KNITTED AND FORMED MESH

Mounts

INTRODUCTION

The use of knitted and formed mesh to provide isolation for vibration and shock was developed initially to meet the exacting requirements and environmental conditions experienced in military aircraft and missiles. The successful performance of the method allowed it to be extended to other applications in other military fields and commercial applications. When it is apparent that environmental considerations preclude the use of other materials such as rubber, neoprene, silicon and other polymer materials, knitted and formed mesh provides an excellent alternative, providing isolation of vibration and shock where it would otherwise not be possible.

APPLICATIONS

Typical applications are in aircraft, marine, fighting vehicle, and industrial fields. The mesh can be formed into a variety of shapes including cushions, washers, sleeves and rings. The material can be used as a vibration isolator or can be used in conjunction with springs or other components to create more complex equipment mountings. Examples of applications can be found in products from the Defence Dynamics range.

CHARACTERISTICS

Stiffness and Damping

The cushions behave as variable rate springs with variable damping. Both stiffness and damping increase with deflection. In a vibration isolation system these characteristics have the advantage of minimising excursions at low frequencies at or close to resonance because the change in rate due to deflection alters the natural frequency of the system. High damping associated with low frequency and large deflections absorbs energy in such a way as to give peak transmissibility in the order of only 4. As frequency increases, the inherent damping decreases and results in exceptionally good isolation. At five or six times natural frequency, the transmissibility is in the order of 0.005. Under shock conditions the variable stiffness rate results in good snubbing from progressive stiffening.

Temperature

The mesh is manufactured from stainless steel grade 304 wire. This material can typically be used in the range -90°C to 425°C without changes to its properties. This gives the material the advantage over polymers which can't maintain the same properties at extreme temperatures.

Fatigue and Wear

Wear or fretting is minimal because flexure of the cushion moves the filaments in such a way as to preclude localised pressure points. Wear and ultimate rupture can only occur after extremely long periods of forced high amplitude vibration. Cushions consist of thousands of filaments, so a considerable amount of filament rupture would have to occur for the performance of the cushion to be affected.

Ingress of foreign liquids and particles

Cushions are fabricated from wire which has a residual film of lubricant from the knitting process. Any addition of lubricant makes no difference to performance. The ingress of small solid particles has no effect since the filaments are virtually in sliding point contact. Larger particles are unable to penetrate and are repelled.