LAHEL

System for testing High Energy Lasers

Fig. 1. LAHEL300 test system: a)photo, b)angular spatial intensity distribution of tested HEL

1 What are HELs?

High-power lasers (HELs) have been used for decades as common tools for cutting and welding of metal sheets located at very short distance from laser output. This market has been originally dominated by bulky CO2 lasers that emit beam of rather wide divergence angle even after integration with collimating optics.

However, within last decade powerful but compact laser modules emitting at shorter wavelengths (NIR or SWIR ranges – most common 1064nm wavelength) become commonly available. Technology of collimating optics has been improved, too. These technology changes in laser modules enabled design of high power lasers emitting beams of narrow divergence angle. These new HELs can be divided into two classes:

1. HELs for remote machining of metal sheets,
2. HELs for defense applications as directional weapons.

HEL from first group enable machining (welding, cutting) of metal sheets from distance up to several meters.
HELs from the second group enables blinding or mechanically damaging electro-optical systems used in military applications.

2 What is LAHEL?

In both industrial and military applications, precision testing HELs is a metrological challenge. Commonly used methods based on idea to put tested laser at collimator output and measure parameters (power, dimensions) of laser spot at collimator focal plane cannot be used. HELs generate laser beam of so high optical power that immediately damages not only optical meters located at collimator focal plane but also collimator mirrors.

In such a situation Inframet offers LAHEL as system for testing High Power Lasers used in both industrial and defense applications.

LAHEL can measure two important group of parameters:

1. Angular spatial intensity distribution (mean and temporal non stability). Divergence angle (mean and temporal non stability) is calculated on such measured data.
2. optical power (mean and temporal non stability.

Design of LAHEL system is basically based on classical method to put tested laser at collimator output and measure parameters of laser spot at collimator focal plane but LAHEL uses special hardened collimator, power meter and laser profiler sensor. These tools can withstand testing HELs of ultra high power that could easily damage typical collimators or laser meters.

3 What HELs can be tested?

LAHEL can be used for testing of almost all HELs offered on the market. This test system can enable testing HEL of optical aperture up to 600mm (option 1000mm) hardened for testing HEL of power up to 30kW (option up to 100kW).

4 Safety issues

LAHEL system does not emit its own radiation but reflects a small fraction of light emitted by tested HEL. Even this small fraction can be dangerous for operators of LAHEL test systems. Special safety rules must be observed when testing HELs using LAHEL test system.

LAHEL

System for testing High Energy Lasers

5 Versions

LAHEL can be delivered in form of different versions of different design, test capabilities and price. Special code that uses one number and three letters is used to describe these versions. The number describes aperture of collimator used by test system (approximately maximal aperture of optics of tested HEL). This number can vary from 100 to 600.

Code	1	2	3
	Test capabilities	Estimated power of tested HEL	Wavelength of tested HEL
A	Only measurement of spatial intensity distribution (divergence angle)	0.1to 1 kW	In band: 700-1100nm
B	Only measurement of optical power	0.1to 3 kW	In band: 950-1600nm
C	Both spatial parameters and power parameters	0.1to 10 kW (option up to 30kW)	In band: 700-1700nm

Example: Code LAHEL-300 CBA means system built using collimator of optical aperture 300mm, capable to measure both spatial parameters and power parameters of tested HEL of power up to 3kW and of wavelength in band: 700-1100nm.

Version 1.4

CONTACT: Tel: +48 22 6668780 Fax: +48 22 3987244 Email: info@inframet.com