

Stand 3

CLUSTER 1

NanoG®

Sense, purpose and aim:

NanoG is a foam for seats that enables them to be made significantly thinner in an elegant design while still providing the same comfort level as regular seats.

Initial Situation

Automotive engineers are looking for new materials that provide them with freedom in designing thin, luxurious car seats that have excellent padding properties, are safe and low cost. Our NanoG material achieves this by combining our interpenetrating polymer networks (IPN) that incorporates unique nanoparticles to form a highly shock absorbing cushion in a small form factor. Our nanoparticles are onion-like nested spheres of non-flammable tungsten disulfide. The combination of IPN and this nanotechnology provides a solution not obtainable with conventional substances.

Problem

With use the cushions lose their shape and comfort level due to deformation of the foam. This leads to inferior back support and can cause spinal problems. Also, the cushion needs to be made thick in order to provide adequate comfort. This reduces space in the passenger compartment and limits the design options for such seats.

Proposed Solution

Our NanoG solution provides a very comfortable seat with the feel of a thick padded cushion but in a thin format for greatest design options. NanoG is designed to improve the shock absorbing and pressure distribution capabilities of various foams and polymers that are used in a large variety of everyday applications such as automotive seats. Using NanoG in seat cushions will allow greater retention of shape and firmness, adding to the support and comfort of the driver and passengers. NanoG has been shown to provide good compression qualities, low rebound and good pressure relief qualities.

Degree of Innovation

Alternative solutions include modified poly-urethane foams, and engineered pads that include for instance air bubbles, or have multilayered structures wherein each layer has different properties. Our product uses the synergistic effect of penetrating one polymer system into the host matrix of another. This creates a special structure that dissipates the impacting energy very effectively in a very small volume. In addition, we incorporate highly shock absorbing inorganic fullerene-like nanoparticles into the IPN to further increase its impact resistance.

Degree of Maturity

We have demonstrated in small to medium size molded pads that the concept of a nanomaterial-IPN hybrid achieves 25% more pressure relief and 40% more shock absorbing than common foams. This can easily be scaled up by the use of molds to make seat prototypes. To realize commercialization extensive field tests need to be done, the NanoG cushions need to be covered with textiles and attached to the vehicle chassis. Field tests can be completed in about 12 months given adequate resources.

Economic Potential

Approximately 40 -50 million vehicles are manufactured each year and each one contains about 15-20 kgs of foam totaling 600 million kgs of foam cushioning is our potential maximum market. Estimated costs: development, \$1M, production \$5M, and other \$1M for marketing, regulations, etc. for a total of \$7M. We estimate that 4 years would be required to the start of commercialization. A leading European car maker is interested in thinner car seats made with NanoG foam and we are holding discussions with them. NanoG pads have started to be sold already in non-automotive applications.

Increase in Comfort

The target market is drivers of private cars and also professional truck and race drivers. Comfort level is increased by the force-dispersion properties of the NanoG foam. It provides firmness for back support, and retains its shape and compression properties longer than other types of foam padding. It enables more ergonomic seat design to reduce driver fatigue, higher quality driving experience, leading to a safer more comfortable drive.

Improvement in Functionality

NanoG uses a special production process that is a more environmentally friendly foam than conventional ones. There is much less release of volatile organic compounds. On the seat side, the NanoG seats are 25% more pressure resilient and 40% more shock absorbing than regular seats. This enables a design of thinner, more functional car seats with greater comfort and possibilities for more functional shapes. A thinner more comfortable car seat will provide a new driving experience and a higher level of a passenger car riding environment.

