Flush for success

There is a lot of confusion about power flushing. Heating engineers often refer to chemical flushing, hot flushing, and back flushing, and there are still engineers who take radiators outside and flush them out with a hose. Tarquin Purdie at Powerflush looks at the benefits of power flushing, and talks us through how Powerflush would tackle an open system with an accessible pump.

Power flushing is often described as a 'green and money-saving service'. I believe it is vastly underestimated. Power flushing does save fuel and therefore cost, but it is the ability to extend the life of the pipe systems, therefore reducing the need to replace copper pipework, and repair damage to floors and walls, and the later redecorating and floor fixing which I see as a huge benefit both environmentally and financially.

We define power flushing as cleaning corrosion and scale debris out of radiators, pipes and boilers as thoroughly as possible. This will always include a powerflush machine, a power flushing magnetic filter, chemicals, heat, surface temperature readings, vibration, TDS and pH readings, corrosion inhibitors, and a thorough and methodical approach to maximise the result in the time frame available to carry out the job. Often it will also include checking for and clearing blockages (ie, in the cold feed), attempting to clean the hot water side of combination boiler plate heat exchangers,

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divertor valves, thermistors, and trying to reduce boiler kettling.

The single biggest factor why power flushing is growing so quickly as a vital part of boiler installation is the high risk of blockages in low water content plate heat exchangers, and other sensitive components in combination boilers such as divertor valves and thermistors.

Some large service companies and boiler manufacturer engineers prefer to fit strainers or magnetic filters on return pipework to protect their boilers, and while we do see the benefit of these devices, we believe they are an 'addition' to having thoroughly cleaned the system initially.

Without halting the corrosion process the boiler will still become contaminated. Even large power flushing magnets do not pick up all corrosion debris in one pass (the clear chambers allow us to see that some rust does indeed get past). And, of course, filters do not stop the rest of the system becoming blocked by rust, air-locked from corrosion by-product gases, or simply corroding away. Replacing system pipework is probably the most expensive and disruptive central heating project an existing homeowner faces, so avoiding this wherever possible is essential.

Infrared thermometer used to detect corrosion debris cold spots and confirm when cleared

How it's done…

Powerflush tackles an open system with an accessible pump.

Set-up

We remove the circulator pump and connect a magnetic filter and then our Powerflush equipment. It is very important to connect at the pump as successful power flushing is about having maximum control over flow – connecting at a radiator reduces flow and the control of it.

Power flushing often involves clearing blockages and the classic power flush blockage is the cold feed. First the feed and expansion (F&E) cistern mains supply is stopped by turning off valves or tying up ball cocks, and we cap off the air vent.

We then check to see if there is a blockage by opening the pump valve in the cold feed direction and if all is clear the feed tank contents drop into our empty powerflush container. If they do not, we cut the feed pipe 20cm above where it joins the system pipework, with bucket and towels handy, and we manually clear the blockage.

Sometimes cutting out and renewing this area is a good idea, but this depends how far your customer wants you to go. We now reconnect the cold feed with a full-bore ball valve and turn it off so that we have a closed system. We now open the other pump valve and can start circulating the system water so that it leaves the pipework and radiators carrying loose corrosion debris to the powerful magnetic filter and the rust (which is magnetic iron oxide) sticks to the magnet and is largely removed at this point. We always try to keep our power flush machine clean and filter the water before it enters the boiler heat exchanger.

Add chemicals, loosen and filter rust

The filtered water goes on to the power flush pump where a chemical cleaner is added. Whether an acid-based chemical or a milder non-acid chemical is used is based on the engineer's experience: either way someone will always claim you made the wrong choice. Those responsible for the boiler heat exchanger do not want an acidic flushing chemical to be used when there is an aluminium heat exchanger, but the person paying for the power flush wants a guarantee that their system is thoroughly clean. The water and cleaning chemicals then pass through the boiler and get hot. It is very important that the chemicals get hot for two reasons;

i) Chemical reactions double in reaction speed when the temperature increases by 10°C, therefore by increasing temperature by 50°C the cleaning efficiency is increased many times.
ii) As the hot chemicals pass through the radiators we can use our infrared thermometers to measure the radiator surface temperature. Where there is good flow we see high temperature readings; where there is corrosion debris build-up we see cold spots. The heat contrast enables us to see where the debris is and we can then vibrate these areas, reverse the flow, add more chemical etc until the whole surface reaches a uniform temperature. There will still be a layer of rust on the inner radiator surface so we close the radiator valve and leave the hot chemicals to soak in. We then repeat this process one by one for each radiator and the hot water coil until everything has soaked.

SDS vibration with PTFE head loosens corrosion debris at cold spots and lifts debris into flowing water

Whilst waiting for the system to heat up it is a great time to clean out the F&E cistern, either in situ or outside depending on the risk of causing other problems. After the last radiator is hot all over we close it and open the hot water cylinder circuit, which is rarely blocked but can occasionally have surprises of its own – ie, blown hot water coil. We then close off the hot water coil.

Purging

Once everything is soaking we open the mains water connection into our power flush machine and open the valves on the radiator which has been soaking for the longest. The clean water is now sent along the system flow pipes, through this open radiator and back along the return pipes. At this point we isolate the magnet filter so that we can assess the water condition and we dump the water down a drain.

After a while the water will start to run clear. We then vibrate the bottom of the radiator to loosen stubborn adherent debris that is then carried out of the radiator by the flow. This ensures that as much rust and corrosion debris is removed as possible.

We continue purging and taking TDS (Total Dissolved Solids) & pH readings (the latter if we are using acid based cleaners) of the dump water until we have clean pH neutral readings and then we close off the radiator. Changing flow direction is useful but vibration is even more effective. One by one this process is repeated for each radiator, and then the hot water coil until all are clean and pH neutral.

Neutralise, inhibit, disconnect and balance

Although we take pH readings until the system water is neutral, we add a small amount of alkali neutraliser to the system in case any acidic cleaner is hiding on radiator surfaces, purge this from the system, and then add a DWTA approved corrosion inhibitor. We then disconnect our equipment, and replace the circulator pump and balance the system.

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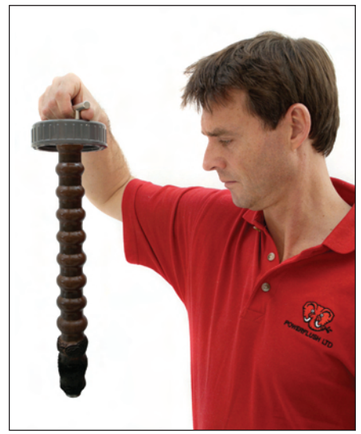

Magnet filter shown 'before' in the left photograph and 'after' in the far right picture.

Pay back!

Many heating engineers choose not to power flush because:

- They do not have time to allocate from their busy work schedule.
- They do not have or want lots more equipment (pumps, magnet filters, SDS vibration etc).
- They have had poor results and customer call backs when power flushing.

Powerflush Ltd pays £50 for each job referred to them by heating engineers. They only do power flushing, so there is no worry that they might poach other work. Any secondary work from a specific job is always referred back to the introducing engineer if he or she wants it. For further information, contact Tarquin Purdie at Powerflush Ltd on 0800 7317939.