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M1Po3C-01: The Design and Manufacturing of Superconducting Undulator Magnets Utilizing Additive Manufacturing & Plastic Components.

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The next generation of superconducting undulator (SCU) magnets are being design and manufactured for use in the Advanced Photon Source (APS). These Niobium Titanium (NbTi) superconducting magnets consist of cores fabricated from low carbon steel and are surrounded with isolating material that makes up the remainder of the magnet. These isolating structures are fabricated utilizing additive manufacturing techniques including 3D printing. Because the magnets for the SCUs cannot be shimmed once installed, they have very tight machining tolerances. This poses unique manufacturing and fabrication challenges, which are simplified using this new design. This paper will cover the design of the prototype magnets cores being fabricated for use in superconducting undulators at the APS, lessons learned from manufacturing, magnet training data, and potentially measurement data from full length magnets.

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