

Degritter

Ultrasonic Cleaning with Degritter RCM

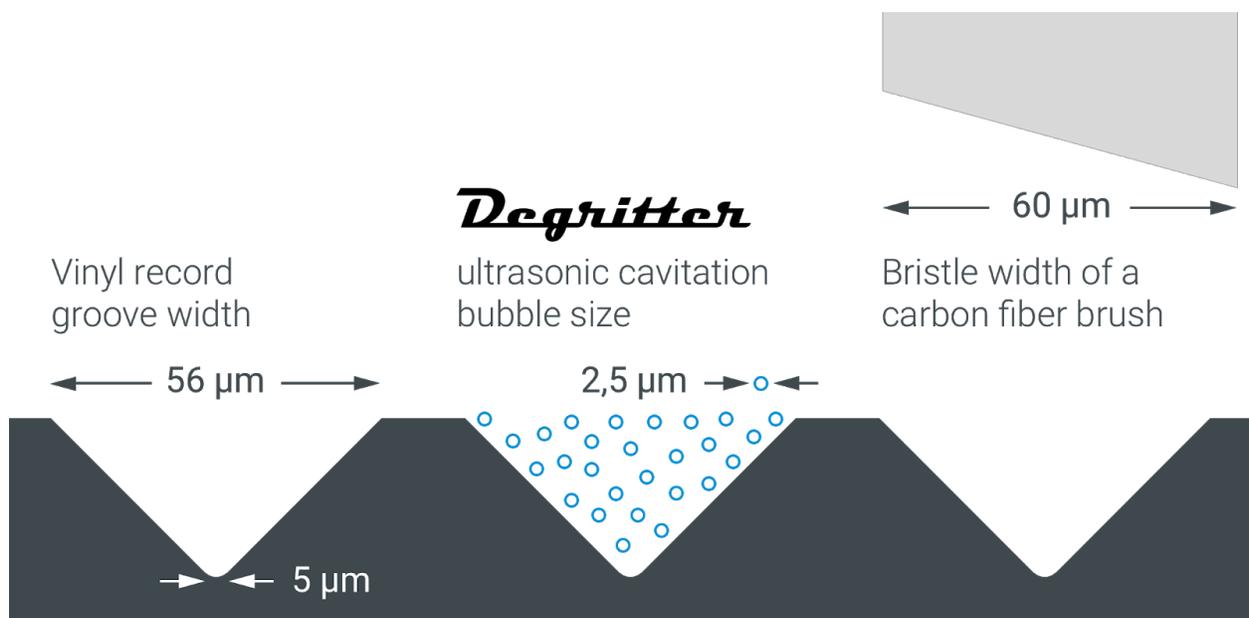
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Introduction

Ultrasonic cleaning used by the Degritter record cleaning machine is a technology unique in its ability to remove contaminants from record grooves that due to their size cannot be easily cleaned by other traditional means.

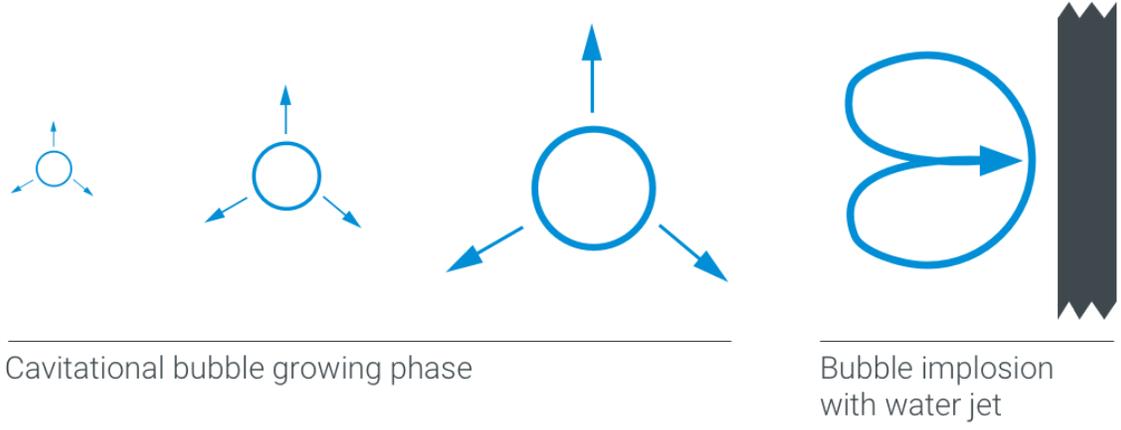
Smallest measures in a vinyl record groove have a size of a few micrometers[2]. Bristles of a typical vinyl cleaning brush are unable to reach all surface features due to their larger size.

Brushes are also used in the common "vacuum" type record cleaners. These are able to remove most of the grease and oils, but they cannot access the minute particles lodged deep within record grooves[1]. The same applies to hand scrubbing records with a combination of fluids and brushes.



Ultrasonic cleaning

Ultrasonic cleaning works by agitating the cleaning medium with high frequency pressure acoustic waves. This creates a large number of microscopic vacuum bubbles in the medium, a phenomenon called cavitation. With every ultrasonic wave the bubbles form and grow until they reach a critical limit and collapse, releasing energy as heat and minuscule strong water jets. This combined effect can thoroughly clean adjacent surfaces [3].

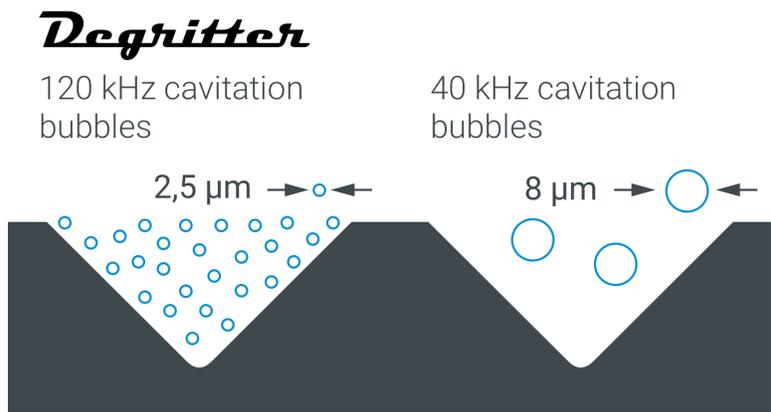


Ultrasonic frequency

Size of cavitation bubbles is inversely related to the ultrasonic frequency. The higher the frequency, the smaller the bubbles. Having higher ultrasonic frequency also means that the energy per bubble is smaller[4] when compared to lower frequency systems and the chance of eroding adjacent surfaces is lowered[5]. When comparing two ultrasonic systems with equal power output and different driving frequencies, the system with higher driving frequency will have more bubbles, as smaller bubbles are more easily formed[4].

This means that using **higher ultrasonic frequencies** with the same power output results in **more delicate**[5][6] and precise cleaning effect with **better cleaning energy distribution**[4].

Because of this the Degritter record cleaning machine uses **120kHz ultrasonic frequency** opposed to the most common 40kHz.

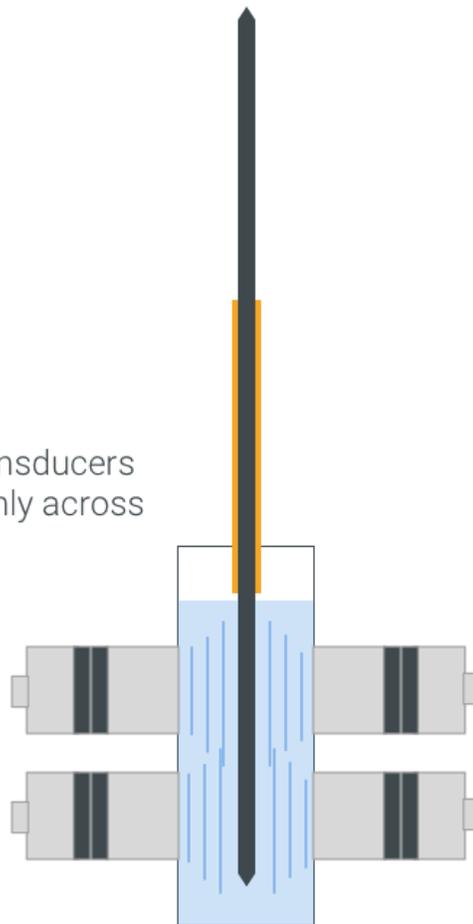


Cleaning power and ultrasonic tank

Two important factors that affect ultrasonic cleaning effectiveness are output power of the cleaning system and the layout of the ultrasonic cleaning tank. With more power, the number of cavitation bubbles increases while the cavitation bubble size remains the same, the more bubbles the better the cleaning[4]. Also, the cleaning effect is stronger near the ultrasonic transducers (emitters)[4].

For this reason Degritter record cleaning machine has a custom ultrasonic amplifier with 300W output and ultrasonic cleaning tank designed for cleaning vinyl records.

4 ultrasonic transducers
distributed evenly across
record surface



Automated temperature management

With every ultrasonic cleaning solution, the energy used to drive the system will transform into heat and a big portion of it will dissipate in the water. This means that all ultrasonic cleaners will gradually heat up the cleaning solution.

This is beneficial to a degree as ultrasonic cleaning is more efficient in a warmer solution[7]. The optimal water temperature for cleaning records with ultrasonic cleaners is between 25 - 35 degrees Celsius. Temperatures over 40 degrees can subject the records to heat damage and at lower temperatures the ultrasonic cleaning is not as effective.

When a larger number of records are washed consecutively with Heavy washing programs, the water in Degritter's external water tank will eventually heat up. Once this happens the user can either replace the water with cooler one or wait a bit to let the water cool.

To prevent water temperature from rising above 35 degrees, the Degritter machine comes equipped with two temperature sensors. These monitor the water temperature, regulate cooling fans and automatically cancel the washing program when the temperature exceeds 35 degrees.

Conclusion

Ultrasonic cleaning with the right frequency and power output is perfect for cleaning records, as it is capable of removing even minuscule contaminants from the record's groove. Degritter record cleaning machine is designed to provide the best record cleaning solution with higher ultrasonic frequencies, custom ultrasonic tank design, and high power output.

References

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