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Wed-Af-Po3.23-09 [94]: Non-destructive testing of high strength conductors for high field pulsed magnets

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High field pulsed magnets at the NHMFL use high strength conductors up to 90% of its ultimate tensile strength. Therefore it is critical to ensure that the conductor is free of defects for its entire piece length which could be as long as a few hundred meters. It is known that in the wire drawing process, internal crack or so-called 'chevron crack' can occur due to unsuitable drawing die schedule, poor lubrication and so on. These cracks occur infrequently along the wire, so tensile tests of samples cut from ends of a long length conductor often miss the problem. In addition, small inclusions on the wire surface might have impact on its fatigue properties. So it is critically important to inspect these defects using non-destructive testing (NDT) methods.

In this paper, we present results of our NDT inspection of Glidcop AL-60 and Cu-Nb wires using Eddy current testing, ultrasonic testing and x-ray tomography (2D and 3D). The minimum detectable flaw sizes for our conductors are established for each NDT technique. Some chevron cracks are found in some Glidcop conductors by all three NDT techniques. We have developed a long length Eddy current wire inspection capability, the technical details of which will be presented.

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