This study examined the effect of post-process compressive plastic deformation on the mechanical performance of metal made by direct metal laser sintering (DMLS), an additive process. Laser-based additive manufacturing currently suffers from an inability to achieve the mechanical performance of wrought materials; this study focused on a fundamental look at whether forging and related processes could serve as a potential approach to improving the mechanical properties of these materials. 316L stainless steel samples made in standard sheet form were compared to DMLS samples of the same geometry in both an as-manufactured state and a rolled state in regards to porosity, tensile performance, fatigue performance, and corrosion resistance. Deformation was introduced through a rolling process to introduce controllable, varied levels of deformation. Modeling and experimental characterization of mechanical properties were then performed to investigate the differences in material behavior, as well as absolute mechanical performance.