Cold-Welded Staged Mechanical Fusible Links

Using additive manufacturing processes or other manufacturing processes, two-dimensional or three-dimensional arrangements of appropriately-sized fusible link cells are arranged such that a predetermined force limit is reached but not exceed as the bonds or attachments of the fusible link cell fail successively when the desired force or strain is reached. As the cell expands after failure, force and/or strain in the system is reduced. This may be achieved via cold-welding techniques using metals, polymers, or other materials, to create a bond (forming the cell) which has the desired strength at the bond line / 3D bond surface interface. A linear, 2-dimensional example of this is shown in Figure 1, Figure 2, and in a video available at https://www.youtube.com/shorts/93L0BQHL1FU.

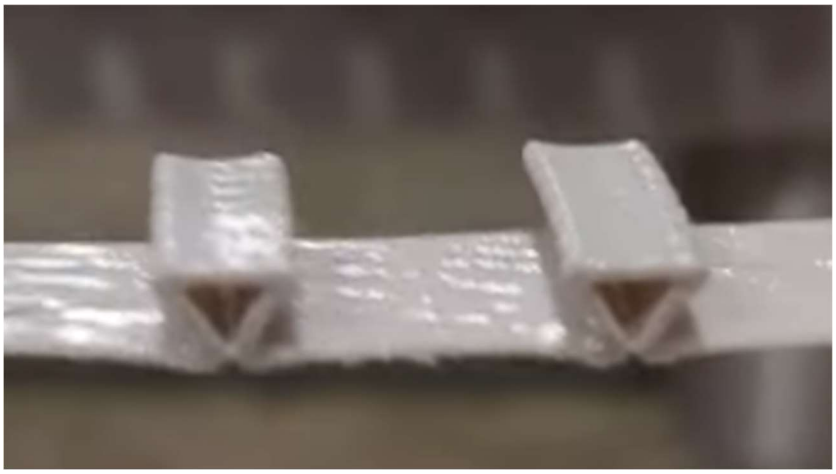

Figure 1: Cold-welded fusible link cells under slight tension.

Figure 2: Cold-welded fusible link cells (failed) after the desired tension, strain or force is reached.