Instrument management - clean then sterilise

By Terri Slough, RDH

Ultrasonic cleaning is by far the most effective method of cleaning to remove fine particles from all areas of dental instruments, particularly hinged and serrated instruments prior to sterilising. A detailed study confirmed that ultrasonic cleaning is at least sixty times faster than a manual hand cleaning operation.

When used correctly, an ultrasonic cleaner eliminates splatter that would otherwise be generated by the manual scrubbing brushes and reduces the handling of instruments that could lead to sharps injuries.

Ultrasonic cleaners featuring a sealed construction, such as the Soniclean bench top ultrasonic cleaners, provide a higher level of asepsis and with their smooth wipe down surface will prevent cross-contamination of micro-organisms, dust and chemicals that can harbour in the open construction type models.

How do ultrasonics work

Ultrasonics is just sound frequencies above 18 kHz, which is above what you can hear. In an ultrasonic cleaner the energy is in the form of a wave motion that is transmitted to the cleaning solution by transducers located on the underside of the machine.

When the ultrasonic generator is activated the transducers generate millions of bubbles that implode upon reaching a high pressure. When the fluid surrounding the bubbles collapse it generates enough force to create shock waves upwards of 20,000 pounds per square inch (PSI) on a microscopic level. This process is called cavitation and it is the essence of the cleaning mechanism of ultrasonic cleaners: the shock waves dislodge fine particles from the surface of contaminated instruments in the solution bath.

It is important to note that ultrasonic cleaners are not designed as washers. Grossly soiled instruments must be pre-cleaned before ultrasonic processing.

It is the wave frequency that greatly affects the cavitational force - the power. Traditional bench top ultrasonic cleaners have multiple transducers with a fixed frequency signal. Problems can arise when the transducers do not all adapt to exactly the same quality of vibration (resonant frequency). An uneven cavitation can lead to hot spots and standing waves that result in uneven cleaning and damage to fine parts and edges of instruments.

Always use a suspended basket so that instruments are never sitting directly on the bottom of the tank as this will reduce the output of the transducers, etch the bottom of the tank and dull the instruments. Also, ensure the ultrasonic cleaner is on a stable, clean and dry surface to avoid moisture deterioration of the transducers.

Pulse Swept Power

Soniclean is an Australian company and a global leader in manufacturing innovative ultrasonic technology and solutions for precision critical cleaning. Soniclean's patented technology of Pulse Swept Power works by sweeping the wave frequency just slightly above and below the fixed frequency signal with frequencies resonating over 135 kHz bandwidth.

The transducers match their frequency to the rate of sweep, which eliminates hot spots and standing waves. The result is maximum efficiency independent of water levels and the confidence in knowing that even tiny crevices will get a powerful cleaning that will ultimately extend the life of valuable instruments.

Cleaning solution

Plain water cavitates poorly and a suitable ultrasonic solution should be near neutral, a little bit on the alkaline side, and should not contain ammonia (high level alkaline) or phosphates (soap). A high alkaline solution can cause skin irritation, whereas a highly acidic solution can cause distinguishing pinholes to form in the bottom of the tank. Follow the instructions for the water to solution ratio, generally around 40 parts water to 1 part solution.

Change the ultrasonic cleaning solution at least once a day. Old solution loses its ability to emulsify and hold the debris, which re-deposits dirt on the instruments and produces a sludge build up on the bottom of the tank that can inhibit the output of the transducers.

Every time a new solution is placed in the ultrasonic cleaner, the solution must be degassed for the most effective cavitation. Cavitation bubbles that are formed in liquids containing gas do not collapse all the way, which lessens the strength of the implosion reducing the ultrasonic effect. Degas a new solution by running the covered ultrasonic cleaner for a few minutes to allow small gas bubbles to group together and rise to the surface of the solution.

Maintenance

A malfunctioning ultrasonic cleaner is difficult to detect both audibly and visually. You could lose half your transducers and not know it because there won't be any change in the sound and the water bath will still display motion. A simple foil test following degassing, using lightweight household aluminium foil, and compared to previous results, will demonstrate if the ultrasonic cleaner is operating at its normal power level.

The foil should be cut to a width just short of the length of your tank and extend downward to the tank bottom, but not touching the bottom. Hold the foil steady and run the ultrasonic cleaner for twenty seconds. Date the foil after air drying, taking care not to wrinkle the foil.

You are looking for a result where the foil portion submerged into the solution is uniformly peppered with tiny pebbling. Areas greater than 1cm square that have no pebbling indicate a possible problem in the unit. Immediately re-test, using new foil, to substantiate the failure and then commence servicing. Retain your foil tests to substantiate proper performance and maintenance of your equipment.

The Soniclean bench top ultrasonic cleaners come in 3L, 6L and 10L sizes and exclusively distributed by Gunz Dental Pty. Call 1800-025-300 or 0800 301 010 in New Zealand to place an order or request additional information.