



## *Making Small Change... Quarter Shrinking*

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The Quarter Shrinker uses a technique called high-velocity metal forming to “electromagically”™ shrink coins. This process creates an invisible, but extremely powerful, pulsed magnetic field which literally “hammers” the coin with a powerful shock wave, forcing it to change its physical shape in the blink of an eye. Energy stored within a high voltage capacitor bank is suddenly discharged into an insulated wire work coil that is wrapped around the coin. Up to 100,000 amperes of current is forced through the coil, inducing perhaps as much as *one million* amperes of current to flow within the coin via transformer action. The instantaneous power going into the work coil is comparable to the electrical power consumed by a medium sized city. Because the current is rapidly changing, a phenomenon called “skin effect” forces this immense current to flow within a thin circular rind along the outer edge of the coin. The current is confined to a thin outer layer of the coin, penetrating only about 50 thousandths of an inch into the coin.

The magnetic fields created by the work coil and the circulating current in the coin oppose each other, creating tremendous repulsion forces between them. The resulting compressive forces on the coin easily overcome its mechanical yield strength, and the coin is evenly “crushed” to a smaller diameter, becoming thicker in the process. The shrinking process is all over in instant - about 20-25 millionths of a second. At an energy level of 5,000 Joules, a quarter shrinks to a diameter a bit smaller than a dime, but, amazingly, it still retains all of its surface features! Higher energies result in smaller quarters. There’s no, “Honey, I shrunk the kids” magic involved. As the coin shrinks radially, it becomes thicker. A shrunken coin still has the same mass and volume, so its density is unchanged.

Similar forces also act upon the work coil, causing it to explode in a violent shower of copper fragments. Early in the shrinking process, the work coil rapidly expands, stretching and ultimately fragmenting from irresistible tensile stresses. The wire’s insulation can’t stretch to the same degree and is blown off, leaving fragments of stretched, bare wire. After fragmenting, pieces of the coil are forcefully ejected with the force of a small bomb! For safety, the work coil must be confined within a bulletproof blast shield. Once the coil disintegrates, residual energy in the system is transformed into a blinding ball of blue-white plasma, accompanied by a loud explosion. ***Every shrunken coin requires a carefully hand-crafted work coil, which is explosively destroyed during the shrinking process.***

The Quarter Shrinker works on most coins. It’s particularly effective on US “clad” coins, since these coins use a highly conductive pure copper core sandwiched between thin outer layers of a nickel copper alloy that has a higher melting temperature. Sacagawea and new Presidential Dollars (“Golden Dollars”) also shrink quite well, since these utilize a pure copper core sandwiched between layers of a manganese/brass alloy. Bronze pennies (those made before 1982) also shrink well. Pennies made after 1982 use a thin copper layer plated over an easily melted zinc core – during shrinking, the copper layer vaporizes, leaving an unrecognizable, and partially vaporized, glob of molten zinc. US nickels and similar nickel-copper coins tend not to shrink very well because the alloy is harder and has a markedly lower electrical conductivity, while pure nickel coins (such as older Canadian quarters) shrink quite nicely.

Bimetal coins (coins with rings and circular centers made from different alloys) often show different degrees of shrinkage based upon the electrical conductivity and hardness of the different alloys. In some cases, the center portion may even become separated from the outer ring. Shrinking coins or token that have a hole in the center often cause the hole to shrink or even close up entirely. Larger silver coins also shrink quite well, but energy levels must be reduced since the silver/copper alloy has a significantly lower melting temperature. More pictures, detailed information, references, and links can be seen at our web site: <http://www.teslamania.com>. ***Physics can be fun!***

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