Laser modules

OEM LASER MODULES & SCANNERS

world leading laser measurement technology

MDL
Laser Systems

Integrate a laser into your own application

PROCESS CONTROL

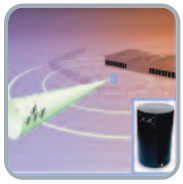

COLLISION AVOIDANCE


BALLISTICS


AVIATION


OIL & GAS


TRANSPORT


SECURITY

The Integrated Laser Module (ILM) units are compact class 1 eye safe, rugged, multipurpose laser distance meters for integration into OEM applications.

These laser distance measuring modules have been specifically designed for additional integration, each giving a reflectorless range of up to 1500 m (4650 ft), 500 m (1500 ft), 150 m (500 ft) and 35 m (110 ft) for the ILM-1500, ILM-500, ILM-150 and ILM-35 units respectively.

The laser module, or *sensor* can be integrated into a number of suitable system applications that, primarily require distance measurement. ILM modules can be configured to output distance measurement (range), speed and height of vehicles (or objects) and may also be set to trigger cameras in tollbooths or law enforcement applications.

Sensors can also be integrated to produce vehicle profiles with the ability to classify or identify them, count axles, over height detection and much more. Alongside traffic applications, the ILM is used in military, security, construction and aviation markets. From a target designator, motion detector, surveying tool or altimeter, each market segment has its own special requirement.

At MDL we are aware that no two applications are exactly the same, so we work with OEM partners to provide unique solutions to their individual applications and are always willing to help. The ILM is cost effective, accurate, fast and environmentally sealed to IP67 making it the most robust sensor on the market today!

MDL's laser sensors use time-of-flight technology, which put simply, measures the time taken for a very short pulse of infrared laser light to travel from one window in the module to a target and back to a very low noise detector behind a second window. The distance to target is calculated from the time taken to make the round trip. The reflected light signal levels are very low, so the greater the reflectivity of a target, the longer the range over which this target can be measured or 'seen'. Therefore, reflective targets will increase the range of each of the ILM modules.

OEM Fanned Laser Module (FLM)

The FLM units are compact class 1 eye safe, rugged, multipurpose laser distance meters for integration into OEM applications.

The sensors can be integrated into a number of suitable system applications that require detection of a distance change.

FLM modules can be configured to output range and height of vehicles or objects and may also be set to trigger cameras in tollbooth or law enforcement applications. The FLM's can be further integrated to produce vehicle profilers and scanners that classify and identify vehicles, over height detection and much more.

OEM Scanning Laser Module (SLM)

The SLM is a compact, rugged, class 1 eye safe, multipurpose scanning distance meter for integration into OEM applications.

Capable of a reflectorless range of up to 500 m (1500 ft), the SLM can be additionally integrated (with suitable software) into other equipment for a variety of applications. The laser head turns on its central axis meaning that the laser module inside is always perfectly aligned to the receiving detector making it a very rugged, accurate system. An angle encoder defines the angular position of the respective targets. The reflected light levels can be very low, so the greater the reflectivity of the target, the longer the range that can be measured.

MDL provides a set of standard systems designed for easy integration into many applications. Other variants are available and customisation can be provided for OEM integrators.

Please talk to us about your application and needs so that we can show you how our range of OEM modules can help you.

OEM Altimeter

MODULES RANGE UP TO 1500 M WITH 5 CM ACCURACY WITH UP TO 1000 READINGS PER SECOND

Altimeters can be provided as an OEM module or combined with a visual cockpit display to form a fully functioning end user system. Three variations of modules are available with ranges of up to 1500 m (4650 ft) and can be configured to output range or make speed calculations such as rate of descent. MDL has many versions of laser modules and so work with our OEM partners to provide unique solutions to their individual applications.

In this application the altimeter provides a guide for optimum crop spraying height. The display in the cockpit allows the user to set the offset height for their aircraft (for example if the laser is mounted in the wing). Then the optimum height is programmed into the unit and a tolerance set. The displayed value provides the current aircraft height as well as an indication of being above or below the 'optimum' spraying zone.

Precise height control means:

- Safer landings
- Less damage to equipment
- Reduced maintenance cost
- Reduced pilot stress
- Precision approaches

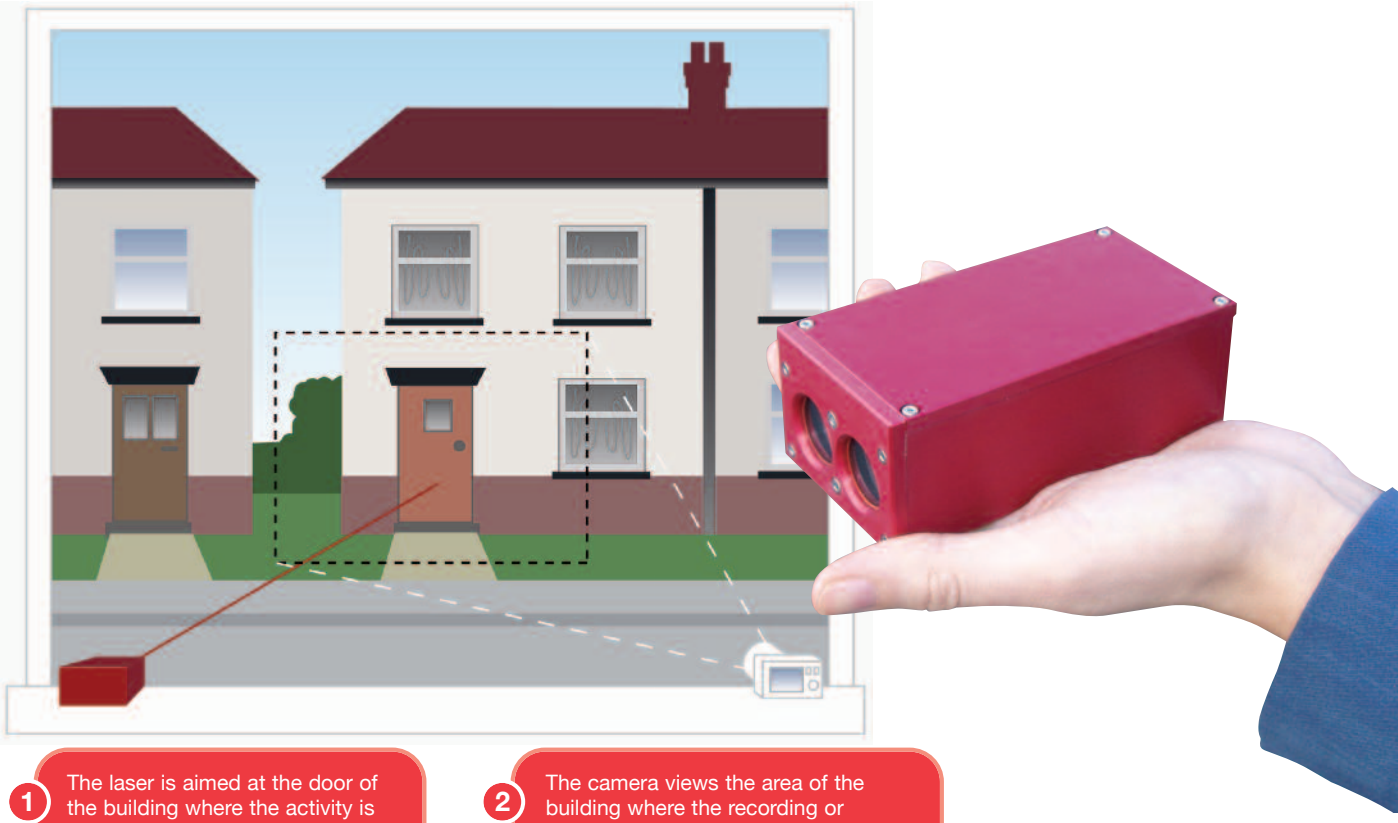
Cockpit display

Laser module mounted in aircraft wing

ILM

Laser Motion Detector

Laser rangefinders are very good at detecting changes in distance and in many of the applications that use them, this is the main function. An example of such an application is the “laser motion detector”. In a surveillance operation, a digital camera records activity at the house of a known drug dealer. This could be over a period of many weeks. The dates and times of interest in the recorded video are when there is movement about the door area of the monitored house/scene.



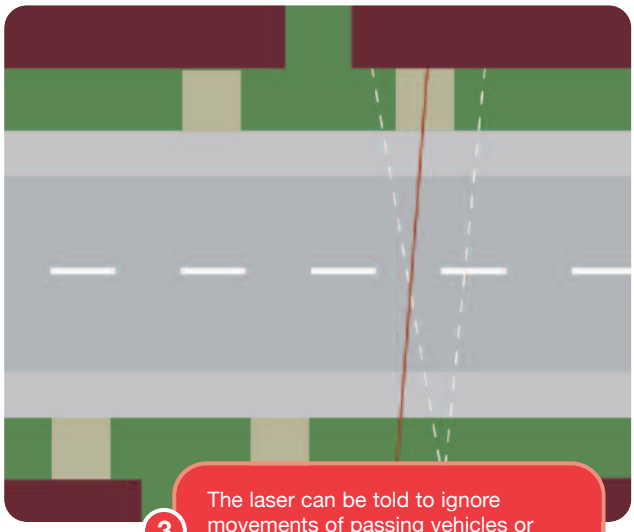
1. The laser is aimed at the door of the building where the activity is expected to take place.

2. The camera views the area of the building where the recording or photographs are required. Laser and camera do not have to be in the same location.

The solution is to aim the laser at the door. The internal program constantly measures the distance to the first object that it “sees”,i.e. the target.

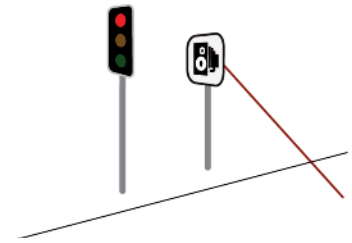
If the distance measured is between the start of the garden and the door of the house, then we consider a visitor is approaching. A distance less than the start of the garden would be people passing in front of the garden or vehicles on the road. Video motion detection software would not be effective at this point. Also if the door opens, the distance measured by the module would increase as the laser pulses travel into the house. A visitor arriving at the door would decrease the distance measured.

This is a simple use of the digital output from the module to directly couple the camera and “mark” the time of an event so it is easier to view at a later date.



3. The laser can be told to ignore movements of passing vehicles or pedestrians so only indicates activity in the required area (front garden area in this example).

Red Light Violation



When no vehicle is present the laser measures the range to the road surface, for example, in this case let us assume 10 m.

When the vehicle passes through the laser external beam path, the range to target is reduced. The module can detect the presence of the vehicle from the recorded change in range. In this example, say to 8 m.

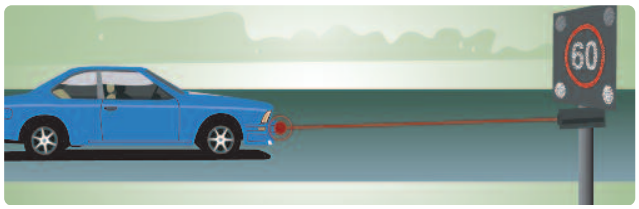
At the point when the vehicle is just beyond the laser module external beam path the measurement distance increases back to 10 m again. At this moment we can 'trigger' the camera to take a photograph. For red light violation, this would occur if the traffic lights were on red and the laser module observes a range decrease which then return to the default datum or road surface measurement.

In a system arranged like this, the customer:

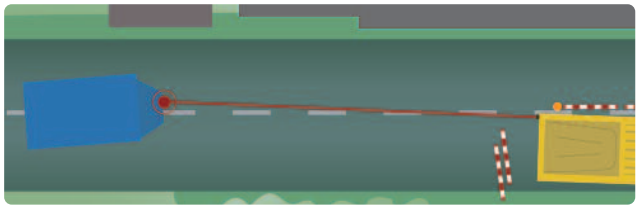
- Knows exactly where the back of the vehicle is positioned;
- Can set up the camera to capture the correct field of view;
- Can use a fixed focus camera;
- Has a single installation for laser and camera, so reduced cost;
- Can use digital or film based cameras;
- Uses non-contact measurement so no parts to wear out on the road surface.

Mobile Camera Triggering

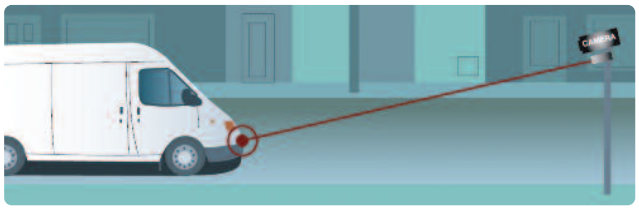
Axle Counting



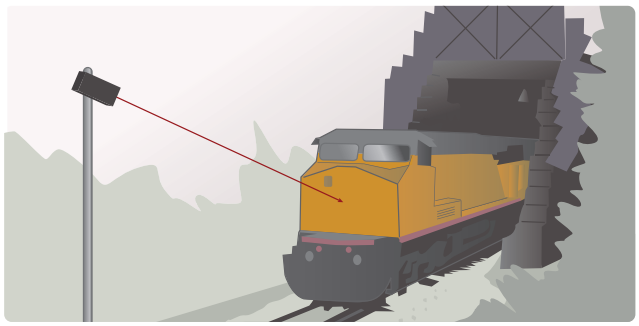
Active Sign



Safety for Roadside Workers



Camera Trigger



Train Presence Detection

Train Detection on Subway

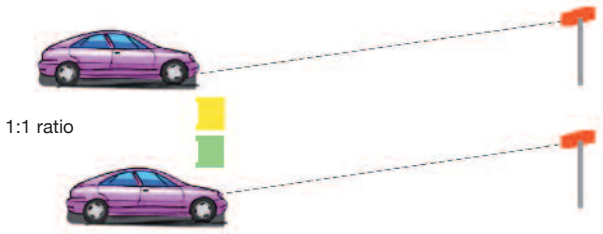
ILM

Fixed Speed Measurements

1 To calculate the speed of an object (vehicle) moving the laser sensor records a distance measurement. After a short time period (typically 0.25 second) the module records a second distance measurement. From the difference between the two measurements speed is calculated. The module outputs this data via an RS232 serial port with the second distance measurement for reference.

For a given 1:1 ratio a vehicle travels at 50 km/hr if it moves 3.5 m in 0.25 seconds.

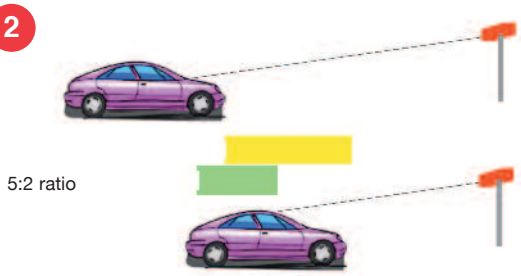
Laser module integrated into a speed gun



Physical distance travelled by car

Change in distance measured by laser

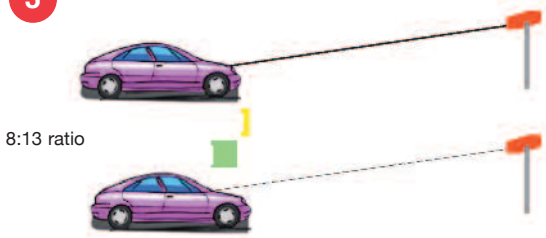
2



However, with a laser module in a fixed position it is possible that the first and second distance measurement can be made on different parts of the vehicle.

In this example, the ratio is nearer 5:2 and so the calculated speed increases to 125 km/hr even though the vehicle has moved a shorter distance in reality.

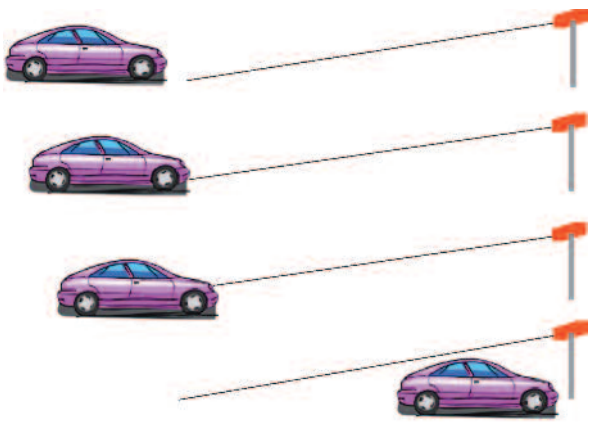
3



So it is obvious that different parts of the vehicle can have very different effects on speed calculation.

In this case the ratio falls to 8:13 causing the speed calculation to fall to 31 km/hr.

4 To overcome this issue use the trigger feature available in our laser modules. The module is configured to continuously measure the distance to the road surface when there are no vehicles present. When the distance is reduced, it indicates that a vehicle is present. The distance is logged as the first measurement in the speed calculation. The second measurement is made (as before) 0.25 seconds later and the speed calculated. We know that this is the very front of the vehicle and the best place to make the measurements for speed calculations. The laser does not output any more speed values until the vehicle has passed. Once the distance to the road surface is once again made, the process can start again.



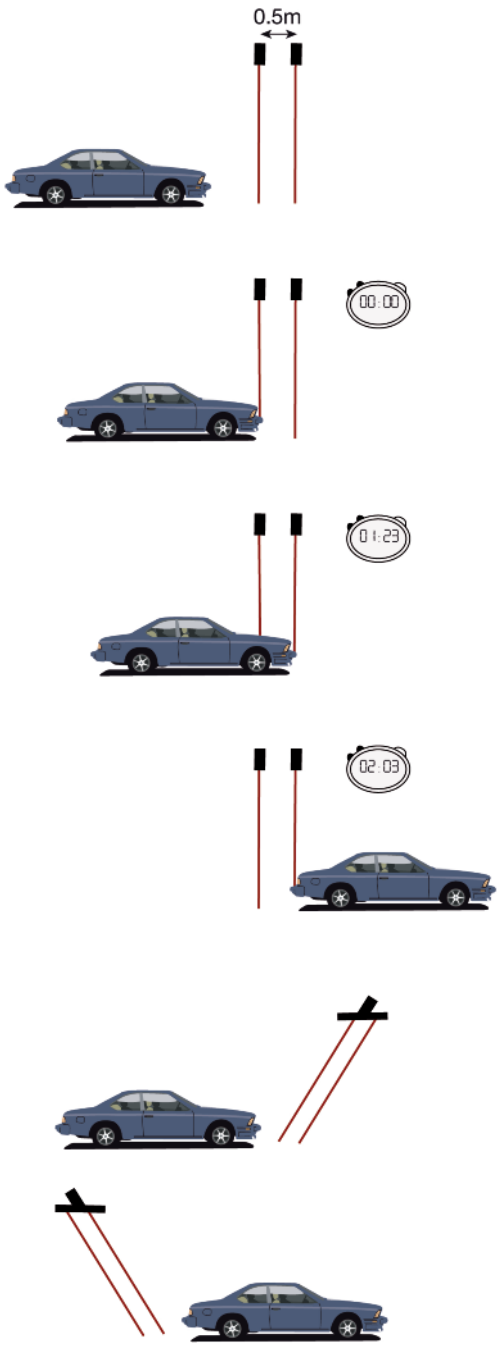
Before the vehicle is observed by the laser

Laser observes a distance change and logs this as the first speed distance

Laser makes the second measurement and calculates speed

When no vehicle is observed the laser resets and waits for the next vehicle

Fixed Speed Measurement (using two laser modules)



When no vehicles are present, both laser modules shall measure the distance to the road surface. Normally this data is ignored by the combined system.

When a vehicle intersects the first laser module external beam, a range change is detected. With this confirmation of a vehicle being present, a count increment is commenced as it passes (00:00)

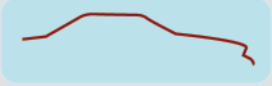
When the second laser module detects the vehicle is present, we know how long it takes to travel 0·5 m (distance between the modules) (01:23). Using these numbers we can calculate the speed that the vehicle is travelling.

When the first laser module detects the road surface again the end of the vehicle has been found. Timing how long the vehicle was under the first laser and from the speed of the vehicle (calculated above), the length of vehicle can be calculated.

If angled, the laser modules shall function as before but with the addition of a camera a trigger shall be generated when certain criteria are met, for example, a speed gun for 50km/hr.

The process is equally applicable for the backs of vehicles as they pass. This provides a flexible camera trigger to the final system.

By data logging from one of the laser modules, a plot of the vehicle profile as it passes below can be generated. This permits very accurate classification.



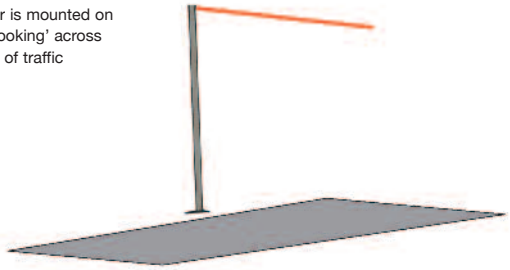
If the receiving computer compares the data string from the modules when generated, it is possible to calculate vehicle separation once two vehicles have passed, and the general flow rates of the traffic.

Over Height Detection Solutions

MDL's laser distance measuring units can be mounted on a pole, gantry or even a building at the maximum height that you intend to detect, above which is to be classified as over height.

The laser module has two outputs, a serial connection for setup during installation and a digital output which can be connected through a relay to provide a true make-break contact switch. The module makes distance measurements at very high speeds as vehicles pass through the beam path, they are not observed by the laser. The laser will either report a fixed object in the distance or nothing at all. When an object is high enough to be observed by the beam, this is identified as an over height object.

The laser is mounted on a pole 'looking' across the lines of traffic

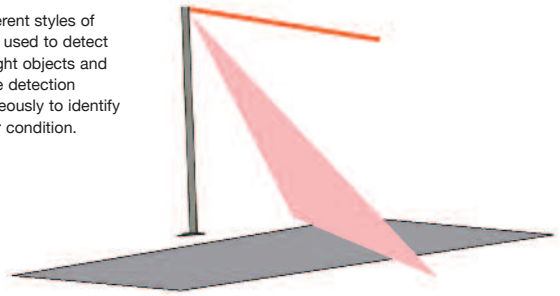


The digital output is programmed to change state when it detects an object between two predefined distances. Normally this is the edges of the lane (or lanes) that are to be monitored. Anything detected outside of the 'monitored' zone will not activate the switch even if the laser detects them. So for example, this could be vehicles on the opposite carriage way or leaving the danger area via a slip road.

One single module, as shown, is the simplest form of over height detection. However there is the potential for example, that a bird, could fly through the beam and trigger the system. To prevent these *false* triggers, a similar laser technology which has a Fanned output beam is used. This can be mounted such that it is 'looking' at the road surface draws a striped beam over most of the lane itself. In a similar manner to the first module identified, this fanned unit is measuring a fixed distance to the road surface.

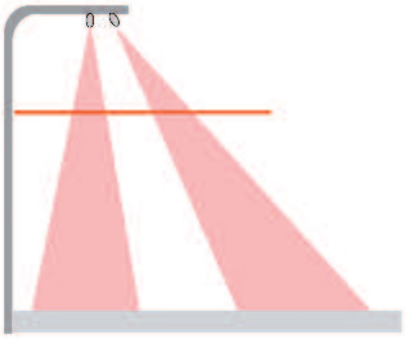
Each time a vehicle passes through the beam, the module measures the height of the vehicle as it can no longer observes the road. Any measurement made by the device, which is less than the known distance to the road surface, can 'trigger' the digital output of this device. If the fanned unit detects a vehicle in the road AND the beam unit detects that there is something over height, the relay output can trigger the required warning signs to indicate an over sized vehicle passing.

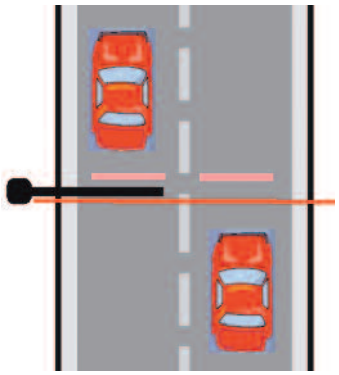
Two different styles of laser are used to detect over height objects and presence detection simultaneously to identify a danger condition.



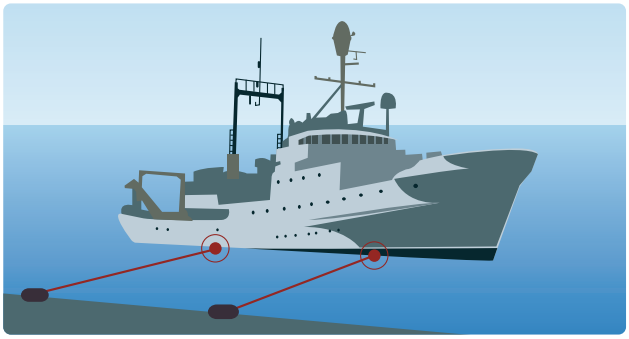
If more than one lane is to be monitored, additional fanned units can be added. Since the distance to the over height object is known, even the lane that the offending vehicle is currently travelling in can be identified.

Multiple lanes can be monitored from a single pole.



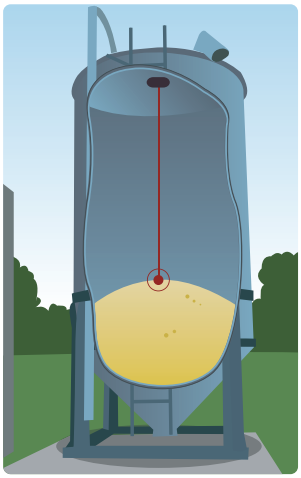


Plan view of a multi-lane system shows the stripes on the road surface and the over height beam crossing the lanes. Note that these would be on top of each other in practice, but they have been separated for ease of understanding.



Ship Docking Measurement

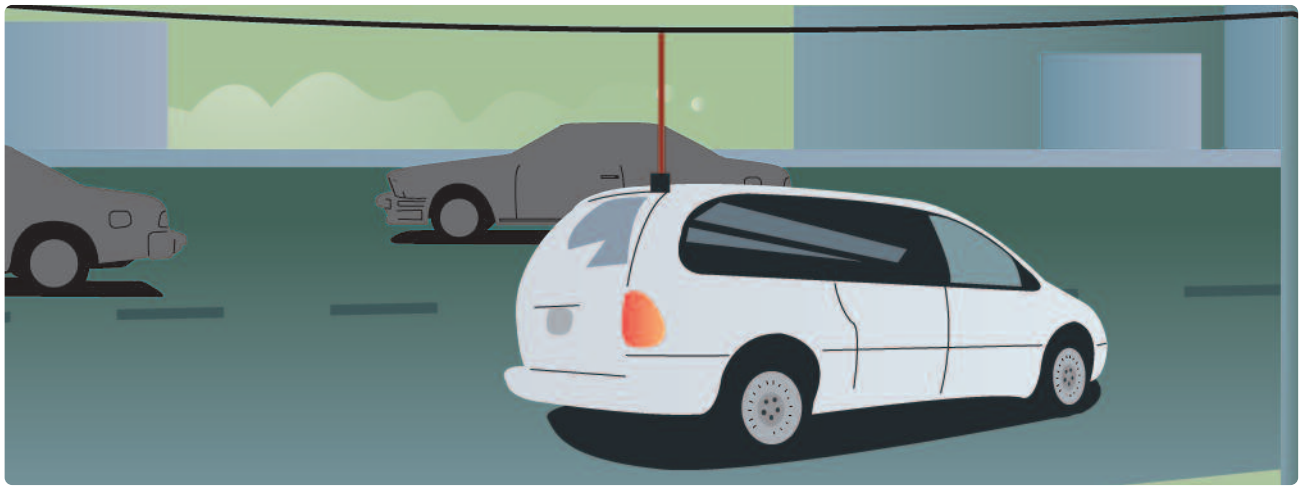
Elevator Position Measurement



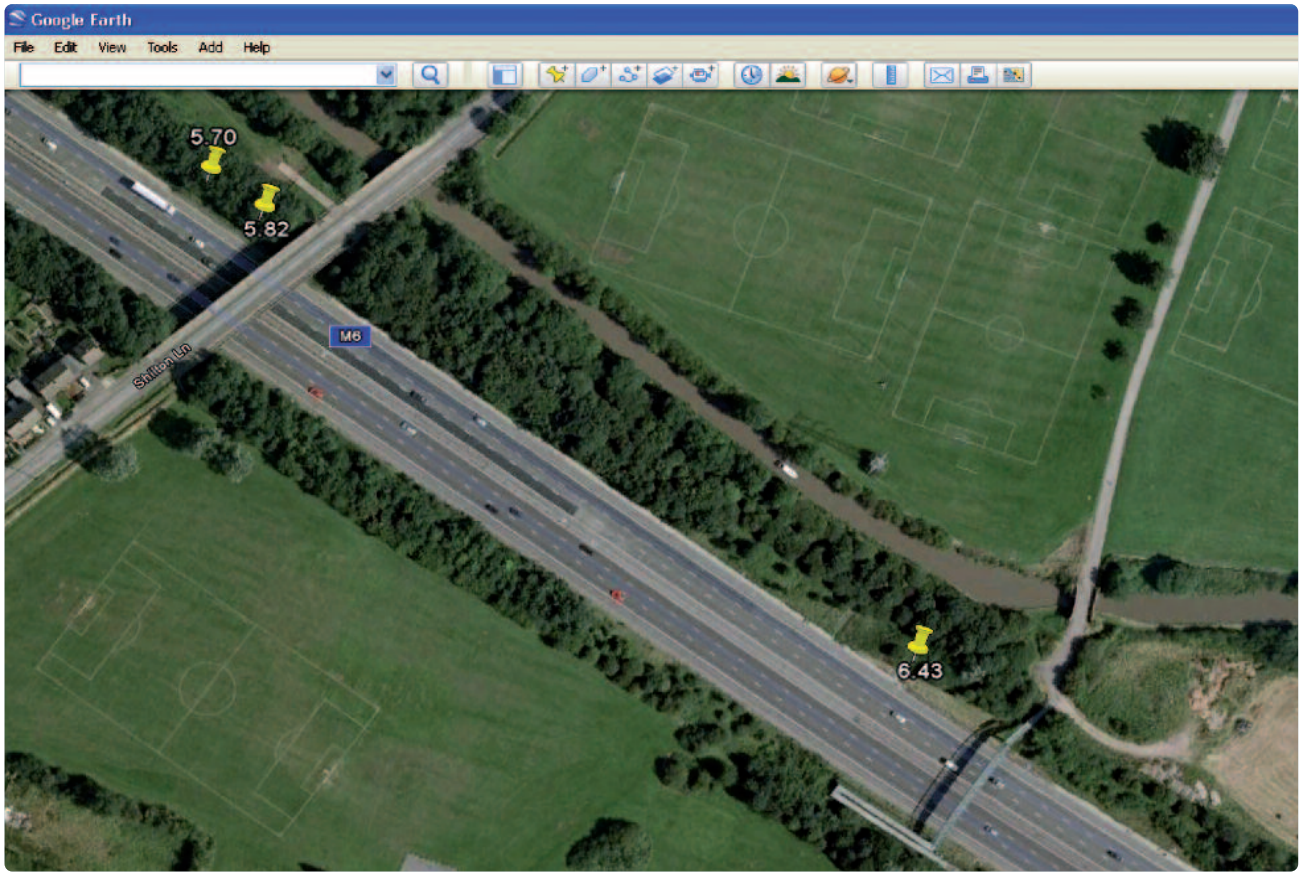
Silo Measurement

Bridge Height Surveying

In this arrangement an MDL laser sensor is mounted on a vehicle looking upwards. For most of the time it does not make any distance measurements as there is nothing but sky and cloud above.



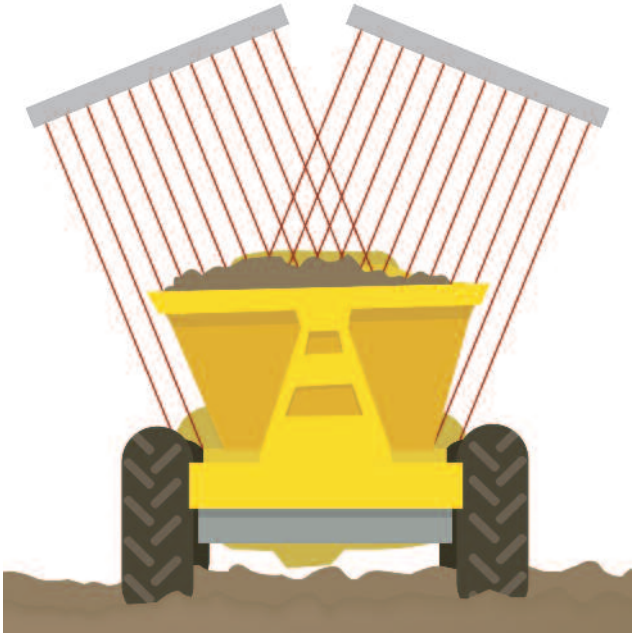
Setting the laser to only output ranges below 6 m for example, will check for obstructions which are less than 6 m high. By combining the distance measurement with a GPS input, the location of the potential obstruction can be combined and logged using a Windows PC application.



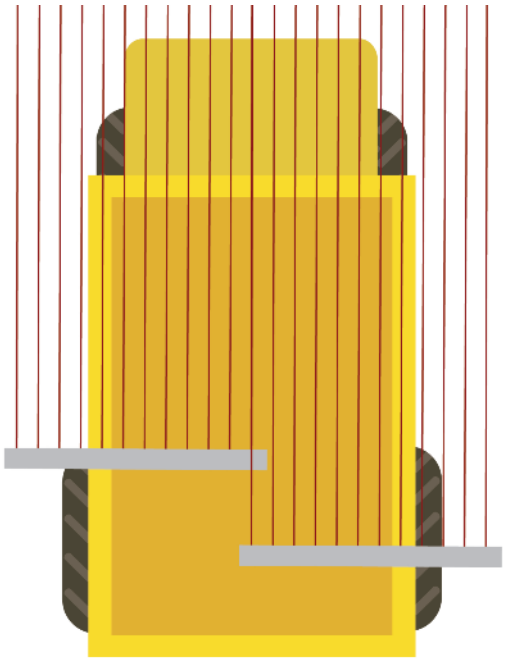
Using an MDL inserter program,the collected data points can be presented on a Google Earth™ map or aerial photograph. Pointing at the pin with a mouse reveals the data logged at this point. The more accurate the GPS used, the closer the pins will be shown to the object.

Volume Calculation, Virtual Weighbridge and Loading Profiles

Two support bars, each containing an array of 12 laser modules are used to scan trucks that are up to 8 m wide.

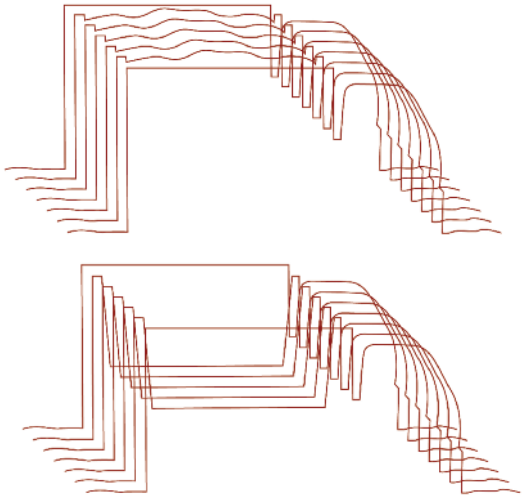


As the vehicle passes below the laser module array, a set of height profiles are revealed along the length of the truck that can be combined to form a 3D profile. When the vehicle enters the loading area it is scanned empty. This generates the initial volume profile for the empty truck. As it leaves the loading area it is scanned again and any additional volume can be calculated. If this is a known material, the load can be virtually weighed based on this volume calculation.

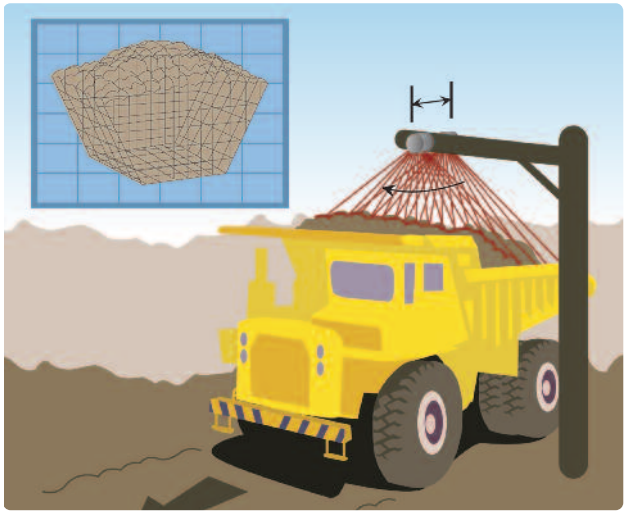


The two bars of laser arrays are positioned slightly offset so that it is possible to measure the time taken for the truck to travel from a module in array 1, to a module in array 2. This time is used to calculate the speed of the truck and so correctly space the datapoints along the trucks length.

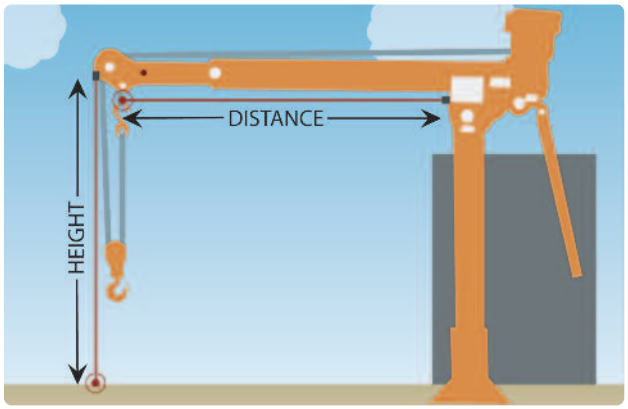
An example of a 3D profile for a scanned full and empty truck is illustrated below. Software calculates the volume and corrects the offset of the data from the profiles.



The volume of a vehicle with additional material in the back section shows the volume increase which would be measured on the second pass.

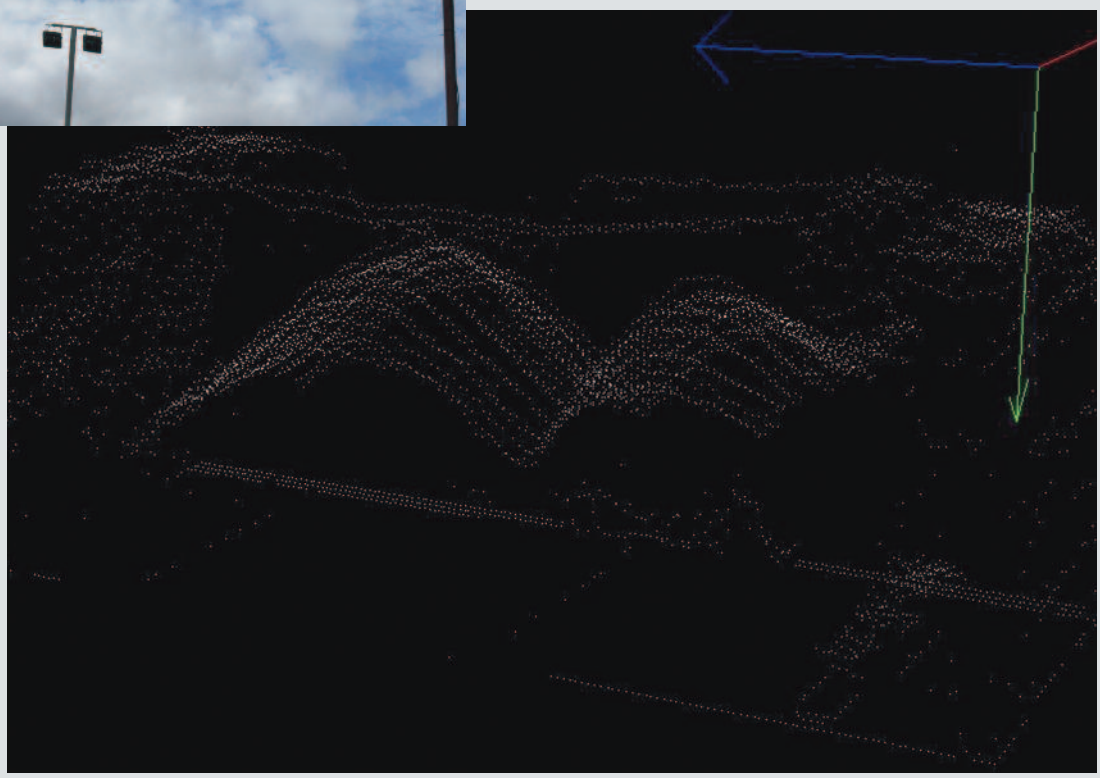


Truck Volume



Position and Height Measurement

Volume Calculation, Virtual Weighbridge and Loading Profile



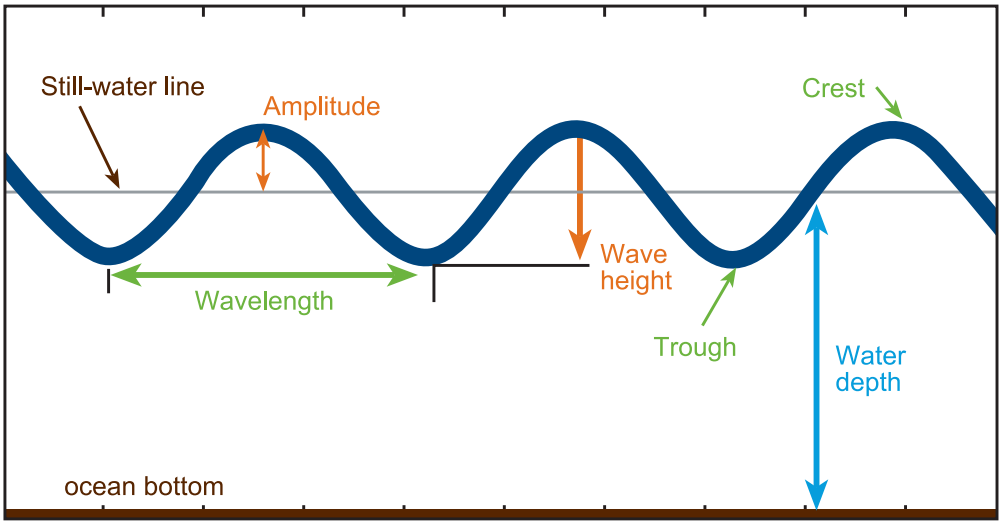
Tide Height and Wave Monitoring




Out in the ocean, as the wind blows across a smooth water surface, air molecules push against the water. This friction between the air and water pushes up tiny ridges or ripples on the ocean surface. As the wind continues to blow, these ripples increase in size, eventually growing into waves that may reach many metres in height.

Using an MDL laser sensor, looking down at the water surface, the height data can be gathered and plotted to determine the wave height and hence the still water line. In areas such as harbours this can be a water level indicator or used along a river to show tidal height changes.

On an oil rig for example, such as sensor can be used to evaluate the outside sea state. Combining the laser system with a solar panel and a GPS modem for example, a set of remote water monitors can be deployed.




TECHNICAL SPECIFICATION

Model	ILM R/R (L)				ILM T/T (L)				ILM S/S (L)			ILM D/D (L)
Module Type	**35**	**150**	**500**	**1500**	**35**	**150**	**500**	**1500**	**150**	**500**	**1500**	**35/150/500**
Laser												**Programmable**
Typical Wavelength (nm)	905	905	905	905	905	905	905	905	905	905	905	905
Beam Divergence (mrads)	2.5 x 0.2	2.5 x 0.2	2.0 x 0.1	2.25 x 0.15	2.5 x 0.2	2.5 x 0.2	2.0 x 0.1	2.25 x 0.15	2.5 x 0.2	2.0 x 0.1	2.25 x 0.15	↑
Reflectorless Range (m)	0.3 - 35	0.5 - 150	1 - 500	3 - 1500	0.3 - 35	0.5 - 150	1 - 500	3 - 1500	0.5 - 150	1 - 500	3 - 1500	
Reflectorless Range (ft)	1 - 110	2 - 500	3 - 1500	10 - 4650	1 - 110	2 - 500	3 - 1500	10 - 4650	2 - 500	3 - 1500	10 - 4650	See individual
Max Range (m)	650	650	650	6000	650	650	650	6000	650	650	6000	columns
Max Range (ft)	2000	2000	2000	18600	2000	2000	2000	18600	2000	2000	18600	↓
Accuracy (cm)	5	5	5	5	15	15	15	15	5	5	5	±1 to ±15 cm
Resolution (cm)	1	1	1	1	10	10	10	10	1	1	1	1 to 10 cm
Speed Accuracy (mph)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1	1	1
Rep Rate (Hz)	9	9	9	4	1000	1000	1000	1000	4	4	4	up to 1000*
Eye Safety	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1M	Class 1	Class 1	Class 1	Class 1
Communications												
Data I/O	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type	2m cable with 9-pin D type
Trigger Out (digital)	FET Collector	FET Collector	FET Collector	-	FET Collector	FET Collector	FET Collector	-	FET Collector	FET Collector	-	FET Collector
Power (V)	9 to 24	9 to 24	9 to 24	12	9 to 24	9 to 24	9 to 24	12	9 to 24	9 to 24	12	9 to 24
Protocol	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232◆
Environmental												
Operating Temp (˚C)	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60
Extended Range (˚C)❖	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60	-40 to +60
Protection Class	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
Physical Construction	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised & Painted Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised & Painted Aluminium	Anodised Aluminium	Anodised Aluminium	Anodised & Painted Aluminium	↑
Dimensions (mm)	103 x 54 x 38	103 x 54 x 38	134 x 83 x 53	154 x 130 x 73	103 x 54 x 38	103 x 54 x 38	134 x 83 x 51	154 x 130 x 73	103 x 54 x 38	134 x 83 x 51	154 x 130 x 73	See individual
Dimensions (inches)	4.0 x 2.1 x 1.5	4.0 x 2.1 x 1.5	5.3 x 3.3 x 2.0	6.0 x 5.1 x 2.9	4.0 x 2.1 x 1.5	4.0 x 2.1 x 1.5	5.3 x 3.3 x 2.0	6.0 x 5.1 x 2.9	4.0 x 2.1 x 1.5	5.3 x 3.3 x 2.0	6.0 x 5.1 x 2.9	columns
Weight (g)	260	260	600	950	260	260	600	950	260	600	950	↓
Weight (oz)	9.2	9.2	21	33.5	9.2	9.2	21	33.5	9.2	21	33.5	

Variations on these standard specifications are available, for example, ◆RS485 or RS422 outputs, *higher rep rates and longer ranges. Custom sizes and formats are also available.
Internal software and functionality can also be changed to suit OEM applications where appropriate.
❖Extended temperature versions are identified with the (L) added to the product name.

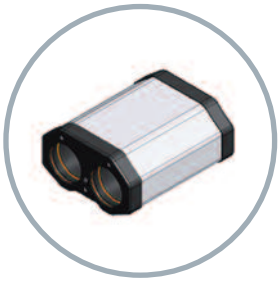
OEM Module Evolution

Fanbeam®

ILM 300

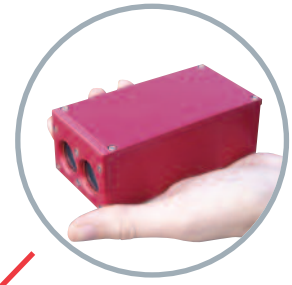
ILM 500

Quarryman® Pro
(long range)



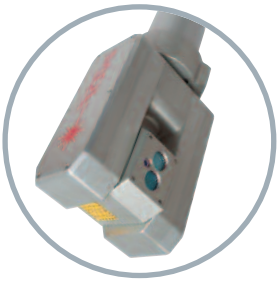
ILM 1500

LaserAce® Pocket Series



ILM 150

C-ALS



Void Scanner

SLM 150

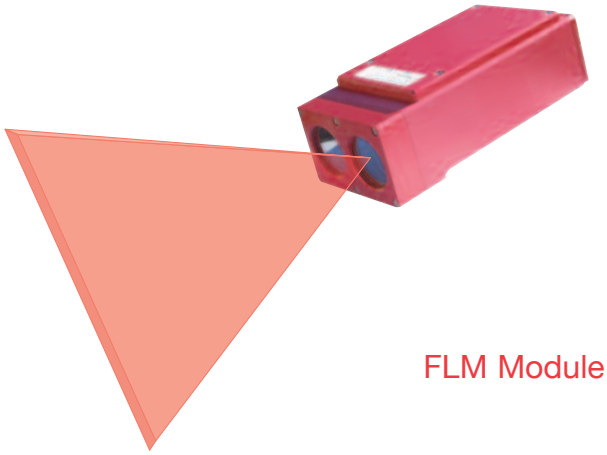
Custom Rangefinder

Many of our units have been customised to suit specific applications as requested. To give an idea, a few of the variants that have been applied are listed below. MDL are happy to discuss your new ideas and requirements.

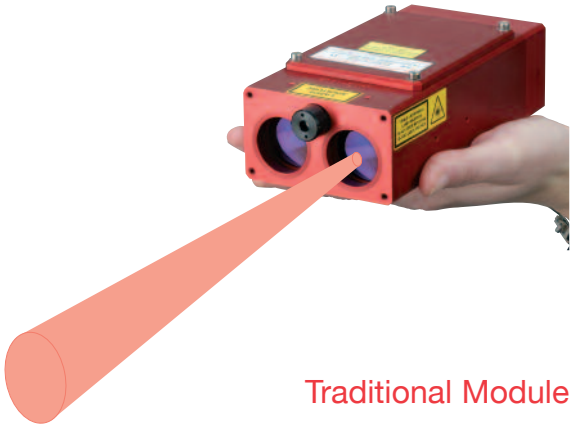
- RS485 / RS422
- ATEX Housing
- Control Buttons
- Measurement per second
- Red Pointers Displays
- Extended Temperature Range/Heaters
- 3-48 volts
- Bluetooth
- Distance
- Fanned Beams
- Range
- Sight Scopes

Fanned Laser Module (FLM)

OEM FANNED LASER MODULE



FLM Module



Traditional Module

Model	FLM

Module Type	FLM-2	FLM-5	FLM-10	FLM-15	FLM-20	FLM-30	FLM-40
Laser							
Beam Divergence (mrads):	35 x 0.2	88 x 0.2	175 x 0.2	263 x 0.2	350 x 0.2	525 x 0.2	700 x 0.2
Reflectorless Range (m):	0.5 - 120	0.5 - 60	0.5 - 30	0.5 - 20	0.5 - 15	0.5 - 10	0.5 - 6
Reflectorless Range (ft):	2 - 370	2 - 190	2 - 98	2 - 50	2 - 37	2 - 25	2 - 18
Wavelength typically (nm):	905						
Max range (m):	630						
Max range (ft):	2000						
Accuracy (cm):	±5						
Resolution (cm):	1						
Rep rate (Hz):	1000						
Eye safety:	Class 1						
Communications							
Data I/O:	2m cable with 9-pin D-type						
Trigger Out (Digital):	FET collector						
Power (V):	9 to 24						
Protocol:	RS232						
	RS485 / 422 (option)						
Environmental							
Operating Temp (°C):	-20 to +60						
Extended range (°C)	-40 to +60 (option)						
Protection Class:	IP67						
Physical Construction:	Anodised Aluminium						
Dimensions (mm):	154 x 78 x 49	*113 x 54 x 38					
Dimensions (inches):	6.0 x 3.1 x 1.9	4.4 x 2.1 x 1.5					
Weight (g):	950	300					
Weight (oz:	33.5	11.4					
		*Available from Q3, 2010					

® FLM-T

One of MDL's standard range laser modules with a repetition rate of up to 1000 Hz. This unit is used in distance measurement, excess height measurement and traffic applications. It is also used as a fixed distance high-speed camera trigger. This unit is ideal for integration into a camera system for vehicle recognition, vehicle classification and profiling.

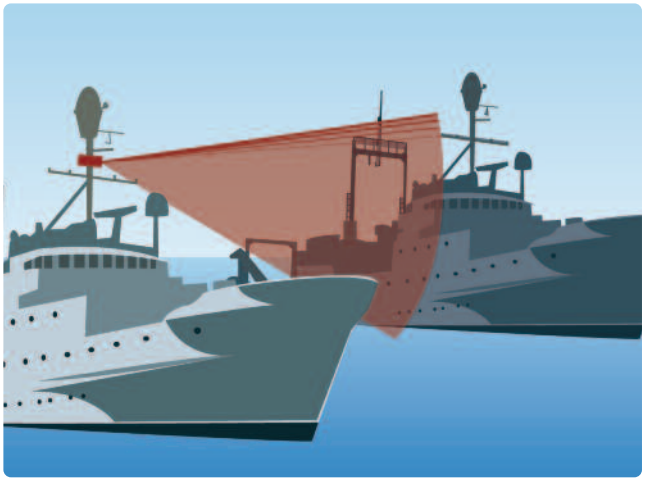
Please note that for OEM customers MDL can customise the modules output information and repetition rate.

MDL provide a set of standard systems which are designed for easy integration into all applications based on commonly required specifications. Other variants are available and customisations can be provided for OEM integrators. Please talk to us about your application and needs so that MDL can define how FLM modules can help you.

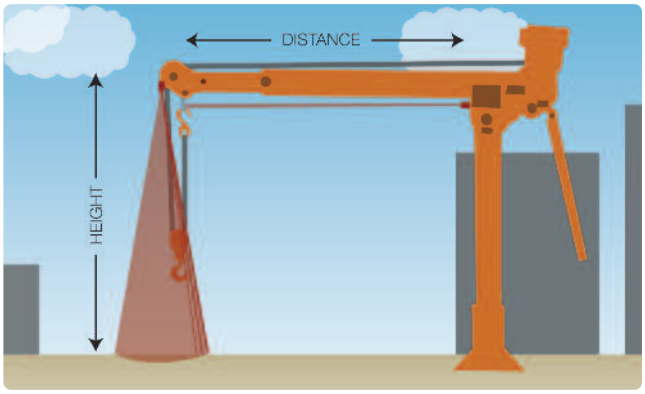
Accessories

- Red Dot Pointer: An additional red laser pointer, aligned to the measurement 905nm beam, may be used as a visual directional or alignment aid. Note: the inclusion of a red laser pointer increases the laser classification specification to class 2 for all FLM products.

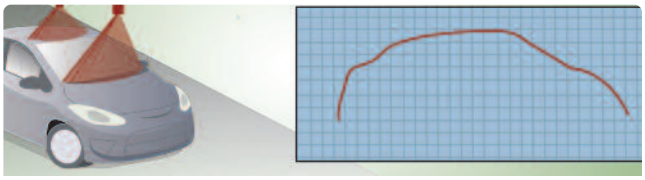
Potential FLM applications



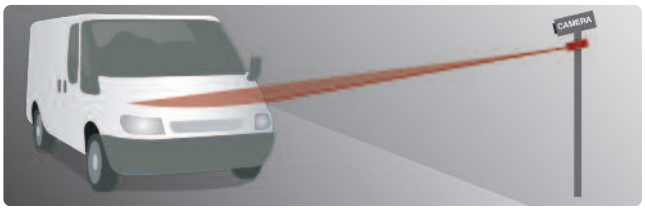
Ship Collision Avoidance



Load Height Measurement

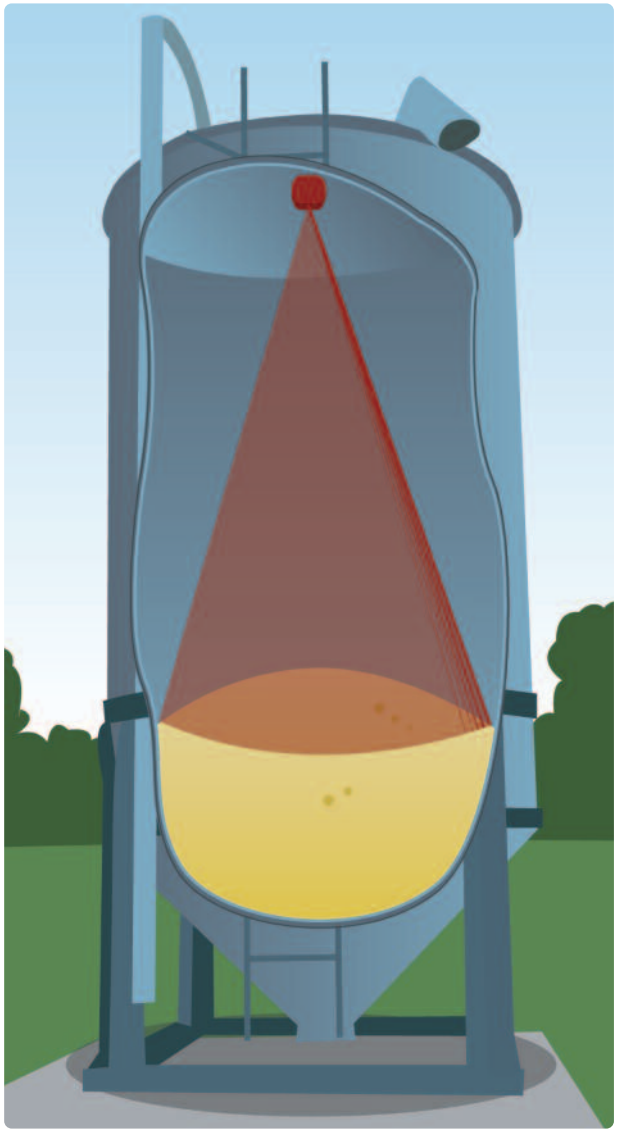


Vehicle Profiling / Height Detection



Camera Trigger

Overheight / Height Detection

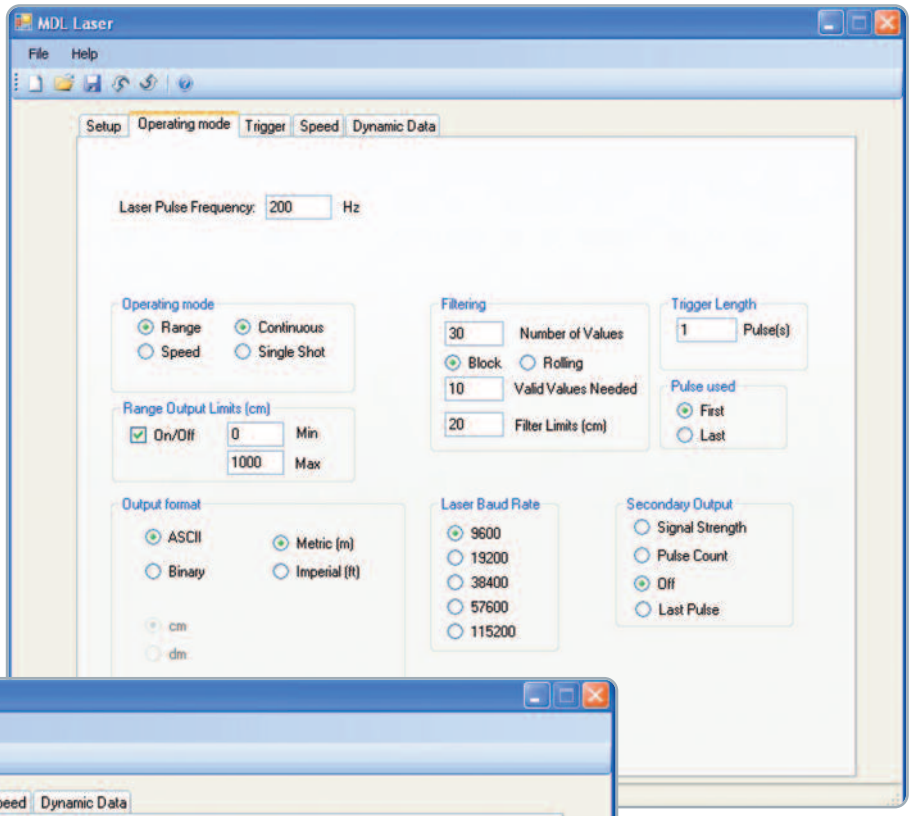


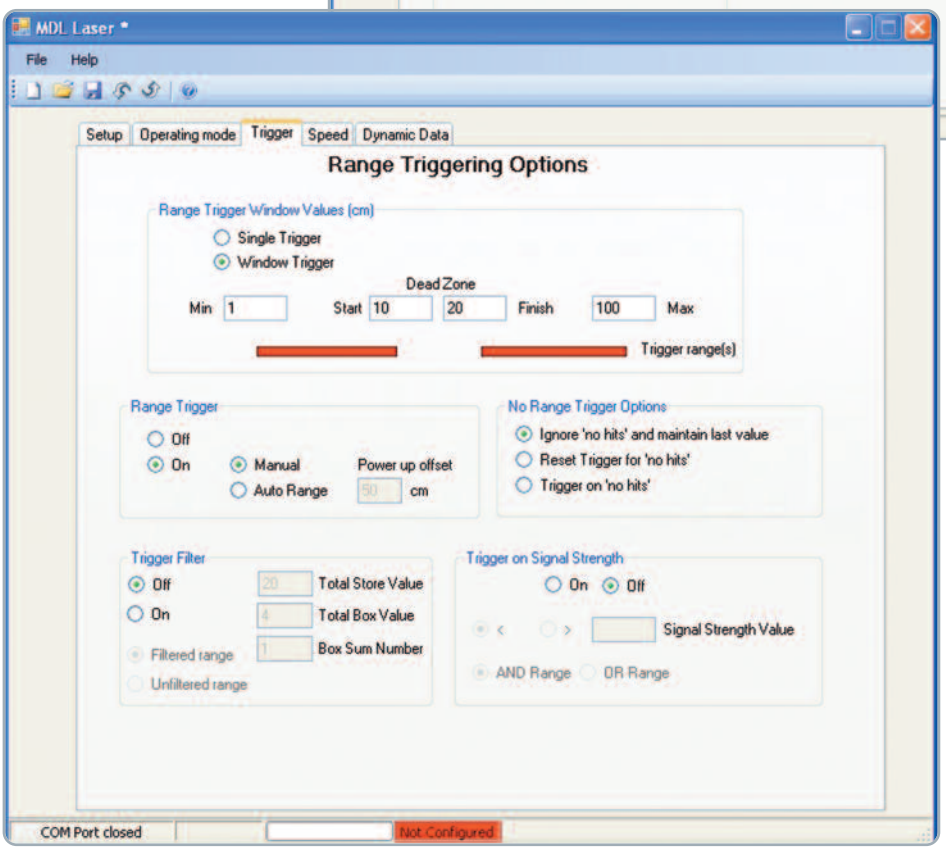
Silo Measurement

Security/Intruder Detection

Laser Programming Kit (LPK)

The laser programming kit offers customers the ability to change the operating configuration of their laser module. The two screen shots pictured below from the PC software give an idea as to the flexibility of the changes that can be made. Options include pulse filtering, output formats, baud rates and secondary outputs to accompany the range. Changes made within the laser programming kit are then downloaded to the laser module itself. Once programmed, the laser shall operate in the desired way.





The trigger window screen shot illustrates how the laser may trigger cameras for both road traffic applications and motion detection. Here, the trigger is active between 1 and 10 cm and 20 and 100 cm. For motion detection example the door would be in the untrigged zone (digital laser output) between 10 and 20 cm.

In the red light violation example on page 5, the road surface would be situated at 15 cm. In reality of course the numbers shown in this screen shot would be set for the specific application and conditions, ie. metres rather than centimetres.

Scanning Laser Module (SLM)

The SLM is a compact, rugged, class 1 eye safe, multipurpose scanning distance meter for integration into OEM applications.

The SLM offers a reflectorless range of up to 500 m (1500 ft) and can be additionally integrated (with suitable software) into other equipment for a variety of applications. The laser module turns on its central axis which means that the laser module is always perfectly aligned to the pulse detector making it a very rugged, accurate system.

The laser scanner uses time-of-flight technology, i.e. it measures the time taken for a very short pulse of infrared light to travel from one window in the unit to a target and back to a very low noise detector in a co-aligned second window. The distance to the target is half the time taken for the light to make its round trip.

An angle encoder defines the angular position of the target. Reflected light levels can be very low, so the greater the reflectivity of the target, the longer the range which can be measured.

Our standard system is designed for easy integration into all applications. Other variations are available and customisation can be provided for OEM integrators. Please talk to us about your application and needs so that we can show you how our scanning laser module can help you.

Technical Specification

- Class 1 eye safe laser (FDA / IEC / EN60825-1)
- 150 m / 500 ft typical range (reflectorless target)
- 500 m / 1500 ft typical range (reflectorless target) [option]
- Wavelength 905 nm (typically)
- Beam divergence 2.5 x 0.2 mrads
- Repeatability 5 cm / 2.0”
- Range resolution 1 cm / 0.4”
- Angle resolution 0.01 °
- Revolution upto 10 Hz, 36,000 data points
- Data I/O: Ethernet

Environmental

- Operating temperature: - 10 °C to + 60 °C / 14 °F to 140 °F
- Storage temperature: - 20 °C to + 70 °C / -4 °F to 158 °F
- Water & dust resistant (IP66)

Power & Dimensions

- Power: 9-14 V DC / 7 W
- Weight: 3.1 kg / 6.8 lbs
- Size: 126 mm Ø x 174 mm H / 5.0” Ø x 9.0” H

Example Applications

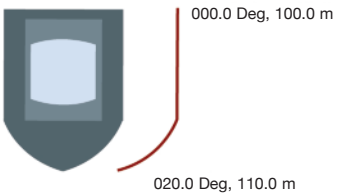
- Distance measurement
- Perimeter scanning
- Camera triggering
- Area / object profiling
- Security / intruder detection
- Collision avoidance

Accessories

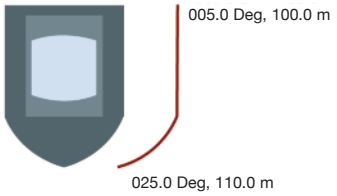
- Red Dot Pointer: An additional red laser pointer, aligned to the measurement 905 nm beam, may be used as a visual directional or alignment aid. Note: the inclusion of a red laser pointer increases the laser classification specification to class 2 for all FLM products.

Laser Scanners For Ship Docking

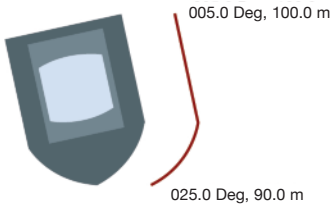
Looking at the scan data (red line) and the coordinates of the start and finish, the parameters of the ship can be measured. To simplify the text here, we look at only the detected data points of the ship.



1st scan: Knowing the distance to the ship we can calculate the length from the arc angle.

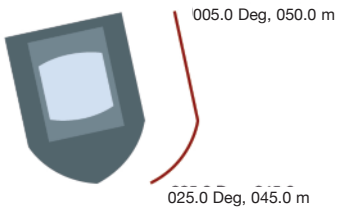


2nd scan: The ship has not moved any closer to the dock but has sailed forward by a 5 degree arc at 100 m away. This is close to 9 m of movement. Since each scan takes one second, it can be deduced that the ship is moving forward at 9 m per second, hence its speed is known.

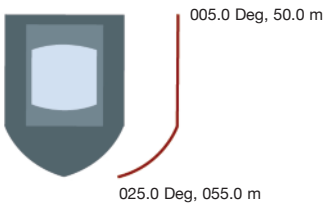


3rd scan: No further forward motion has taken place but the range to the front of the ship has decreased. This indicates that the ship has turned towards the dock since the previous laser scan.

4th scan: In this scan, the ship has moved closer to the dock whilst maintaining the previous orientation.



5th scan: Here the ship has turned back again so that it is parallel with the dock side.



Having the SLM looking from the dock side at the vessel will profile the side of the vessel itself. See the pink lines on the diagram.

As the scanner rotates these profiles move in space on the water and the movement of the ship can be tracked. This is a better dynamic system than just having two static lasers which have to be aligned.

The range of such a unit is based on the reflectivity of the vessel. By having reflectors on the vessel structure the target reflectivity is drastically increased. Tracking the reflectors increases the range over which this system would work.

Multiple objects can be tracked in the software in both passive and active target tracking.

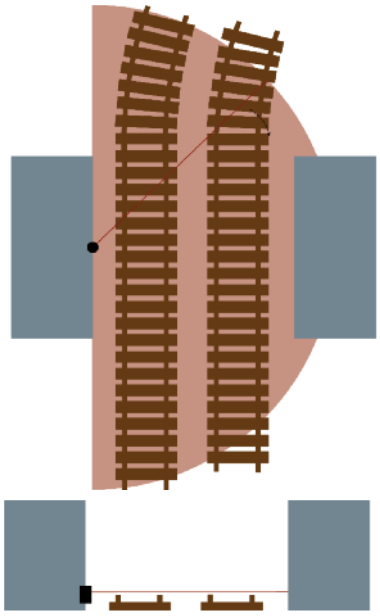
Stainless SLM (shown with red dot pointer) Class 2 product

We also offer a 20˚ and 40˚ fanned output option (see FLM units). This tracks prisms mounted on a target. Two targets on a vessel allow tracking of the movement over a range of tide heights.

Example of prisms in a cluster.

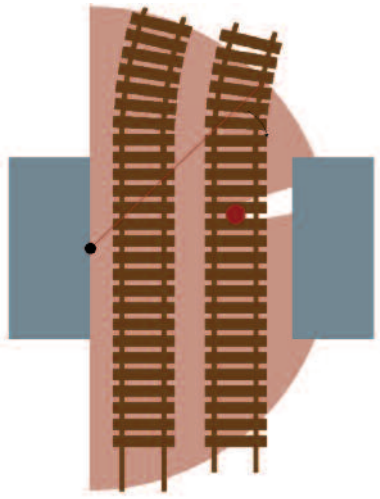
Railway Safety in Stations and Crossings

The MDL SLM will scan 360 degrees as it rotates. If 0 degrees is vertically upwards in the first drawing and 180 is vertically down, the laser would see the opposite platform from about 50 to 130 degrees. From 0 to 50 degrees it would be looking up the track and from 130 to 180 degrees it would be looking down the track. The basic SLM has a typical range of 150 m, so by placing the laser as pictured, you would be able to cover a 300 m length of track and 2 platforms 150 m apart (unlikely as this may be). The SLM may spin one full rotation in 1/10 second and so the whole area can be checked 10 times every second. There is an option to increase the range of the units if needed.

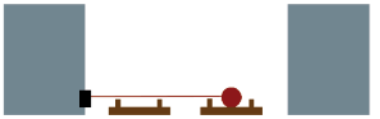


The orange area shows the coverage of the laser as it scans round and draws on a PC screen

On the diagram below a red football has been added to the same image. The data output from the laser scanner (orange area) shows an effect where part of the opposite platform is shadowed. From this data change, software may show an object on the track, its distance from the scanner and information about its physical width.



If the ball was moving along the track, the laser would see it in a different location each time it rotated. This could be used to plot the movement or even measure the speed of movement.



Equally this could have been a train that was detected as it approached the platform. First the front of the train would appear and when it was parked along side, all of the wheels (or the body if the laser was mounted high enough) would be visible.

Level crossing for cars and trains are a safety hazard.
(It is also possible to use our static FLM product for this application. The FLM would create a sheet of light, just above the truck surface).

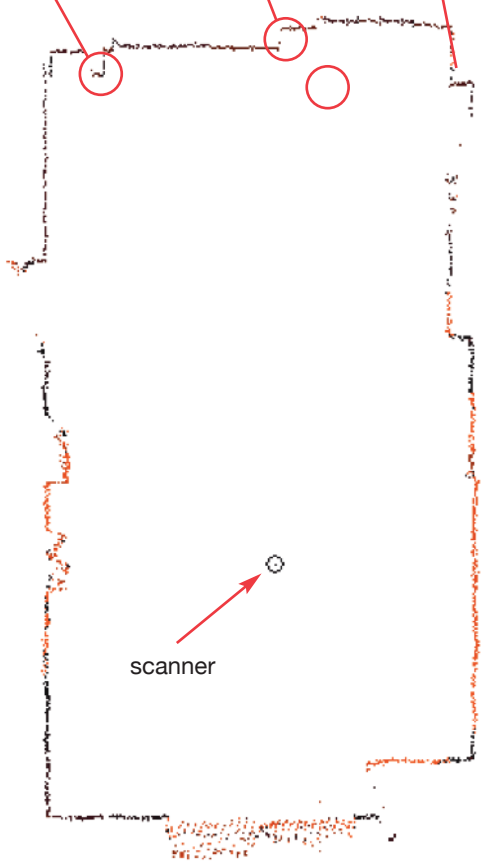
Scanning from the top of a guided vehicle creates a curtain of detection that acts as a warning system as the vehicle moves looking for obstructions.

SLM-150 (Sample Data)

The photograph shows the corner of a room. The data points below show scan data from the SLM unit as it turns 360 degrees.

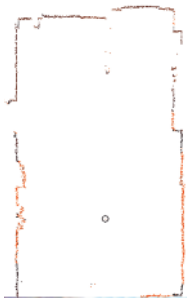
Some features have been picked out in red to highlight the features in the data that relate them to the photograph.

On the next page a person will stand in the room and be scanned with the laser. The location is shown by the change in profile data and on the matching photograph.



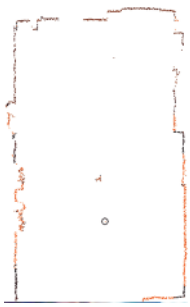
vertical blind partially open here

People Tracking and Security

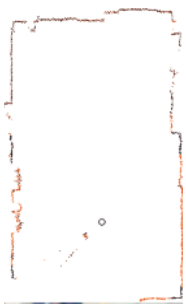


1) The head of an intruder is detected as the laser rotates.

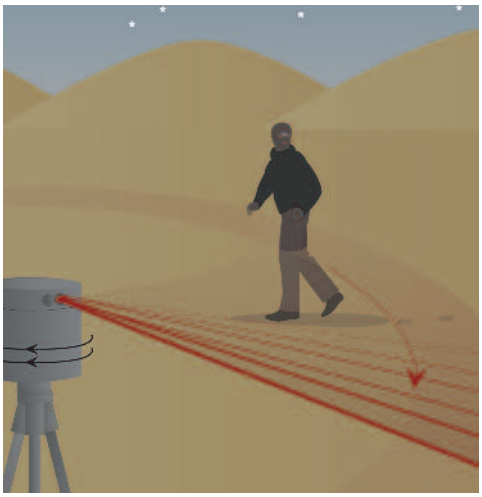
2) The intruder moves forward



3) The intruder continues to move forward



4) The intruder is now at the side of the SLM device.

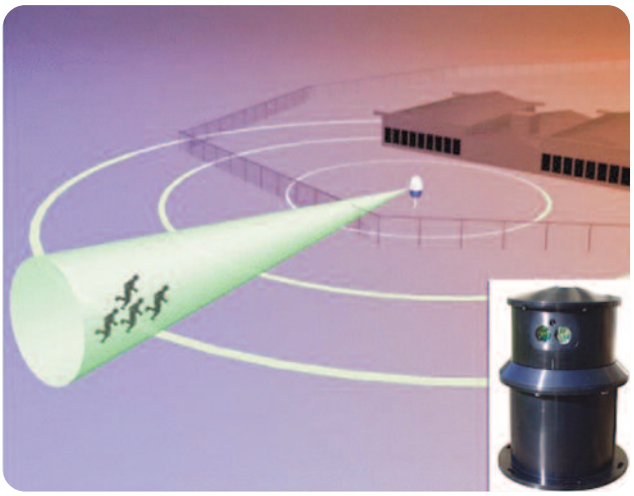


Intruder Detection

The scanner detects the head of the person in the photograph. Compared with the size of the room, this is a small object and so is only represented by a few data points on the plots. These plots do not show all of the data available due to scaling of the image but are measurements made by the scanner in a single rotation. From this data, the position of the person can be identified as they move. Behind the person there is a loss of data where the head has shadowed the object background. In applications where this is critical, multiple scanners can be combined to work together from different locations to eliminate shadow effects.

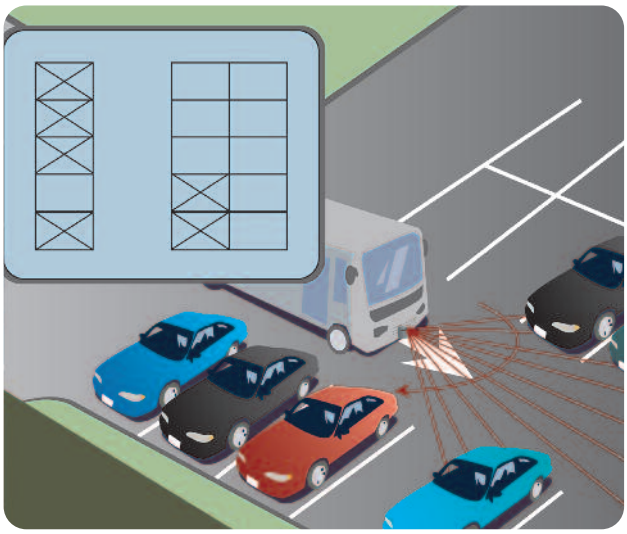
Using an original scan of the room when empty, it is possible for a simple software application to show the positions of the person as a point on the profile. If these stay on the screen, it is possible to track the path taken by the person moving around the room.

Moving the scanner through a scene allows a 3D point cloud to be generated.

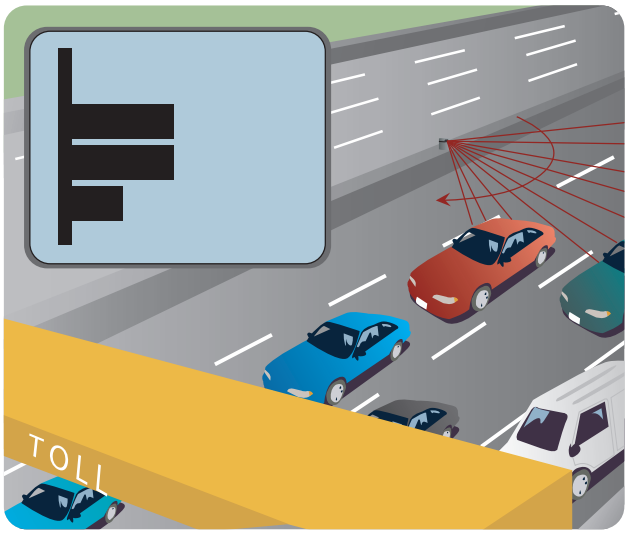


Scanners can detect movement around fences or protected areas to give the pan and tilt co-ordinates to camera security systems.

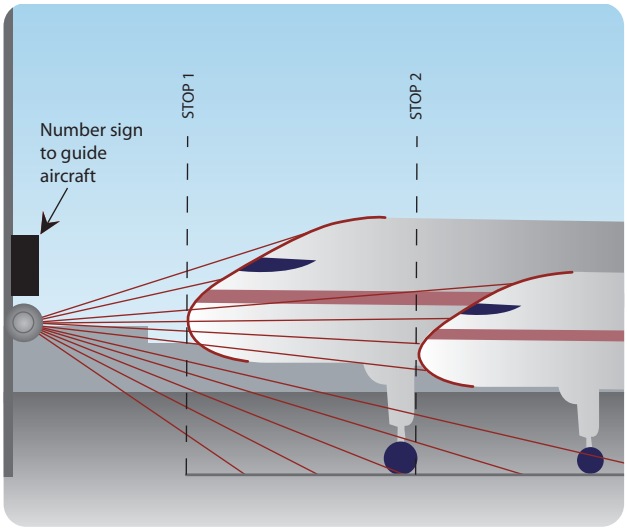
SLM mounted to protect the roof and walls of a building. If any objects such as body parts portrude from a window in these scanned areas their co-ordinates will be determined.



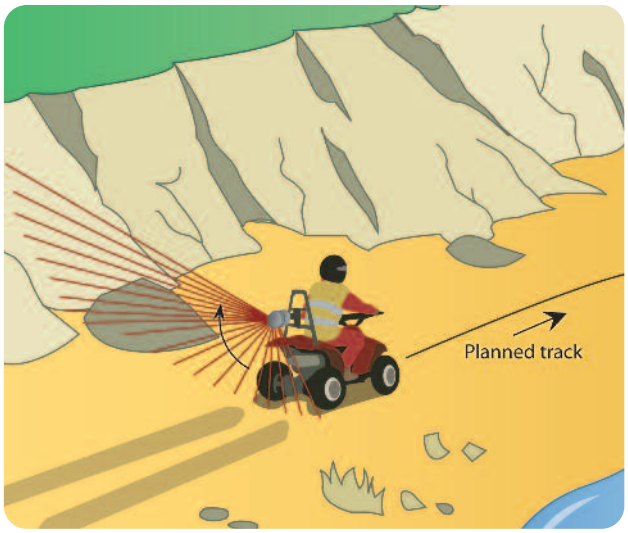
Car park spaces



Toll traffic queue



Airport loading



Cliff erosion

MDL's Strategic Business Units

MDL's products are managed within two divisions.

Laser Modules

The design, manufacture, service and support of reflectorless, eye-safe (pulsed time of flight) laser modules to end users, OEM's and system developers. Custom design to further integrate with other equipment and to provide unique solutions is part of our role. Product brands include ILM, FLM and SLM.

Applications/market areas include: Aviation, Traffic, Security, Industrial Process Control, Collision Avoidance and Ballistics.

SENSORS DIVISION

Laser Systems

The design, manufacture, service and support of integrated 2D and 3D laser surveying and scanning systems. Product brands include: **Quarryman**®, **C-ALS**® (Cavity Auto scanner Laser System) and **Void Scanner**.

Applications/market areas include: Mining, Mapping, Military, Construction and Engineering.

SYSTEMS DIVISION

Dynamic Systems

The design, manufacture, service and support of mobile (on the move) reflectorless 2D and 3D scanning systems used in oil related marine positioning and collision avoidance markets.

New developments have recently extended MDL's capabilities to dynamic land/terrain scanning. Product brand names include: **Fanbeam**® and **DynaScan**.

CLASS 1 LASER PRODUCT

CLASS 2 LASER PRODUCT

Agent:

Measurement Devices Ltd (MDL)

UK Sales Office
tel: +44 1904 791139 • fax: +44 1904 791532
email: sales@mdl.co.uk
web: www.mdl.co.uk

UK Service Office
tel: +44 1224 246700 • fax: +44 1224 824987
email: service@mdl.co.uk
web: www.mdl.co.uk

USA Sales & Service Office
tel: +1 281 646 0050 • fax: +1 281 646 9565
email: info@mdl-laser.com
web: www.mdl-laser.com

MDL
Laser Systems

This brochure contains both class 1 and class 2 laser products. Information contained is believed to be accurate. However, no responsibility is assumed for its use. Technical information is subject to change without notice.

9001/2000 Certified

Laser Modules Rev_06 _04_01_12