleasure of the water spraying on our bodies. The well designed shower will allow us to enjoy the process of creating that refreshing feeling of being clean!
V. Conclusion: Good or bad designs in the residential bathroom? The consumer decides which one is manufactured.

In the previous sections, the major components of the residential bathroom were analyzed from a consumers viewpoint. Possible solutions and ideal designs have been proposed. As a consumer, where can you buy these neat fixtures for your bathroom? Many of the ideas proposed are not available on the residential market. Some similar concepts are becoming available in commercial markets serving hospitals, hotels, restaurants, offices and schools. These components are often more expensive than those available in the residential market. If you can afford it, you can obtain the fixtures you want. If you can afford only those fixtures that are on sale this week at a plumber's outlet, you still have many choices. Take along your new-found knowledge and painstakingly apply it to your purchases. Carefully evaluate the products to see how they would fit your needs and not just how they will look in your bathroom. There is quite a range of functionality in bathroom products presently on the market.

Consumers are the driving force in the market. What people want is what is designed and bought. What is not profitable this year will not be on the market next year. Manufacturers decide what is produced from market research. If consumers continue to buy faucets with sphere-shaped handles that are difficult to manipulate, the bathroom companies will flood the market with
those types of products. If you buy bathroom fixtures that are
easy to use, easy to clean and safe to use, then you will be
sending a clear message to the market analysts. You want
products that will work for you!

As a consumer, you do have control over what products are
designed and manufactured. So vote for well designed products
with your dollar!
Appendix A - Concept Sketch Package
Storage is at different levels to accommodate various heights of people.
UNITS ORIGINATING FROM FLOOR
- NO NEED FOR WALL SUPPORT.
- BEWARE OF HEAVY MONOLITHIC FEELING.
Seat may move up and down with vacuum pump.

1. Water fixture attached in front to be used as a spray down after elimination.
2. Be aware of joining this fixture to corners.

Pull up on seat with both hands.

Seat height adjusted by pressing on pneumatic pump.

Wall mounted eliminates touching floor - uses an attached track.

To accommodate young children, adults and the elderly, floor to rim height should be variable between 10-19".

Floor rakes and lowers around toilet.
Foot Rest - Can be pushed out with feet while sitting.

Storage

Flush Buttons

Pull-Out Bidet Sprayer

Stationary Foot Rest
STORAGE FOR EXTRA T.P., SANITIZED SUPPLIES, READING MATERIAL.

PULL OUT BIDET SPRATER

FLUSH BUTTONS

STAINLESS STEEL BOWL WITH PLASTIC HOUSING.

STORAGE

PULL OUT BIDET SPRATER.
For teeth brushing and bowl rinsing—another jet of water could be supplied to the rim. A constant 'swishing' action.

Faucet moves up and down

Height adjusts up or down

Rotates right, left, up or down.
SEE BOTTOM DETAIL OF FAUCET CONTROL.

ONE-PIECE SINK AND BACKSPLASH.

EASILY IDENTIFIED HANDRAIL IS SOFT AND NON-SLIPPERY.

PULL OUT STEPS TO ACCOMMODATE PEOPLE OF VARIOUS HEIGHTS.

COLORS SIGNIFY HOT OR COLD H₂O.

BETTER TO USE ROTATIONAL RATHER THAN SLIDING CONTROLS.

HAND AND FINGERS APPLY PRESSURE W/O MOVING LATERALLY.

VS.

VERY DIFFICULT TO CONTROL LATERAL MOVEMENTS.
STATIONARY HAND HELD FAUCETS.

FAUCET

SINK

BACKSPLASH

PULL OUT SPIGOT.

PULL OUT HOSE

LEVER CONTROL

GOOSENECK - MULTIDIRECTIONAL

ROTATING, UP/DOWN

PUSH-BUTTON ON/OFF TEMPERATURE CONTROL.

FULL OUT - RUBBER COATED HANDLE

SEPARATES HERE TO BECOME
Relaxing in a Tub
Space Requirements.

Compromising Space
Total Body in Water
with Less Bent.

Legs can be
stretched when
Body sits upright.

V-Shaped
Soaking Tub

And Foot and Leg
Bath.
"Shower in a Bag."

"Recline in a Bag."

"Work in a Bag."

Roll-out Tub Cover—
Free up tub surface for seating or lounging.

Shallow Soaking

Hand-held Soaper and Massager

Provides consistent soap and water during bathing.
Flip up shower -> flip down bathing tub.

- Gigantic shower ring - hose down from ring-shaped water pipe.
- "Wash-wall" stand next to it for gentle bristled massage. Sprays water and soap as it cleans a body standing next to it. Rotating bristles.
- Spin-around shower head, allows for all over spray from above.
VENTILATION

SHOWER/TOILET

HUMIDITY - LARGELY CAUSED BY SHOWER

ILLUMINATION

CRITICAL - IN A SHOWER BECAUSE OF ITS DAMPNESS AND DARKNESS. SHOULD BE REPLACED WITH A WARM, WELL-LIT ATMOSPHERE.

EXHAUST FAN

PANELS RADIATE BOTH HEAT AND LIGHT.

FLUORESCENT LAMPS.

HEATING COILS.
* Rotating shower heads - multi-directional.
* Move vertically along shower unit.

Controls

Hand rail

Optional accessory holder, pops into wall panel.

One-piece shower unit. Top view.

WALL
WATER INLETS
SHOWER HEADS
SHELVING STORAGE (SEE CLOSE-UP)

BUILT-IN SEAT

HANDRAIL

WOOD-SLAT FLOOR ALLOWS FOR USE AS A SAUNA.

SPRAYER RESTS ON HANDRAIL WHEN NOT IN USE.

HANDRAIL

ON-OFF BUTTON

SHOWER WALL

STORAGE SHELVING

SIDE VIEW

ROLL-TOP COVER
- 3 LEVELS OF WATER-SPRAYING.

- PUSH-BUTTON.

- EACH SHOWER HEAD ROTATES.
Different Types of Water Receptacles can be used with Modular Wall Panel Shower System.
Appendix B - Scale Model Photographs
Scale Model
Sink
Scale Model
Sink
Side View
Scale Model
Toilet/Bidet
Side View
Scale Model
Toilet/Bidet
View with Model
Scale Model
Shower
View with Model
Scale Model
Toilet/Bidet
and Sink
Scale Model

Bathroom
Bibliography

BOOKS


PERIODICALS AND PUBLICATIONS


