All About Dishwashers

Quiet and almost invisible in the kitchen cabinetry, today's dishwashers are made to clean and not be heard

BY ROE A. OSBORN

My folks were lucky: They had five dishwashers—my three brothers, my sister and me. All in all, we were pretty awful compared with our mechanical counterparts. Our daily whining was noisier than even the loudest dishwashing machine. We were notorious water wasters, and we often spent more time playing in the water than doing the task at hand. In the end, the dishes didn't get all that clean. Then, in the late 1960s, salvation arrived. As part of a kitchen remodel, my dad had a state-of-the-art dishwasher installed.

Do I still have to prerinse?

Today's dishwashers can do the heavy cleaning that their forebears had trouble with. Manufacturers have come up with ingenious strategies for getting dishes cleaner without anyone having to do a lot of work before the dishes go into the machine (sidebar below). Every dishwasher manufacturer I spoke with said that as long as hard food waste such as chicken bones and nutshells is removed, a dishwasher can handle the rest.

Todd Copitzky of KitchenAid (sources p. 102) says you can put a large pizza in one of their dishwashers and that it will be gone

Getting the most out of your dishwasher

If you think a trip through the dishwasher is a refreshing hot shower for your dishes, think again. The water in a dishwasher is much hotter than the hottest water at your tap. Sani-cycles can boost the temperature even more. And dishwashing detergent is harsh and caustic. It's little wonder that drinking glasses turn cloudy or that decorative glazes are erased from those plates that have been washed too many times.

at the end of the wash cycle. The Whirlpool folks offer a soak-and-scour cycle on their 1500 Series dishwashers that guarantees to remove any food from dishes, pots and pans.

In the soak-and-scour cycle, the wash cycle runs for 90 seconds; then the dishes soak for 16 minutes. The cycle then repeats continually over a four-hour period. After that, the machine completes a heavy-soil cycle. You've got 30 days to throw your worst dish-cleaning nightmares at this machine. If it doesn't get them clean, you get your money back.

It's all about getting soap and water on the dishes

Virtually every dishwasher on the market has one or more wash arms that spin under, above or between the layers of dishes. Heated soapy water is pumped into these arms, causing them to spin. Nozzles on the wash arms direct the water onto the dishes.

At first glance, these wash arms look pretty much the same from one model to another, but their designs can be quite different. The first difference is in the material the arms are made of. Most high-end dishwashers have stainless-steel arms that never rust or wear out (photo center right, p. 103). Lower-level models use other metals or plastic, which isn't nearly as durable (photo top right, p. 103).

The DCS dishwasher has a stainless-steel wash arm with a smaller arm on its end that rotates independently (photo bottom right, p. 103). The idea is to increase the sources and directions from which water hits dishes for maximum washing effect.

Another difference in wash arms is the number and size of nozzles that deliver water. The entry-level 1970s dishwasher at my house has just a few large square nozzles that spray water. Today's Maytag and Jenn-Air dishwashers boast 60 smaller nozzles, The smaller nozzles supposedly deliver a more even, consistent flow of water over dirty dishes.

Perhaps the biggest difference among water systems inside dishwashers is the way water is delivered to the upper dish rack. Many entry-level machines have a tower that telescopes up from the lower wash arm (photo left, p.100). The tower rotates and shoots water on the upper-level dishes. Other machines use a telescoping tower that feeds water to an upper wash arm.

The problem with these towers is that if dishes are placed improperly or if they shift during the rigors of washing, they can block the tower from telescoping, which drastically affects how well the machine does its job.

Most high-end machines have direct-feed wash arms. In addition to direct-feed wash arms, Maytag's top-of-the-line JetClean machines have a nontelescoping tower in the middle of the machine. An oscillating tip on the tower adds another level of wash power (photo right, p. 100). General Electric's Triton has three arms. The top arm is direct feed, and the middle arm is engaged with a tower.

The transatlantic dishwasher battle

Many dishwashers made in this country have built-in garbage disposals, while European dishwashers use pumps and filters to remove waste from water while water is being circulated. The American system can handle anything without clogging. All the crud that comes off your dishes is ground up to fine particles. American companies use their disposal systems to underscore the fact that prerinsing is unnecessary.

But the water that circulates and is sprayed on the dishes in most American-style machines is laden with all those tiny food particles. "Yuck!" say the Europeans. The water

GO EASY ON THE SOAP

The biggest culprit in wear and tear on dishes and glasses is detergent. Most of us just use too much of it. Most dishwashers have two hoppers for detergent, one for the prerinse and one with a lid that opens when the machine finishes its initial cycle. Jeff Ingerman of Zemel's TV & Appliance in Danbury, Connecticut, told me that for all but the heaviest cleaning loads, no soap is needed for the prerinse. The closed hopper needs to be filled only halfway for most loads in most dishwashers. More soap simply increases the concentration level of detergent in the water and shortens the life of your dishes.

NOT JUST FOR ASTRONAUTS

Dishwashers can suffer from mineral deposits. Ingerman tells customers with hard water to run the machine empty through a cycle with Tang powder instead of soap a couple of times a year. The citrus in Tang removes deposits. A product called Glisten does the same thing.

DIRTIEST FACE TO THE CENTER

Our dishwasher is an entry-level machine that has a tower with a single large nozzle to clean the upper rack of dishes. We used to have trouble getting the upper-rack dishes clean until I started loading the dishes with the worst side facing the center, where the water comes from. I saw an instant change in performance.

Jeff Ingerman also told me that it helps to run the hot water at the sink briefly before starting the dishwasher. When the machine starts off with the hottest water your tap can deliver, the soap is dissolved more quickly, and the dishwasher doesn't use a lot of extra energy bringing the water up to the wash temperature.

—R. A. O.

TOWERS OF CLEANING POWER

Towers are one way dishwashers send water to dishes. Some towers telescope under water pressure (photo left), but dishes have to be kept out of their way. Maytag machines use a stationary tower with an oscillating tip (photo right).

ENERGY STAR

By now we've all seen the logo: a little half globe with the word "energy" followed a star. Energy Star is a program started by the EPA in 1992 to identify and promote energy-efficient products. The program has now expanded to cover a wide variety of products from entire new houses to traffic lights.

Dishwashers are among the appliances rated for Energy Star compliance. Dishwashers receiving the Energy Star rating supposedly use 25% less energy than government minimum-energy standards. Energy Star machines save on both electricity and water, as well as the energy needed to heat water. For the environment, it means less carbon-dioxide pollution; for the consumer, it means lower utility bills.

To find out more about Energy Star dishwashers as well as other products, call the hot line at (888) 782-7937, or log on to the Energy Star Web site at www.energystar.gov.

—R. A. O.

that their machines circulate is continuously filtered so that only clean water is sprayed on dishes. Americans counter that this advantage is merely psychological. Here's why.

All the dirty water is drained away at the end of every cycle, so the water sprayed on the dishes grows progressively cleaner until the final rinse cycle, when the dishes (and the rinse water) are supposed to be clean.

The Euro-style folks counter that a small amount of dirty water stays in the drain pipe upstream of the pump; that water is then recirculated when the pump reverses from drain mode back to circulation mode.

Companies that use the American system are Amana, Whirlpool/KitchenAid, GE, Maytag/Jenn-Air, Frigidaire and Sears Kenmore (GE uses the Euro-system in its Monogram series dishwasher). All the foreign companies that sell dishwashers in the United States use the Euro-system. These companies include Bosch, Miele, Asko (which also makes dishwashers for Viking), DCS and Fisher & Paykel (made in New Zealand).

Dishwashers that think and taste

Next, American manufacturers decided to add electronic sensors that measure the amount of waste in wash water. These sensors literally taste the water to see if it's clean.

Sensor-equipped machines from GE, Amana and Frigidaire add additional cycles or extend the cycle if they sense that water is still dirty. Whirlpool and KitchenAid machines skim off the dirtiest water during the cycle and replace it with clean water.

Circulating and draining water at the same time takes two pumps, which all Euro-style dishwashers have. Two pumps run more coolly and more quietly, and take up less space than a single large pump. And a dedicated drain pump means that no residual dirty water is recirculated at the start of every cycle.

Both sides claim to have the better system, and both sides have drawbacks. The Euro-systems have filters that need to be cleaned regularly (photo left, p. 102), although most machines have back-flushing systems that supposedly need cleaning only on rare occasions. These accessible filters can save a dishwasher from costly repairs by catching debris such as broken glass that can literally shred a dishwasher's innards.

At the same time, high-end American machines both filter the water and grind the waste, although most do not have a fine mesh filter that's easy to clean. European machines lose the price war with entry-level American dishwashers, which start at about half the price of their European counterparts.

How many settings do you need?

Every dishwasher gives a choice of wash settings. Even the entry-level dishwashers from Maytag, Kenmore, Whirlpool and GE have four cycles, while the Amana and Frigidaire entry-level machines each have five and six cycles, respectively.

These cycles typically include a heavy-duty or pots-and-pans cycle, a normal cycle, a light-duty or short cycle and a rinse-and-hold cycle, which gives dishes a soak but not an entire wash. Rinse and hold is great for those times when you have dirty dishes but not enough for a full load, taking the worst of the food off the dishes before it can dry on.

As machines increase in quality and price, the choices in cycles also increase. Sensor-equipped dishwashers from Maytag, GE and Whirlpool automatically adjust the water temperature and the length of the cycles according the amount of food waste in the water. Many machines offer a china-and-crystal setting, the equivalent of the delicate-fabric cycle on a washing machine.

Another popular cycle offered on nearly every high-end dishwasher is a sanitizing cycle. On this setting, the water in the dishwasher is heated to a temperature that kills household bacteria. This temperature varies from manufacturer to manufacturer, but a wash in the sanitizing cycle supposedly leaves all the dishes and cutlery germ free.

This cycle is particularly useful if you need to sanitize baby bottles, and if you make your own beer or jelly, it's a great way to sterilize the bottles before they are filled.

Many machines allow you to adjust water temperature for washing as well as for rinsing dishes. Some machines even have a cold-water rinse to save energy (sidebar facing page).

Perhaps the smartest feature offered on today's dishwashers is the delayed-start function. In these days of brownouts and rolling blackouts, when an appliance is run can be as important as which setting is used. With delayed start, the dishwasher can come on in the wee hours when energy demand is at its lowest. Delayed start also means that even minimal noise from the dishwasher doesn't need to bother you while you're in the kitchen.

Dishwashers dry the dishes, too

Dishwasher manufacturers should be applauded for offering energy-saving drying cycles on virtually every dishwasher. Even our old 1970s harvest-gold dishwasher offers a choice between a heated drying cycle and an energy-saver cycle that circulates room-temperature air.

High-end machines such as Miele's allow you to customize drying temperature. The heated dry cycle can also warm plates before dinner, although some manufacturers offer plate warming as a separate cycle. Many European machines dry dishes by sucking the warm, moist air from the dishes down to the cooler area at the pump. Here, the moisture condenses and is drained away. No steamy air is pumped into the kitchen in the process.

One issue about drying dishes is where the air for the drying cycle comes from. Most machines draw air from inside their own cabinet, which can end up smelling as bad as the cabinet under the sink. I doubt you'd want that air anywhere near your dishes. Dishwashers from Viking and Asko draw air from the kitchen for their drying cycles.

Is that thing running?

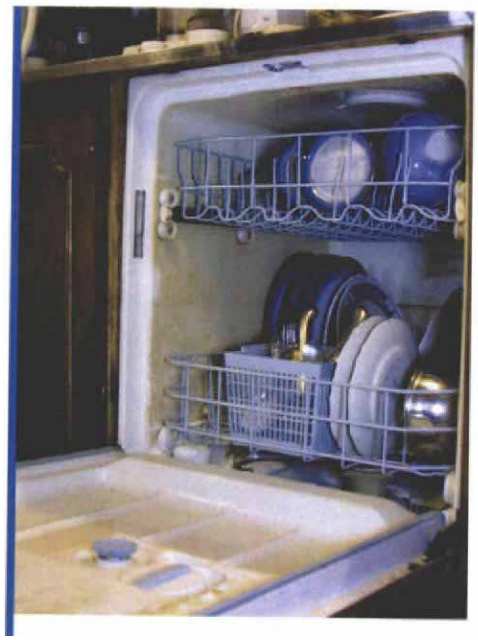
Our old dishwasher is loud enough to drown out two barking Jack Russell terriers. But today, noise is not as great a factor: All dishwashers are acceptably quiet.

Even machines at the entry level have been designed for noise reduction. Above that level, new dishwashers barely murmur. All noise levels that manufacturers quote for their high-end machines are in the low 50s or upper 40s decibel range. Of course, every manufacturer claims to have the quietest machine. But the difference between 51 db. and 49 db. is like the difference between a purr and a whisper. Rest assured, most of today's dishwashers won't be interrupting even the quietest kitchen conversations.

So how did they squeeze the noise out of the machines? The first thing was to add insulation in the door and around the tub. In addition to making the machine quieter, insulation keeps heat in the dishwasher, making it more energy efficient. Next, companies focused the nozzles on the spray arms away from the door, which eliminates the rhythmic whoosh that is the trademark sound of older dishwashers.

A third step is using two pumps. As I mentioned previously, two small pumps operate much more quietly than a single large pump. The pumps as well as the other moving parts in most dishwashers have been engineered and built to operate more quietly.

One of the cleverest noise-reduction strategies I've seen is the three-stage filter system



TALE OF TWO TUBS

Dishwasher tubs can be made either of plastic or of stainless steel. Plastic tubs can break down and discolor over time (photo left), while stainless steel looks and performs like new for the life of the machine (photo right).

Tall tubs can be a pain in the back. Streamlined dishwasher pumps and motors have allowed for taller tubs and deeper upper racks that can hold large dinner plates or stemware loaded upright. However, you have to bend farther to access the bottom rack.

Removable filter can save a dishwasher. European-style dishwashers have mesh filters that can catch harmful debris such as broken glass before it can damage the inner workings of the machine.

DISHWASHER CONTROLS

Entry-level machines use buttons and dials to select cycles and turn on the machine (photo top left). Machines at the next level use electronic touch-pad controls (photo bottom left), and top-of-the-line machines have fully integrated controls concealed in the door (photo right).

Sources of dishwashers

Amana
(800) 843-0304
amana.com

Asko
(800) 367-2444
askousa.com

Bosch
(800) 944-2904
boschappliances.com

DCS
(800) 433-8466
dcsappliances.com

Fisher & Paykel
(800) 863-5394
fisherpaykel.com

Frigidaire
(800) 374-4432
frigidaire.com

General Electric
(800) 626-2000
geappliances.com

Jenn-Air
(800) 536-6247
jennair.com

KitchenAid
(800) 422-1230
kitchenaid.com

Maytag
(800) 688-9900
maytag.com

Miele
(800) 463-0260
miele.com

Sears Kenmore
(800) 349-4358
sears.com

Viking
(888) 845-4641
vikingrange.com

Whirlpool
(800) 253-1301
whirlpool.com

on the Viking machine. While the first two filters are designed to remove food particles, a third filter takes tiny air bubbles out of the water to reduce gurgle.

A word about tubs

Dishwasher tubs are made either of plastic or of stainless steel. Plastics have come a long way in the past 30 years. Plastic tubs in today's dishwashers are much more durable and less likely to break down in the harsh environment inside a dishwasher.

The drawback to plastic tubs is that even the best of them eventually break down and discolor (photo top left, p. 101). On the other hand, stainless-steel tubs are forever (photo top right, p. 101). Nearly every company offers stainless-steel tubs in its high-end machines. These tubs add a bit to the price tag, but the upgrade is worthwhile.

Dishwasher tubs are not all the same size. The two-pump system permits bigger tubs, so the upper rack can hold stemware upright or full-size dinner plates (bottom photo, p. 101). The upper racks in tall-tub machines are adjustable so that extra-tall items fit below. The price you pay for this extra space is having to bend over farther to reach lower racks. Companies with a tall-tub feature are Whirlpool, KitchenAid, Miele and Bosch.

Controls: Some you see, some you don't

My folks' old dishwasher had buttons to depress for the various cycles. Lean against the machine the wrong way, and you'd be warming the plates instead of washing them. Most of those systems were replaced by rotating knobs. Just about every entry-level dishwasher today turns on with a knob rotated to the desired cycle (photo top center). These knobs are analog switches that make a mechanical connection to work.

In this age of electronic wizardry, though, analog switches are passe. It comes as no surprise that as dishwashers increase in quality, electronic touch-pad controls replace knobs. The first step up in quality puts electronic controls mounted in the face of the dishwasher (photo bottom center).

The latest craze in dishwasher controls, again with almost every dishwasher maker, is fully integrated electronic controls with the touch pad in the top of the door. When the door is closed, no controls are visible (photo right).

The problem with fully integrated controls is that they come on the highest-quality machines, which also happen to be the quietest. If you can't see the controls, it's tough to tell if the machine is running. Dishwasher doors can be opened before cleaning is finished.

Now many companies that make machines with fully integrated controls incorporate LED readouts on the front of the machine to let you know if the machine is on and how much time is remaining before washing is complete. The DCS dishwasher has what they call a peekaboo door. When the machine is running, the door panel slides down a short distance to reveal the readout.

What's inside drawer No. 1? Fisher & Paykel gave dishwashers a new twist by putting them in drawers instead of behind doors. Drawers allow greater flexibility for washing as well as being easier to load and unload.

I was amused to discover that the Viking dishwasher with fully integrated controls was not Viking's most expensive model. Viking's Designer series features fully integrated controls, but the more expensive Pro series dishwashers are controlled by—you guessed it—knobs, really big knobs to match the ones Viking puts on its fancy stoves.

In general, dishwashers are the most adaptable kitchen appliances. No matter what the quality level, most machines can be given a face panel to match whatever finish you have in your kitchen, as well as the standard white, off white, black or stainless steel. Some, such as the Viking Designer series, even come in a variety of beautiful enamel colors to match their other appliances.

Dishwasher in a drawer

Most dishwashers have one thing in common besides water, soap and dirty dishes: They have doors. But an ingenious appliance manufacturer from New Zealand, Fisher & Paykel, built its dishwasher in a drawer (photo above).

Each Fisher & Paykel drawer is mounted individually, so drawers can be stacked one atop the other, be mounted side by side or be put in different areas of the kitchen. With the drawer just below the countertop, no bending over is required to load and unload the machine. Many owners of dishwasher drawers also use them for dish storage.

Fisher & Paykel's machines are among the priciest of the dishwashers, running between $1,200 and $1,400 per drawer. They have models equipped with fully integrated controls, and the dishwashers come in a variety of styles and finishes.

The best appliance bargain on the planet

In my travels, I've visited kitchens that cost many tens of thousands of dollars, and I've been astounded to see entry-level dishwashers in them. In many cases, homeowners paid more for a kitchen faucet than they did for a dishwasher.

Entry-level dishwashers start at about $220. Think about that. A built-in appliance with pumps, valves and complex controls costing less than some fancy toasters. For just a few hundred dollars over the entry level, you can get a top-notch, energy-efficient dishwasher with electronic controls, stainless interior and a wide choice of cycles and settings. In general, expect to pay a bit more for European-style machines than for their American counterparts.

If you decide to throw caution to the wind and get the most expensive dishwasher on the planet, you'd be hard-pressed to spend $2,000. In this day and age of stoves and refrigerators that can tip the scales at more than ten grand, a dishwasher might just be the best bargain in your kitchen. □

Roe A. Osborn, *Fine Homebuilding* managing editor, no longer suffers from dishpan hands. Photos by the author.

ARMED BUT NOT DANGEROUS

Rotating dishwasher arms are the primary systems for delivering soap and water to dishes. Stainless steel (center photo) is the best choice for durability. Plastic arms (top photo) can break down over time. DCS puts a small arm on the end of the main arm to deliver more water in more directions to the dishes (bottom photo).