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TRIAX Upgrade at MURR

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Neutron scattering is an extremely powerful tool in the study of elemental excitations in condensed matter. One instrument used for these studies is the triple axis neutron spectrometer (TRIAX). Within the past decade the triple-axis spectrometer located at the 10 MW University of Missouri Research Reactor (MURR) was upgraded with triple-axis spectrometer previously located at the Oak Ridge Research Reactor (ORR) and owned by Ames Laboratory. The TRIAX located at the MURR serves two purposes. The first is to carry out condensed matter research, and the second as a training tool for educating a new generation of neutron scatters. An upgrade of this instrument is needed to ensure that the TRIAX can continue to fulfill this dual role and remain in good working order. In order to upgrade the TRIAX, several components need to be replaced and a new control system is being added which will be compatible with a similar instrument at Oak Ridge National Laboratory. SPICE "spectro and instrument control analysis" is software from Ames Laboratory, which is being installed to communicate the TRIAX with the user. During this upgrade it was noted that a drive mechanism on the TRIAX had backlash between the worm gear and the gear that it drives. To resolve this problem experiments were performed to measure the applied load necessary to move the part that the worm gear is moving. It was found that a different force was necessary to move the part in different directions. For movement in the clockwise direction it took 1 pound of force while in the counter-clockwise direction it took approximate 8 pounds of force. The reason for the backlash between the gears is that the drive didn't have sufficient torque to drive the 8 pounds of force. To verify this assumption, calculations were prepared using Actual Mechanism torque analysis that demonstrated insufficient torque from the combination of the motor and the reduction gears. To resolve this problem, a new motor of the same frame size and larger torque was identified and, based on the same calculations used before; a new gear ratio has developed to provide approximate 9.5 pounds of force. The engineering design for this new drive was implement with AutoCAD and Solid Works software and will be implemented on the TRIAX as part of the system's upgrade. This material is based upon work supported by the US Department of Energy Innovations in Nuclear Infrastructure and Education program under Award No. DE-FG07-03ID14531.