A Method for Machining Metallic Foam

Summary:
The present invention relates to a process of cutting metallic foams that eliminates the problem of smeared surfaces. When a traditional machining approach is used, the surface of the material smears, causing the surface pores of the foam to close. Evidence of this is shown in the traditionally machined sample shown in Figure 1b versus the uncut TM shown in Figure 1a. In contrast, Figure 1c illustrates the same material cut using the method of this invention.

The method of this invention has been used in conjunction with a Rapid Machining process in the laboratory to illustrate its capabilities. As shown in Figure 2, a CAD model of a bone fragment (due to traumatic fracture) from a human Tibia was reverse engineered from CT scan data and replicated using CNC machining of Trabecular Metal(TM).

Potential Impact:
This invention is the first method capable of machining foams using conventional machining processes, rather than non traditional methods such as electrical discharge machining (EDM). EDM is capable of cutting the material without smearing, but is not an easily customizable process. Moreover, recent research has shown that EDM has a detrimental effect on the material properties, in particular, a reduction in porosity1. Initial testing of this newly invented process indicates that the porosity of the TM may not be affected using the new approach. This process could enable the creation of custom shaped TM implants of virtually any free-form geometry, using a CT scan derived CAD model of the desired geometry.