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Design of an electrical system for swaging targets in the production of molybdenum-99

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Molybdenum-99 is used all over the world to make technetium-99m for use in medical and research fields. The Molybdenum-99 is made by placing low enriched uranium foil in a reactor and allowing it to be irradiated. In order to irradiate the uranium safely, an aluminum target must be assembled to surround the foil. The current process for making these targets is to use a manually powered swaging device. It works by pulling a plug through an aluminum tube assembly which contains the uranium foil. The plug plastically deforms the inner tube and seals the foil inside. This process is time consuming and requires a lot of strength. The idea of using an electrically driven system to swag the tubes was investigated. The required system was analyzed to determine the forces, torque and power needed. A detailed design of the driving system was established and necessary standard components were selected. The new design concept was constructed in a three dimensional solid presentation and in two dimensional drawings. Assembly analysis of different components was conducted in order to assure accurate mating relations among different components.