Ultrasonic Aided Cutter

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Knives have several uses, varying from simple domestic uses to complex uses such as those used for precision purpose such as surgery. Being manual, their effectiveness is limited as human efforts have to supply the force needed for its cutting operations and this has resulted in causing unintended damages and the cutting edge being contaminated by the media it is being used on. This project seek to address these limitations. The knife like cutting system is powered by a 12V power adapter. The oscillator, SG3524 inverter multi-vibrator was used to drive 2 sets of MOSFET IRFP 450 transistors which powered the power transformer which is in a Push-Pull mode consisting of 10 turns 17 S.W.G. in the primary coils and 56 turns of 24 S.W.G. in the secondary coils with an output of 280V and 0.25A. The current was transmitted to the piezo-transducers at the base of the cutting edge which invariably vibrate based on the frequency of the power supply, 40 KHz. The pulse width released varies directly with the power released into the piezo-transducers and this was controlled by a rheostat. The vibration creates cavity in the water molecule, the pressure causing a non-audible nor visible implosion releasing energy at plasma level of 3000 cycles per second at micro level, causing the media to open up. The knife cuts through selected media; leather, paper, nylon and plastic far easily and accurately then when manually driven. The flash temperature produced dried up the water molecule on the blade, sterilizing the blade and making it last longer because of the minimal contact with the water molecule. Further development of the device will go a long way in reducing associated stress in cutting though any media especially when precision in needed.

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