

Capabilities and Challenges of the Target Fabrication Science team at AWE Orion

C. O'Connor, L. Brimble, E. Hancox, J. Jestine, J. Milton, R. Sealey, R. Taylor, T. Tipler
Target Fabrication Group, AWE Nuclear Security Technologies, Aldermaston, United Kingdom



Team Structure

The TF Science Team is split into three specialisms, Characterisation, Chemistry, Coatings and Micromachining. The team is currently 6, but is growing to 10 people in the coming months with ongoing recruitment. The team's purpose is to support production of targets through synthesis of core materials, plating of components and analysis throughout the production cycle. It requires staff to be multiskilled within their disciplines and we seek to be at least familiar with each other's techniques to provide support whenever required.

Characterisation

We perform analysis of components and assemblies at all stages of target fabrication and have recently been expanding into other areas as a test house for their requirements.

Current Capabilities:

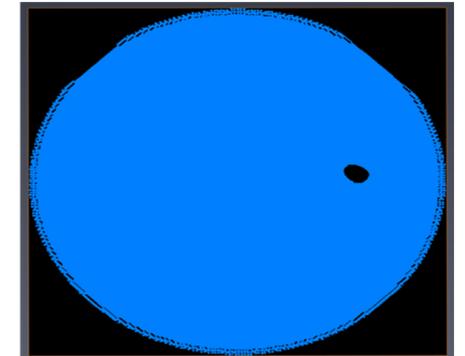
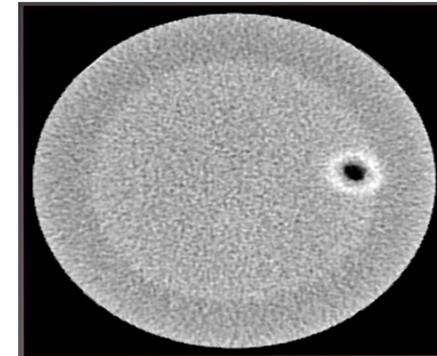
- . Interferometry
- . SEM
- . Microscopy
- . CMM
- . X-ray CT

Current Challenges:

- . Analysing thin bond lines
- . Assessing porosity in gold parts
- . Identifying contaminants

Future Capabilities:

- . Upgraded X-ray CT
- . Improved dimension systems
- . Double sided interferometry



Chemistry

The team is primarily tasked with producing a series of foams and aerogels to support the variety of campaigns that AWE supports. There are a series of established processes for campaigns, but we are also investigating new densities, techniques and base materials for these foams. Recently we have been asked if we can support other areas of the business applying our components in new ways such as for heat sinks in electronic components.

Current Capabilities:

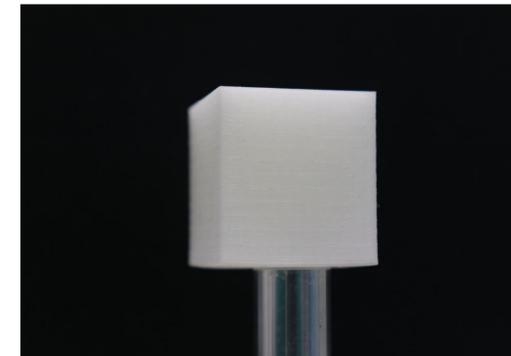
- . Traditional Wet chemistry
- . Critical Point Dryers/High Temperature Critical Point Dryers

Current Challenges:

- . Manufacture of Tantalum and Silver foams
- . Establish predictive recipes
- . Understanding aging and storage conditions

Future Capabilities:

- . Microfluidics



Coatings and Micromachining

Machining of gold components to the size/shape/tolerance requirements of AWE isn't feasible, so we machine templates out of copper and then electroplate in gold. Further processing allows us to produce a gold component of the required dimensions. The team has a desire to move into the micromachining realm of milling, etching and polishing for sample preparation and modification to further support Campaigns.

Current Capabilities:

- . Electroplating
- . Sputter Coating

Current Challenges:

- . Staining is observed on some gold parts
- . Lack of resource

Future Capabilities:

- . Multilayer coatings
- . Micromachining
- . Laser machining

