

## Developments in Target Manufacture Procedures

ISIS is a synchrotron that utilises more than 30 different specialised instruments over 2 target stations to gain an insight into the properties of materials on the atomic scale. (ISIS, 2019). It was established in the 1980's and has undergone a series of expansion projects to get to where it is today, the most recent being a £90M investment to bring in 4 new instruments and upgrading an existing 5 in the facility.

ISIS is one of the few facilities in the world that manufactures both of its targets almost entirely in house. A recent addition of an ISIS Target Manufacture workshop has meant that the Target group has expanded its production capabilities and has the capacity to put more focus towards refining and perfecting the manufacture and build of each target. This facility also allows for a more reactive style of work. Designs can be changed and improved quickly with the manufacture of development pieces, resulting in these changes being proven and implemented on the very next target build.

Details on the recent developments made in the ISIS target manufacture and build will be presented. This will be covering how 5-axis machining capabilities have meant that all main components are now made in house, how Electrical Discharge Machining (EDM) technologies have allowed for complex and advanced profile manufacturing to be carried out, and how the 2 electron beam welders enable all plate and target assembly to be completed in the workshop under controlled conditions. The ISIS target manufacture group have also recently commissioned their own Hot Isostatic Press (HIP) facility with the aim of doing all their own bonding work in the near future.

Furthermore, through years of experimenting and developing the process a huge importance has now been placed on the preparation and cleaning procedures for the tungsten and tantalum. Rigorous cleaning procedures are in place before anything is sent for HIP as this has been found to be one of the biggest effecting factors as to whether a complete bond is achieved or not. From start to finish components are polished, cleaned and kept under vacuum to reduce the chances of them picking up contaminants. Without these processes in place it would be very difficult to create successful HIP bonds or weld joins on both targets, and the proportion of work that fails after ultrasonic Non Destructive Testing (NDT) would be much higher. This will also be expanded on further during the presentation of work.

With credit to Jeremy Moor, Leslie Jones, and Daniel Cross for their work and involvement with the ISIS Target Group.

**Primary author:** FENEMORE, Grace

**Presenter:** FENEMORE, Grace

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