Fears surrounding appliance failures in the wake of technological innovations are by no means new. A New York Times article published in 1984, “The Digital Revolution Breeds Smart New Appliances,” stated: “For better or worse, the digital revolution has come to the laundry and kitchen. Appliances are beeping, blinking, flashing messages and signaling when doors are ajar, cycles over and motors burned out . . . Quality has improved because of increased automation in factories – but so has appliance complexity, oftentimes with irksome results.”
Fast-forward 30 years and that still holds true. Innovation in the home continues to move forward at a rapid pace and appliances are more complex than ever. However, today that can lead to more than just “irksome results”; in many cases, it means an increased risk of fire and flood.

In Canada, approximately 1 out of 5 residential fires start in the kitchen — more than in any other room in the house — and water damage (caused by water main breaks, overflowing appliances and hot water tank leaks) has replaced fire and theft as Canada’s largest source of claims. A significant number of the residential fires and floods that we investigate start in the kitchen or laundry room. I would like to take this opportunity to walk through the typical appliances found in those rooms and explore how and why each one can fail.

THE KITCHEN

OVENS AND RANGES

In Ontario, 18 percent of fires in kitchens are cooking fires, and of those, nearly three quarters start on the range cooktop. You may be surprised to know that both electric and gas ranges are equally likely to be involved in a fire. However, the risk for a fatality is four times greater with gas appliances due to gas leaks and because the open flame from a burner can ignite combustible materials such as curtains, loose clothing, towels, etc.

One important thing to note with respect to recalls — and certainly something that has changed since 1984 — more appliances and components are now being manufactured overseas. Consumer Reports says that almost 4 of every 5 recalls involved products made outside of the U.S., with the majority coming from China. And in the case of ranges, these malfunctions have the potential to cause extensive physical damage if any food or any combustible materials are left on the cooktop.
One of the first things I check when investigating a kitchen fire is whether a recall has been issued for any appliance on the scene. If not, and assuming no evidence of failures is discovered, I then have to consider user-related causes.

When it comes to ovens and ranges, most user-related causes boil down to carelessness, distraction or haste. As previously mentioned, one common user-related cause of fires is the accidental activation of a cooktop. Again, electric ranges are prone to this, but also any model with front controls – both electric and gas.

Self-cleaning ignition scenarios often simply come down to people keeping combustible materials too close to, or even inside, the oven. The self-clean is a feature that works by raising the temperature to over 800 degrees Fahrenheit and incinerating any food inside to ash.

Towels, cookbooks or oven mitts left inside the warming or storage drawer can ignite during the self-clean cycle. In the case of gas ranges, those items can even ignite during normal use.

There are many variations of user-related causes, but unattended cooking is the number one cause of range fires, by far. That said, one should never assume. Sometimes a seemingly open-and-shut case, where the insured says they left the stove unattended, turns out to be a not-so-innocent incident upon further investigation. When a range is used to stage an arson, certain clues may survive the fire, such as combustible materials like towels that people place over the cooktop as a mechanism to spread the fire beyond the range.
MICROWAVES AND BLENDERS

Microwaves present two common causes of fire: Improper usage and internal defects. Improper usage includes unintentionally over-heating items (accidentally setting the timer to 30 minutes instead of 3 minutes) or microwaving foods that can ignite, like bacon or carrots (carrots are effective conductors of electricity and can act as miniature lightning rods under certain conditions created inside a microwave). The second common cause of fires in microwaves is internal defects, usually related to circuit board failures.

Blenders do not commonly catch fire for two reasons: They are not heat-producing appliances and they are generally only used for short durations. However, where early blenders only had an on/off switch, modern blenders have circuit boards and processors, as well as high powered motors, so the potential for a defect is present, especially since they are exposed to liquids.

REFRIGERATORS

People do not normally think of refrigerators as posing a fire hazard, but they have heaters and draw plenty of electrical current. And unlike ranges, fridges are constructed with more combustible materials which can provide fuel in the event of a fire. A common defect in fridges is a relay failure. A relay is an electrical component that turns on a fridge’s compressor. The compressor circulates coolant which absorbs the heat inside the fridge, cooling down the air. However, an electrical phenomenon called arc tracking can cause the relay to overheat and ignite the surrounding plastics.

COFFEE MAKERS AND KETTLES

During the 1990s coffee maker fires became so common that arsonists started tampering with them to simulate a well-publicized mode of fire ignition. Due to tightened safety regulations, coffee maker fires have become less common, but they still have the potential to fail. Both coffee makers and kettles can overheat if their internal safety devices malfunction and they do not shut off as they should.

TOASTERS

The two most common causes of toaster fires are misuse and product defects. Misuse includes overheating greasy, oversized or sugary foods to the point where they ignite. The most common product defect in toasters is the failure of the switch that provides power to the heating elements. This causes the toaster to stay on indefinitely, igniting food inside and anything else in its path, including curtains, paper towel rolls, and low cabinets.
**DISHWASHERS**

Prior to the rise in the popularity of dishwashers in the late 1970s, dropping a plate was the worst thing that could happen while doing the dishes. This past October, over half a million dishwashers sold between January 2013 and May 2015 were recalled because the power cords could overheat and catch fire. However, the most common causes of dishwasher fires are the infiltration of water, detergent or rinse-aid on the control circuit board(s), and the heating element overheating. Failure of the heating element, which frequently results in the ignition of the plastic tub, can be especially destructive.

**THE LAUNDRY ROOM**

**DRIERS**

Dryer fires generally fall into three categories: Manufacturing defects, installation errors, and misuse. Common failures related to manufacturing defects include:

- Heating element failures
- Motor failures
- Electrical arcing events
- High resistance connections

Heating element failures in dryers, similar to those in dishwashers, are not uncommon and can cause incredible amounts of damage. Another cause of dryer fires is due to the improper installation of the exhaust.

The exhaust’s job is to expel moisture from the dryer. The length of straight sections, how the ductwork is positioned, and what it is constructed of determines air flow characteristics through a dryer. If airflow is insufficient or impeded by lint, kinks or excess ductwork it can contribute to a fire.

Sometimes a load of laundry will ignite through no fault of the dryer, but due to misuse. Usually, because it contains things that should never be in a dryer, like cushions, butane lighters and plastic tablecloths. Having the load of laundry available for review is extremely beneficial for an investigation, and should always be kept.

**WASHING MACHINES**

The most common causes of water losses in washing machines are:

- Solenoid valve failures
- Circuit board/control malfunctions
- Hose failures

Solenoid valves are also present in kitchen appliances such as dishwashers and refrigerators. Regardless of the appliance, the job of a solenoid valve is to open when told, allowing water to flow into the appliance and then close, shutting off the water supply. There are many types of failures, such as stress cracking, freezing, and installation errors. Sometimes small bits of debris get caught in the valve and prevent it from closing after it has opened – that is when a flood situation takes place. If the valve does not cut off the water supply, water will keep flowing into the drum, eventually spilling over.
One type of failure that has become more prevalent as the appliances have become more technologically advanced is circuit board and control malfunctions. Circuit board failures can result in a fire but we are also seeing malfunctions that lead to floods. This can happen when people use too much detergent, which causes an overflow of bubbles into the housing of the washing machine. Those bubbles can come into contact with the circuit boards and cause future malfunctions.

The third most common cause of washing machine water losses is hose failures. Hose failures happen for a number of reasons. Age is one important factor, with studies showing failure rates increase dramatically in hoses over 5 years old. The materials themselves can fail, causing the reinforced rubber to crack, leak or burst. And installation errors such as not leaving enough slack in the line to prevent kinks or bends are far from uncommon.

The advancement of technology in the home has made our lives infinitely easier. We no longer have to manually light our ovens – or use them at all if you are a fan of microwave cooking. Dishpan hands are a thing of the past, and even your teenage children can learn to do the laundry (whether they do it is a different story). But risk always increases proportionately with reward, and the fallout from a dryer installation error is much worse than that from a clothesline. Fortunately, knowing is half the battle, and armed with this knowledge we have been able to determine the cause of numerous kitchen fires, originating from all of the above-mentioned appliances.