

## Erosion Problem for Granular Tungsten Targets Using Circulating Fluidized Beds- Experimental Investigation of Surface Damage

For a higher power neutron or muon source, a flowing granular target would offer superior thermal performance and enable a greater particle yield than a monolithic target. However, the flow of tungsten would necessitate solid particle impingement erosion conditions to occur. Previous work at RAL to produce a pilot plant conveying granular tungsten resulted in severe erosion of stainless-steel pipes. Erosion is a well understood phenomenon when considering sand-like materials such as silica, but modelling still requires experimental coefficients for correlations to be correctly applied to each tribosystem. Understanding of the erosion conditions created by high density media is much more limited, and the applicability of wear correlations, developed for low density materials, is untested.

A new test methodology has been developed at the University of Sheffield for recreating accelerator erosion conditions, and initial tests have been conducted for a small selection of metals and conditions. Damage to the eroded surfaces has been analysed and wear features found to be like those created in erosion by silica materials. Roughening was found to be strongly related to the impingement angle of the particles on the surface, and it is suggested that the size and shape of the impinging particle is also significant. Simple material comparisons such as hardness were also shown to be limited in applicability for these high energy particle impacts. Future work in this area will enable confident material selection for granular target containers.

**Primary author:** SUITTERS, Ben (STFC)

**Co-authors:** DENSHAM, Chris (STFC); WILCOX, Dan (STFC); Prof. LEWIS, Roger (University of Sheffield)

**Presenter:** SUITTERS, Ben (STFC)

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