

An Investigation on the Definition and Qualification of Form on Lattice Structures

M. Praniewicz¹, J. Fox¹, C. Saldana²

¹National Institute of Standards and Technology, Gaithersburg, MD 20899, United States

²George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology,
Atlanta, GA 30332, United States

Abstract

The lack of uniform qualification techniques for additively manufactured components throughout industry currently limits their application in high risk environments. This stems from a shortage of proper tolerancing and product definition to convey design intent and required qualification. This definition is particularly difficult for complex lattice geometries. The results of studies in which the form of a lattice component is defined by theoretical supplemental surfaces are summarized, with specific attention to the role of data sampling in the evaluation of form. A new case study is presented where techniques borrowed from surface metrology, namely the construction of a bearing area curve, are used to evaluate the sampling cutoff for form evaluation. This method is first validated on the nominal geometry of three lattice designs. Initial results indicate this as a promising methodology.

The full paper may be found in a special issue of the TMS publication *JOM*, March 2022.