

AMB2025-02 Macroscale Quasi-Static Tensile Tests of PBF-L IN718

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This challenge is a follow-on from AMB2022-01 laser powder bed fusion (PBF-LB) alloy Inconel 718 in the as-built condition (no heat treatment). As seen in Figure 1, eight continuum-but-miniature tensile specimens were excised from the same size legs (2.5 mm width) of one original AMB2022-01 specimen (AMB2022-718-AMMT-B7-P4). Excised tensile specimens were quasi-static uniaxially tensile tested according to ASTM E8 (strain rate $1 \times 10^{-3} \text{ sec}^{-1}$, 3 mm gauge length custom contact extensometer). Calibration data given includes all processing and microstructure data from AMB2022-01 (<https://www.nist.gov/ambench/am-bench-2022-challenge-problems-and-measurement-results>), including 3D serial sectioning electron backscatter diffraction (EBSD) data (<https://doi.org/10.18434/mds2-2767>). Material property data such as elastic mechanical properties are not provided. **Predictions of average tensile properties of all eight specimens are requested, must utilize the prediction submission template found in this dataset (<https://doi.org/10.18434/mds2-3735>), must be submitted via email to AMBench@nist.gov (subject: AMB2025-02 prediction submission), and must be submitted by 11:59pm ET, August 29, 2025. Email nik.hrabe@nist.gov if you have problems accessing the dataset.**

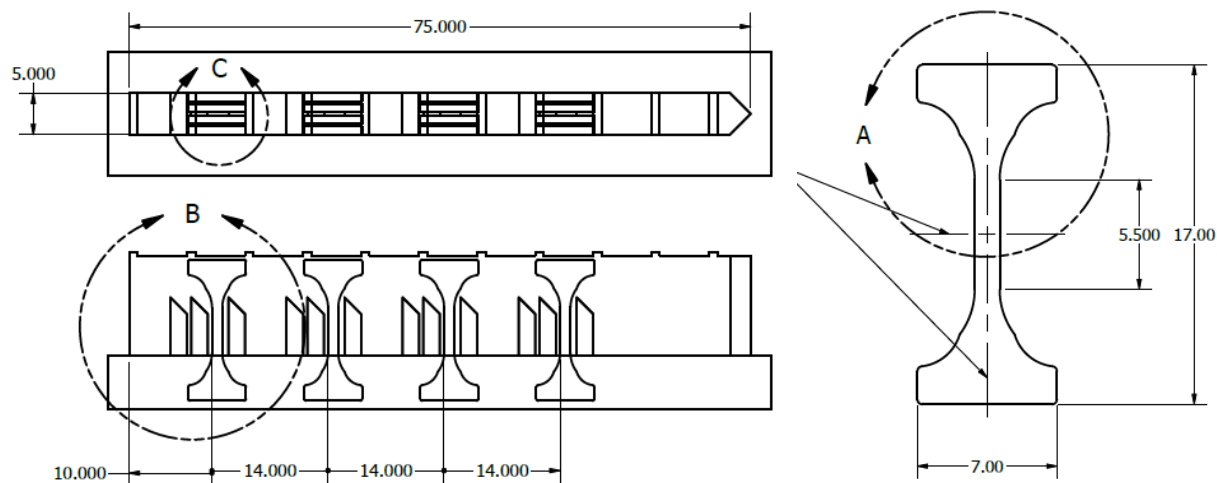


Figure 1: Drawing showing where continuum-but-miniature tensile specimens were excised using electric discharge machining (EDM) from the same size legs (2.5 mm width) of one original AMB2022-01 specimen (AMB2022-718-AMMT-B7-P4). EDM kerf was approximately 0.33 mm. Specimen thickness was approximately 1 mm. Outer specimens containing as-built surface roughness were not tested.