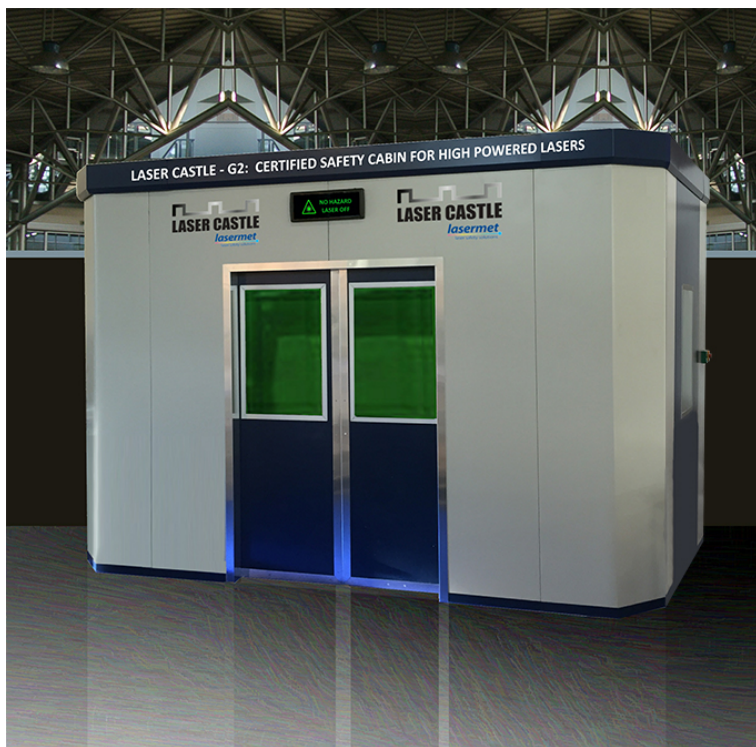


# LASER CASTLE

## Laser Safety Cabins



**lasermet**  
laser safety solutions\*

# Contents

Overview.....	2	Equipment - Doors,	
Key points and Conformance .....	3	Maglocks, Interlock Control,	
Why Laser Castle? .....	4	LED Warning Signs .....	7
Concept and features.....	5	Equipment - HD CCTV,	
The Rapid build process.....	6	Active window, Electrical Overview,	
		Lighting, Containment .....	8

## Overview

### Laser Castle is a modular, rapid-build, laser safety cabin certified to international laser safety standards

The cabins are designed, manufactured, installed and certified by Lasermet. They form an integrated laser safety system used to protect personnel from the dangers of laser radiation emitted from high powered lasers and provide an ideal solution for laser welding robots and associated laser applications.

Lasermet's laser safety enclosures protect personnel from the dangers of laser beams by absorbing the laser power in the specially designed wall and roof panels.

These modular, Class 1, room sized laser enclosures - for high power lasers - are tested and certified to IEC 60825-4 (Safety of Laser Products Part 4 - Laser Guards), and can be rapidly designed, built and installed by Lasermet.

They are supplied complete with Lasermet's interlock control system and dual message, dual colour, low voltage, illuminated LED signs. Lasermet's audible warning system can also be installed. A CCTV system (Standard or High Definition) covers the operations inside the laser

safety enclosure and provision is made for fume extraction making this a cost effective and extremely easy method of enclosing the laser system, which then complies to international laser safety standards.

#### Active "Laser Jailer" upgrade option

The passive enclosure can be upgraded to an active enclosure by specifying the patented "Laser Jailer" Active Laser Guarding System:

- US Patent No. 8 416 820
- European Patent: EP11188501.8
- Australian Patent: 2012202599

Modular active tiles cover the internal walls, roof and doors to detect high power laser beam strikes. If this occurs Lasermet's fail-safe technology isolates the laser safety input in less than 50ms.





# LASER CASTLE Laser Safety Cabins



## LASER CASTLE CAm-locking SafeTy Laser Enclosure

### Passive Guarding

- Modular & Flexible Design
- Lightweight & Strong
- Superior Performance compared to Steel and Aluminium
- Rapid Build Times
- Complete Range of Laser Safe Access Doors
- Standard and Custom Colours Available

### Laser Safety Compliance

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Class 1 Enclosure conforms to:  
IEC 60825-1 Safety of Laser Products Part 1:  
Equipment Classification and Requirements
- IEC 60825-4 - Safety of Laser Products Part 4:  
Laser Guards
- ISO 13849-1 - Safety of Machinery:  
Safety Related Parts of Control Systems
- IEC 60947-1 - Low Voltage Switchgear  
and Control gear
- IEC 61010-1 - Safety Requirements  
for Electrical Equipment.

# Why Laser Castle?

## Why do we need Laser Castle?

Traditional laser safety enclosures using 2mm mild steel to guard against escaping laser beams provide inadequate protection against the multi-kW lasers now being used.

Extensive testing has been carried out, which proves that Lasermet's specially formulated, modular passive wall panels can provide safe containment of 5kW laser beams for up to 7 minutes of sustained impact.

Tests were carried out using 50mm spot sizes and provided the PEL ratings shown below.

Irradiated Area	PEL (T3) 10s	PEL(T2) 100s
4mm <sup>2</sup>	310MW/m <sup>2</sup>	170MW/m <sup>2</sup>
2000mm <sup>2</sup>	3.1MW/m <sup>2</sup>	1.7MW/m <sup>2</sup>

## laser jailer

active laser guarding system

### When do we need Active Guarding protection - the Laser Jailer?


Active laser guarding is recommended for laser powers in excess of 5kW. However, the spot size is also an important factor as well as the focus of the beam.

Laser Jailer is also a modular system made up from detector tiles which line the inside of the laser cabin. The tiles are electrically connected to the interlock controller so that if a beam strikes the internal wall, Lasermet's fail-safe technology isolates the laser safety input in less than 50ms.

### Tests on 2mm Galvanised Steel

2mm Galvanised Steel

50mm Spot Size




#### Example 1

Time taken to break through

- @ 2kW < 30 secs
- @ 5kW < 7 secs
- @ 20kW < 1 sec

2mm Galvanised Steel

10mm Spot Size




#### Example 2

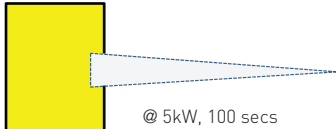
Time taken to break through

- @ 1kW < 20 secs
- @ 5kW < 2 secs
- @ 20kW-milliseconds!

### Tests on Laser Castle

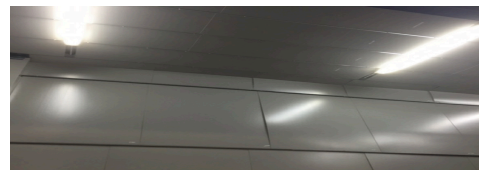


50mm



@ 5kW, 100 secs

< 20mm penetration only



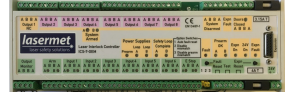
Close up of Lasermet's active laser guarding panels within the enclosure

# Concept of the Laser Castle

**Rapid build - just a couple of days to complete the installation**

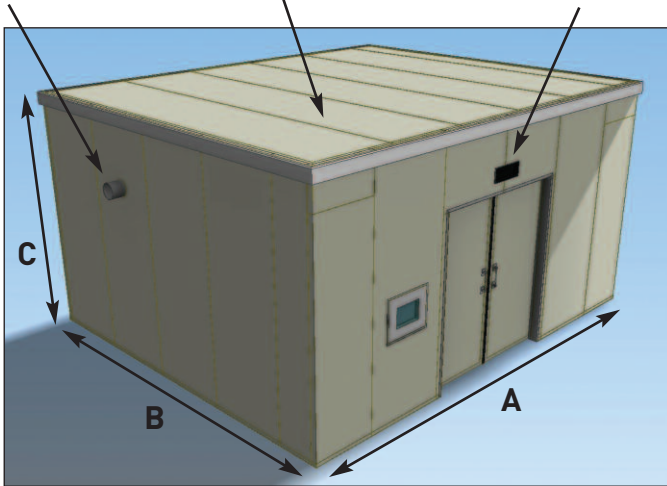
Laser safety is mastered by the ICS Interlock controller. All laser related equipment in the cabin is connected to the controller.

*Modular panels - suitable for extending the cabin size - or relocating the cabin.*



*Fume extraction vent - can be positioned on either side.*

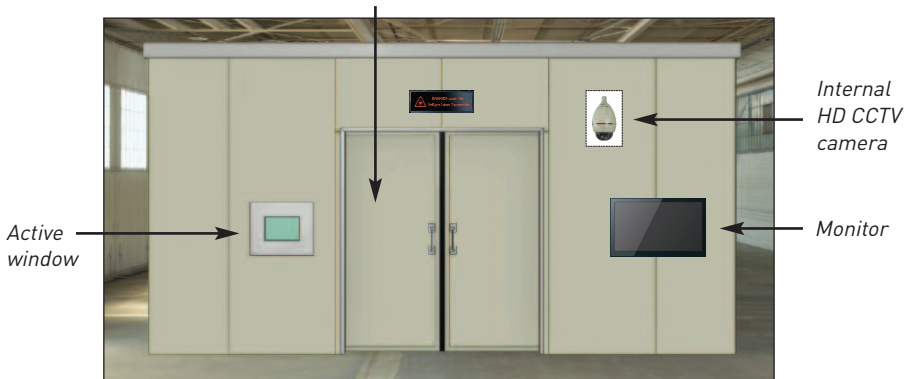
*LED Warning sign - dual colour, dual message - dual language - if required.*



Typical dimensions: A = 6.6m / 21' 8" • B = 5.5m / 18' 0" • C = 3.5m / 11' 6"

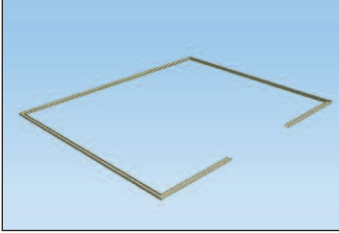
*Double manually operated doors - 2.2m w x 2.5m h / 7'3" w x 8'2" h*

*Single automatic motorised door - 1.7m w x 2.5m h / 5'7" w x 8'2" h*

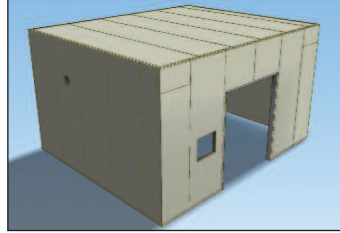


# The Rapid Build Process

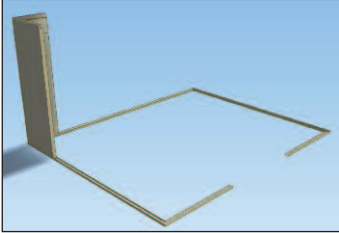
It is essential that the floor is flat and clean before construction takes place.



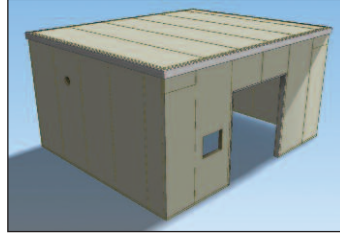
**DAY 1**  
Floor channel fixing and marking out typically takes 1 hour



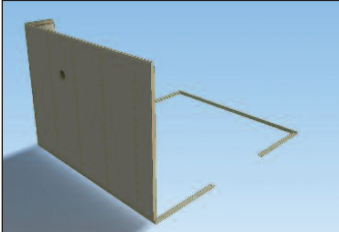
**DAY 2**  
Roof



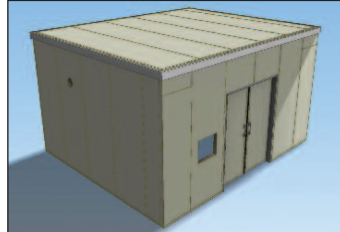
**DAY 1**  
First corner: Typically choose the area with the least access



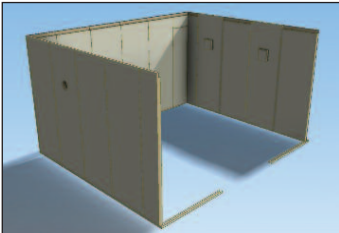
**DAY 2**  
Top planking option



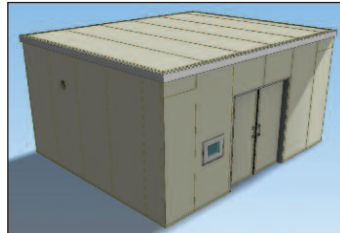
**DAY 1**  
Left hand wall



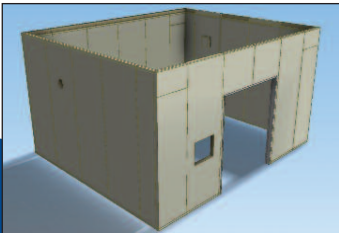
**DAY 2**  
Doors



**DAY 1**  
Rear and right hand side walls



**DAY 2**  
Active window



**DAY 1**  
Front wall



**DAY 2**  
Interlock and extraction  
Lighting and CCTV

# Equipment

## Door Options

All doors are connected to the interlock controller with a magnetic lock and interlock switch. The laser cannot be operated with the door (or doors) open. They must be securely closed to switch on the laser.

The doors enable standard forklifts to travel through the door opening (see page 3 for manually operated doors).



Motorised doors

## Service Door

A service door option is also available. This can be installed in any of the remaining walls.

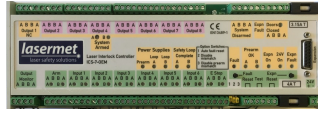


## Door Maglocks

The doors are secured using a Magshear magnetic lock system. This ensures the doors cannot be opened when the laser is operating.



## ICS Interlock System



The interlock controller ensures the laser only operates when all of the laser safety interlock controls are in a safe mode. This means that the doors must be closed, the LED warning sign is illuminated, the active window (if fitted) is functioning and that all of the switches and maglocks are operating correctly. It can also verify that air extraction and other essential processes are operating. Only when all of the above functions are in operationally safe mode will the controller power the laser operator switch enabling the laser to be fired.



## Illuminated LED Signs

Lasermet's smart, high quality, LED warning signs are dual colour and dual message (and even dual language).

## Audio Alert

Lasermet's audible warning system is included to alert personnel to any hazards.



# Equipment

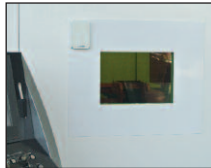
## HD CCTV System components



1. HD Camera
2. Monitor
3. Digital video recorder
4. Joystick control
5. Interface

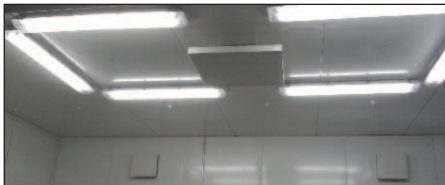
## Active laser safety window

The optional active window is also linked to the interlock controller so that if the window is struck by the laser beam the laser is switched off.

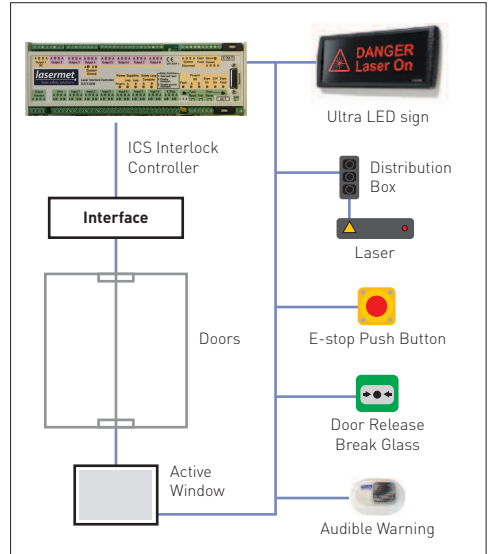


## Lighting

High quality lighting is included as part of the installation.



## Simplified overview of the laser safety system - main components



## Containment

All electrical wiring is housed within containment as shown.



**Completed installation** including containment, lighting, interlock, ventilation and CCTV.

[www.lasermet.com/lasercastle](http://www.lasermet.com/lasercastle)