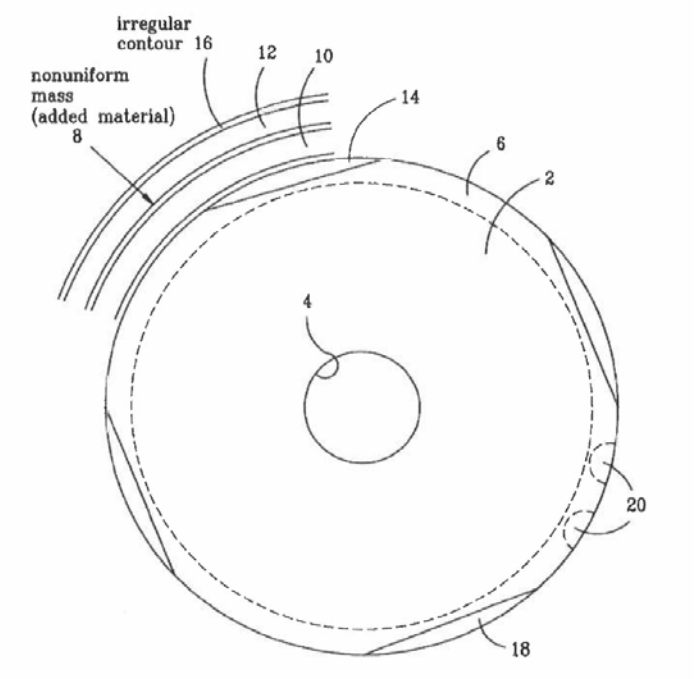
Non Resonant Suspension Coupling (NRSC)

The basic principle behind the NRSC design is to modify the edge of a cone so that in some areas it is cut away, which changes the mechanical impedance by altering stiffness, mass and damping in these areas.
A traditional design may be made to control the edge resonance by attaching a rubber surround with increased mechanical damping, but this additional damping will also influence the music signal in a way that a less damped design does not. The NRSC design has the most profound effect on low-damping designs where midrange clarity is preserved while the break-up modes are better controlled.

See the following image outlining the concept (sketch from patent application):

Fig 1



The first cone break-up is the circumferential resonance. This edge resonance affects the reproduced sound quality and is always an issue when attempting to control this resonance in hi-fi loudspeakers.

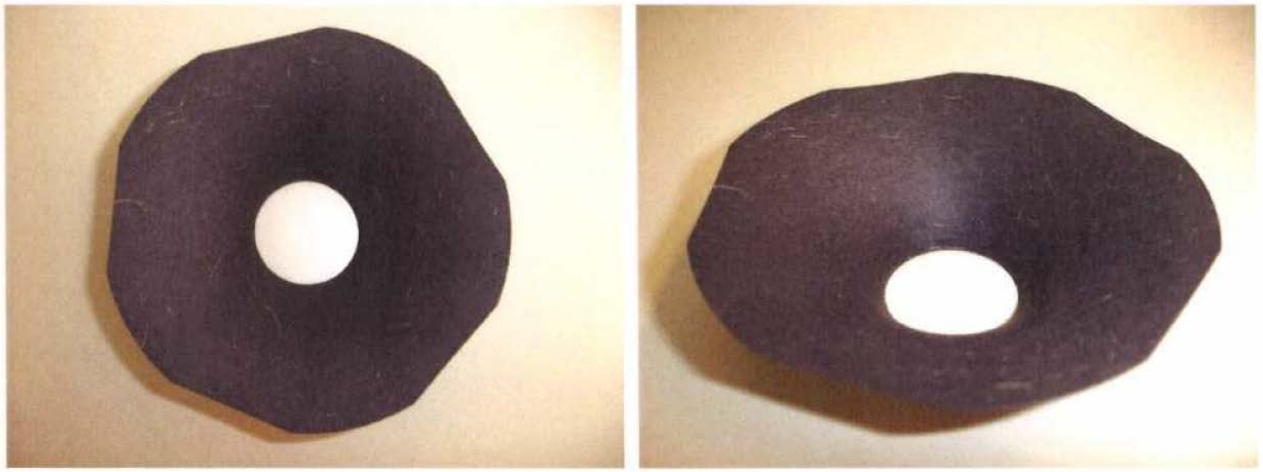
The edge resonance at the cone break-up is then no longer a single frequency, but several resonances, each with a lower magnitude. Lowering the magnitudes of resonances in the cone improves the overall reproduced sound quality.

When you consider the edge resonance moving around the circumference of the cone at the outer edge, it will experience a "bumpy" road, sometimes travelling in the cone and sometimes travelling in the surround. The varying mechanical impedance around the edge gives additional reflections and scatters the resonances. When the cone is cut away, the pure rubber surround handles the motion and energy is dissipated through the rubber due to the shear forces arising.

At a slightly smaller diameter (and higher frequency) the circumferential mode will travel in the cone and as the frequency is lowered and the circumferential mode is present further toward the surround, the speaker system provides a transition to more and more surround material (which is usually a quite soft rubber material difficult to excite at higher frequencies).

This means that the change in mechanical impedance from cone to surround appears less abruptly, which makes the transition smoother.

The NRSC design also has a positive effect on higher order (radial) modes because the gradual transition from the cone to the surround, which does not have a single joint diameter, meaning that these modes are spread out and not present at a single frequency along the entire perimeter of the diaphragm.
Pictures of a diaphragm with the cuts as described in the patent:



This patented technology is used at Scan-Speak in the Discovery line.

US patent 5,937,075 PCT Pub. No. WO95/10165