

## **Residual Stress Measurements in Additively Manufactured Stainless Steel Valve Housing**

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A series of neutron diffraction residual stress measurements were performed on a valve housing additively manufactured of 316L stainless steel. The non-destructive nature of the neutron diffraction measurements enabled documentation of the change in stress state from the as-built state with the housing attached to the build plate, to a state where the build plate was trimmed to only slightly larger than the footprint of the housing, and finally to the state where the housing was removed from the base plate. Significant changes were observed at locations close to the base plate, but only minor changes were observed at locations farther away from the base plate. Due to the intricate internal geometry of the housing the shear stresses were also measured close to the base plate using neutron diffraction. The magnitude of the shear stresses were significantly lower than the three normal stress components measured at the same location, indicating that the measured normal strains were close to the principal stress directions. The experimental data will directly feed into microstructure aware models for the AM materials being developed at LANL and SNL to predict the residual stresses generated during the AM process.