

Target Fabrication Facility

The following gives guidance to the services and support provided by Target Fabrication for experiments in the CLF on the Gemini laser system and the Vulcan 20-20 dark period support. You should discuss your target manufacture requests with the following people prior to the submission of your proposal.

Christopher Spindloe christopher.spindloe@stfc.ac.uk (Target Fabrication Group Leader)

Pawala Ariyathilaka pawala.ariyathilaka@stfc.ac.uk, (V20-20 or Orion)

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Overview

The Target Fabrication group has access to a wide range of facilities that to fabricate the most complex of targets geometries. The group enables the fielding of experiments on Vulcan, Gemini and Orion through the CLF access program and has experience supporting international facilities through collaboration and commercial supply. **As Vulcan has been decommissioned while V20-20 is constructed we also can support UK academics carrying out experiments on international facilities subject to approval of the CLF.**

We have capabilities to produce targets in high numbers for experimental campaigns on the GEMINI laser facility and this includes the provision of tape target delivery systems and complex tape targets to utilise the high repetition rate available. In addition, liquid targetry is being tested and will be available for experimental use.

For Vulcan/Orion type experiments we can manufacture complex multi element, multi target clusters to the highest quality in numbers of a few hundred per experiment.

We will engage you in a rigorous planning procedure and expect to be fully involved in planning of external support to ensure we deliver the highest quality targets in time for your experiment and for Gemini experiments to provide the flexibility during an experimental run that allow the maximisation of the time available on the facilities. (Note it is not always possible to provide flexibility on the level of CLF experiments when supporting external facility access)

Current Target Fabrication Capabilities

Thin Film Coating

- Thin Film Coating of a range of metals (10nm-2000nm in-house and above 2000nm by arrangement) and plastics (Formvar, Polystyrene and Polyethylene, Parylene N and C).
- Hot pressing of deuterated plastic films and doped target foils such as CHBr
- CVD production of DLC (Diamond-Like-Carbon) from a few nm to ~200nm.
- Amorphous Carbon foils from a few nm to a few microns.

Micromachining

- World leading micro-machining for the production of hohlraums, cones and other geometries.
- Diamond point turning for high precision surfaces.
- Laser micromachining for non-contact processing of parts and complex 2D geometric cutting.

Rapid Additive Manufacturing and 3D Printing.

- Medium resolution (25um layer) plastic printer for prototyping target mounts, holders, and components to enable quick changes and turnaround of target delivery.
- High resolution printing (5um layer height) to enable complex target mounting and manufacture on shorter timescales at the cutting edge of the current capability.

Low Density Materials

- Capabilities to produce foams and aerogels to specific requirements (10-500mgg/cc foams), Aerogels 120mg/cc and above. (All geometry dependent)
- Foams with embedded particulates (doped) can be provided with appropriate research and development time.

Medium Rep-rate technologies

- Array based thin film targets of micron and nanometre thickness foils.
- Array based foam target production for higher rep rate experiments.
- Complex Tape Targets developed using thin film coating and etching capabilities.
- Full tape drive delivery system provision for Gemini and support including multiple drives available for an experiment. (Geometry and operation to be discussed with TF and Gemini group)

Characterisation

Full suite of characterisation serves including.

- SEM (including elemental analysis)
- AFM and White light interferometer for surface characterisation
- Confocal microscopy and high-resolution optical microscopy.
- X-Ray tomography for sample analysis.

MEMS Fabrication

Access to the latest fabrication technologies for mass produced targets including micro-dots, thin foils, spokes, and indents fabricated in large numbers for statistical studies.

Gas Targetry

- Gas filled targets for low-rep rate experiments.

Target characterisation requests are to be submitted before the experimental campaign and all target provision data and results will be available for the user group during and after the experimental campaign.