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The effect of location in the build space on the mechanical properties in Ti-6Al-4V samples produced by EBM

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From all possible Additive Manufacture methods, the electron beam melting (EBM) of Ti-6Al-4V has the closest properties to the traditionally produced Ti-6Al-4V. Therefore, EBM Ti-6Al-4V can be used in many engineering parts, yet its material properties must be understood completely. In particular, the differences among properties of objects oriented vertically or horizontally with respect to the build direction were subject to large numbers of research work. In this work, we will compare and explain the difference in properties as a function of printing orientation in the entire range between vertical to horizontal orientations, by studying six Ti-6Al-4V rods at different angles with respect to the build direction.

We will determine the variation in mechanical properties as a function of the building space. The mechanical response and deformation were analyzed by neutron scattering undertaken on the HIPPO diffractometer at Los Alamos National Laboratory. The texture was measured at different deformation levels i.e the texture variation for each rod was measured from as printed state to 10% strain, 14% strain, 17% strain, and failure. We will compare and explain the mechanical properties' relation to texture differences.

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