

# Target Fabrication operational statistics 08/09

Contact [Hazel.Lowe@stfc.ac.uk](mailto:Hazel.Lowe@stfc.ac.uk)

H. F. Lowe, C. Spindloe and M. Tolley

Central Laser Facility, STFC, Rutherford Appleton Laboratory, HSIC, Didcot, Oxon OX11 0QX, UK

## RAL experiments

A total of 3 Astra Gemini and 8 Vulcan experiments were supported by Target Fabrication in the reporting period April 2008 to March 2009. Of these 2 of the Astra Gemini experiments and 6 Vulcan experiments were 'solid target' experiments and 2 Vulcan experiments were a combination of gas jet shots and solid target shots. Target Fabrication provided a total of 46 weeks of experimental support for Vulcan and 16 weeks for Astra Gemini on solid target experiments. This report shows target numbers from the 8 Vulcan experiments. Statistics for high rep rate targetry for experiments in Astra Gemini will be dealt with in a separate report<sup>[2]</sup>. The report does not include the extensive amount of filter and pinhole support provided from Target Fabrication for some gas jet experiments.

## 1) Target numbers

For the reporting year, the total target numbers produced are shown in Table 1. The table is broken down into separate experiments and gives data on total target numbers produced and the subset consisting of high specification complex 3D targets that have been produced. High specification 3D targets are defined as targets that have taken significant highly skilled microassembly or micromachining to be produced over and above standard target manufacture. The total number of targets for use at RAL produced by the group in 2008-2009 was 1,023 compared to 2,223 in 2007-2008<sup>[1]</sup>. Due to the upgrade in TAW, Target Fabrication supported fewer experiments in Vulcan during 2008-2009 which accounts for the reduction in target numbers. However, during 2008-2009, the number of high specification targets produced was 298 accounting for 29% of the total targets made compared to 19% in 2007-2008<sup>[1]</sup>.

Experiment	Targets Produced	High Specification Targets
Aug 2008 TAP	205	33
Oct 2008 TAW	215	80
Nov 2008 TAP	137	65
Jan 2009 TAP	100	38
Jan 2009 TAW	82	38
March 2009 TAP	114	36
March 2009 TAW	170	8
<b>TOTAL</b>	<b>1023</b>	<b>298</b>

Table 1. Target production summary for 2008-2009.

## 2) Target types

The high specification targets can be separated into 6 main types as shown in Table 2 and Figure 1. Most notably, 80 cylindrical compression targets were delivered to the October 2008 TAW experiment and 65 cone targets were delivered to the December 2008 TAP experiment requiring extensive highly skilled micromachining and microassembly.

Target Type	Targets Produced
Cones	67
Multilayered Microsquares (100µm × 100µm)	34
XRTS	39
Cylindrical 'HiPER'	80
Embedded/Coated Microdots	35
Other	43

Table 2. High specification target delivery summary.

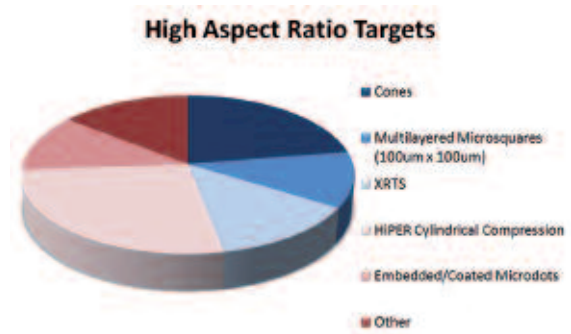
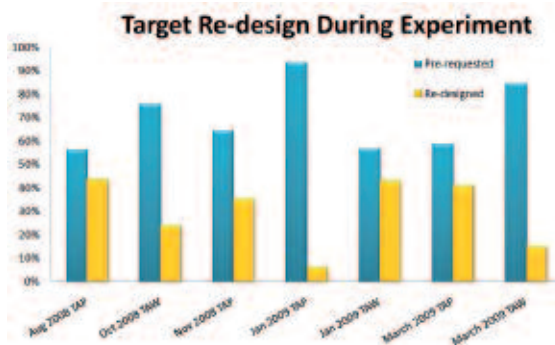


Figure 1. High specification target delivery summary.

## 3) Experimental response

It is seen as a significant strength of Target Fabrication to be rapidly responsive to experimental results and conditions by working collaboratively with experimentalists. The Target Fabrication group responds to experimental changes during a run and often implements a number of modifications or redesigns to the original requests. The number of modifications and variations usually fluctuates widely across a year and is dependent on the type of experiment and also on experimental conditions such as diagnostic and laser performance. On average, during experiments in the reporting period, 30% of the

targets that were shot were modified or redesigned from the planned target specifications. This is consistent with the figure of 32% for target production in 2007-2008<sup>[1]</sup>. Figure 2 shows the proportion of targets that were redesigned or modified during the experiments supported in 2008-2009.



**Figure 2. The percentage of pre-requested targets compared to redesigned targets fabricated throughout the year for each experiment.**

The redesign of targets during experiments means that there are often a number of targets that have been fabricated but that are not shot by the end of experimental campaigns. As shown in Figure 3, throughout the year an average of 35% of targets that were fabricated were either returned un-shot to Target Fabrication or were unused having been made in preparation for the experiment but not required due to changes. This is consistent with the figure of 36% for 2007-2008.



**Figure 3. The average proportion of targets shot, returned and unused during solid target experiments on Vulcan in 2008-2009.**

## External contracts

Target Fabrication also supplied microtargets, specialist coatings and expertise to groups for use at external facilities during the reporting period. This activity included the production of AFI cone targets delivered to LLE, foam washer targets delivered to the University of Michigan & targets delivered to a number of HiPER WP10 experiments at other facilities. All of the work required to supply targets to external groups was carried out in addition to experimental support for the CLF.

## Summary

Target Fabrication has supported 11 internal and 8 external experimental groups in the last year as well as providing an increasing amount of characterisation services and acting as a knowledge base for target fabrication activities throughout Europe. Although there was a reduction in the number of targets delivered to experiments on Vulcan compared to previous years, due to the commencement of solid target experiments on Astra Gemini, there was an overall two-fold increase<sup>[2]</sup> in solid target delivery in 2008-2009 compared to 2007-2008.

## References

1. H. F. Lowe, C. Spindloe and M. Tolley, *Target Fabrication Operational Statistics*, CLF Annual Report 2007-2008, p306-307.
2. C. Spindloe, *Delivery of Targets to High Rep Rate Laser Systems such as the Astra Gemini Laser*, CLF Annual Report 2008-2009.