

# **PRODUCT OVERVIEW**

## **MEASUREMENT AND PROJECTION**



**STATIC AND DYNAMIC LASER SYSTEMS FOR ALIGNMENT,  
POSITIONING AND MEASURING IN INDUSTRY AND CRAFTS**



## ALIGNMENT USING LAP LASERS AND PROJECTORS



### LINES, CROSSES, POINTS

Linelasers are used in industry and crafts for alignment of workpieces or machines. They are used instead of rulers, set-squares, limit stops or similar equipment. Most of the times lasers help at places you can't use mechanical guiding. Or at places where you need both hands for work.

#### Application

- Positioning of an object
- Alignment of one or several objects
- Display of cutting lines or bending edges
- Display of working point for drilling or cutting
- Verification of shape
- Reference line for camera or light section systems



### MOVABLE LINES

Besides static guidelights LAP also offers systems with movable and fixed line laser modules.

#### Application

- Positioning at variable coordinates
- Alignment controlled by PLC
- Production of changing geometries

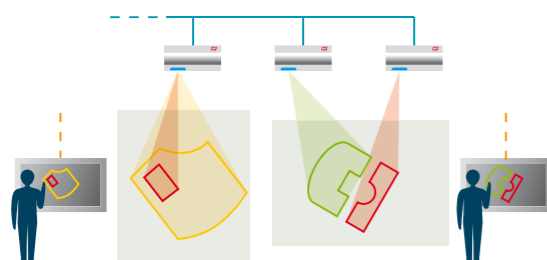


### OUTLINES, TEMPLATES, PATTERNS

Laser projectors display precise outlines, templates, patterns or other shapes on virtually all surfaces by projecting laser lines. Measurement equipment or physical templates are substituted by a 1:1 outline, displayed by a bright laser line.

#### Application

- Production of carbon fiber aircraft parts
- Production of GRP parts for ships
- Woodworking on machining centres
- Cutting and milling of stone tabletops or window sills
- Equipping of PCBs
- Assembly of prefabricated constructions
- Manufacturing of wire harness
- Painting and coating



## MEASUREMENT USING LAP LASER SENSORS



### DISTANCE, POSITION, THICKNESS, WIDTH, HEIGHT, LENGTH, STRAIGHTNESS, FLATNESS

Laser triangulation sensors measure the distance to an object without touching it. This includes dynamically changing distances like deflection, sag, excentricity and the like. By comparison to a reference or by using two sensors, you may measure thickness, width, height or length. With three or more sensors in a line you may detect straightness or flatness. If you move the sensors or the object, you receive complete cross or length profiles. Scanning triangulation sensors offer a local line profile of a surface.

#### Applications for triangulation sensors

- Using one sensor: Distance, displacement, deflection, sag, excentricity ...
- Using one sensor and reference: thickness, width, height, length ...
- Using two sensors: thickness, width, height, length ...
- Using several sensors and/or moving the object: straightness, flatness, cross profile, length profile, combined dimensions ...



### DIAMETER, OVALITY, GAP, WIDTH

Laser scan micrometers detect the shadowing of an object in the measuring field. One sensor consists of one emitter and one receiver in separate housings. The object to be measured must be in between. If there are several objects, their edges and the space in between may be detected. This method prefers round objects, as objects with parallel faces, like cubes, change their shadow size with the slightest change of their angle in relation to the measuring field.

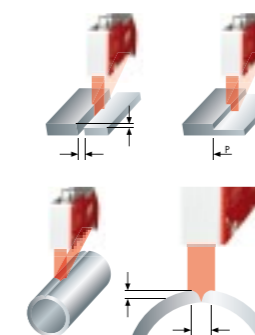
#### Applications for laser micrometer

- Measuring the position of objects reaching into the measuring field ...
- Measuring diameter and position of objects completely within the measuring field ...
- Measuring distance, gap, position and diameter of several objects in the measuring field ...
- Using 2 or more sensors: measuring ovality, large diameters, round profiles ...



### CURVATURE, PROFILE, CONTOUR, FLUTE

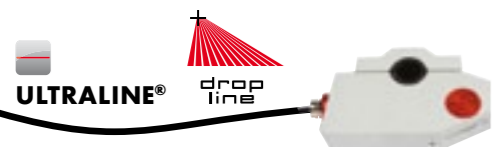
Light section sensors are mainly used to capture contours. Depending on constellation they can determine diameter, surface profile and even detect surface imperfections.



#### Applications for light section sensors

- Using one sensor: measuring steps, gaps, angles, curves, surface profiles ...
- Using several sensors: complete outline, diameter and ovality, surface contour
- Special use: target/actual comparison, e.g. after PCB equipping

## STATIC PROJECTION SPOT, CROSSHAIRS AND LINE LASER



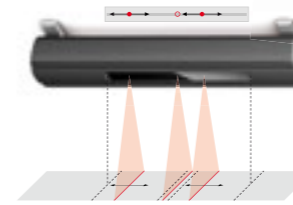
Laser power	1 ... 30 mW
Line length	Line: 1 ... 20 m, Crosshairs: 60/90 cm
Power supply	4 ... 6 V DC
Enclosure rating	IP 42
Highlights	Focusable, small, surge protected, reverse polarity protected
Laser power	1 ... 30 mW
Line length	Line: 1 ... 20 m, Crosshairs: 60/90 cm
Power supply	12 ... 30 V DC, 15 ... 20 V AC
Enclosure rating	IP 67
Highlights	Extremely robust, focusable, surge protected, reverse polarity protected
Laser power	1 ... 30 mW
Line length	1 ... 20 m
Power supply	12 ... 30 V DC, 15 ... 20 V AC
Enclosure rating	IP 67
Highlights	Extremely robust, surge protected, reverse polarity protected
Laser power	10,15 oder 20 mW
Line length	Line: 10 ... >30 m
Power supply	100 ... 240 V AC
Enclosure rating	IP 54
Highlights	Integrated cooling, focusable, adjustable line width and brightness distribution along laser line
Laser power	1 ... 30 mW
Line length	1 ... 18 m
Power supply	100 ... 240 V AC
Enclosure rating	IP 54
Highlights	Standard diameter 40 mm
Laser power	5 ... 30 mW
Line length	3 ... 12 m
Power supply	4 ... 6 V DC
Enclosure rating	IP 42
Highlights	Special optics for low mounting position
Laser power	5 ... 30 mW
Line length	3 ... 12 m
Power supply	24 V DC oder 230 V AC
Enclosure rating	IP 54
Highlights	Patented optics for low mounting position

## DYNAMIC PROJECTION SERVOLASER AND LASER PROJECTORS

### MOVABLE LINES WITH SERVOLASER

LAP SERVOLASER is a flexible laser positioning system with movable and fixed line laser modules. It can be connected to PCs or PLCs. The movable modules move to positions defined by the control system. Possible configurations:

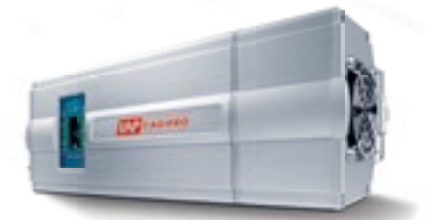
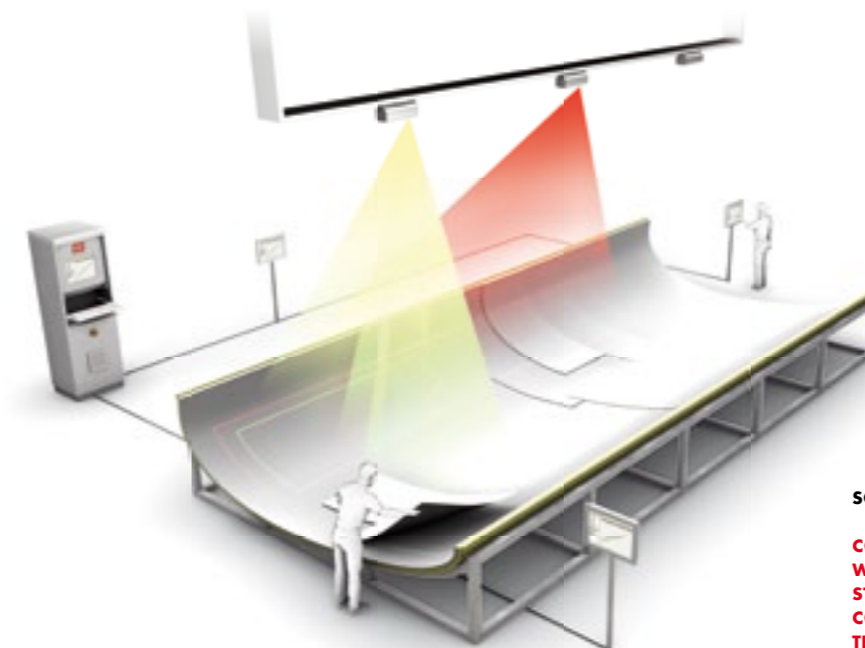
- Two parallel lines moving symmetrically, fixed center line optional
- Two parallel lines moving asymmetrically, fixed center line optional
- Two parallel lines, both movable along the complete movement range



Laser power	1 ... 30 mW
Line length	ca. 1.6 m in 1 m distance
Enclosure rating	IP 54
Highlights	Flexible configuration, high precision, automated laser movement, complete system in one housing

### OUTLINES, TEMPLATES, SHAPES

CAD PRO is a laser system for projection of polylines or outlines onto working surfaces, work pieces or moulds. Laser lines are generated based upon CAD data. The projected shapes are true to scale. Laser outlines replace mechanical templates, rulers or the intricate use of measuring aids.



Laser power	from 5 mW
Accuracy*	± 0,1 mm/m**
Repeatability	± 0,0025 mm/m**
Line width	0.5 mm FWHM
Enclosure rating	IP 54
Highlights	Laser projection in red, green and yellow

\*within ± 30° projection area, beam impact perpendicular to surface, optimal focussing and calibration, at least 30 minutes warmup-time

\*\*mm per m distance projector to surface

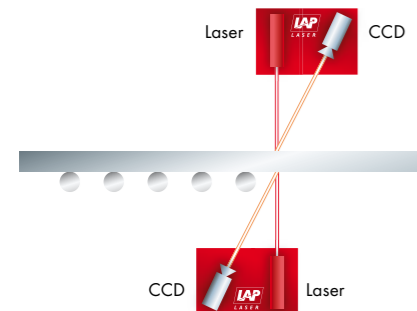
#### SOLUTIONS FOR INDUSTRIES:

**COMPOSITE PRO** - FOR CARBON FIBRE AND COMPOSITES  
**WOOD PRO** - FOR WOODWORKING  
**STONE PRO** - FOR STONE FABRICATORS  
**CONCRETE PRO** - FOR PREFABRICATED CONCRETE PARTS  
**TEMPLATE PRO** - FOR ASSEMBLY, NESTING, KITTING, PAINTJOBS ...

# DIMENSIONAL MEASUREMENT LASER SENSORS AND SYSTEMS



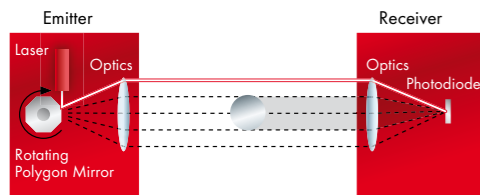
**SENSORS AND SYSTEMS:**  
LAP DOESN'T ONLY SUPPLY SENSORS, BUT ALSO SOLUTIONS. WE DEVELOP YOUR INDIVIDUAL MEASUREMENT SYSTEM, FROM HARDWARE TO INTERFACING TO YOUR CONTROL SYSTEM.



## LASER TRIANGULATION

Laser triangulation sensors use a fixed or scanning laser spot to determine the distance to an object. Using two or more sensors, you may measure thickness, width, height, length, straightness, flatness and more. On a moving object, you get length or cross profiles.

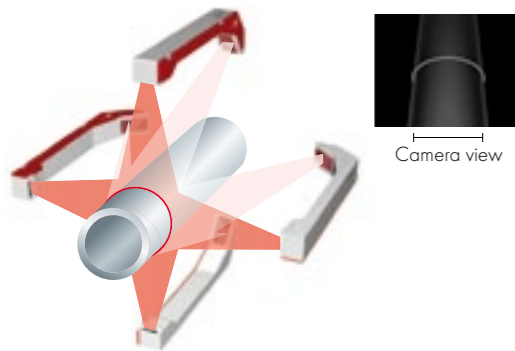
**TRIANGULATIONS SENSORS:**  
ATLAS, POLARIS, ANTARIS, CALIX



## SHADOWING METHOD

Laser scan micrometer work by detecting the shadowing caused by objects in the measuring field between emitter and receiver. These sensors are used for measuring diameters, ovality, gap width or edge position of flat objects to determine width or straightness.

**LASER SCAN MICROMETER:**  
METIS



## LASER LIGHT SECTION

Single light section sensors offer a two-dimensional view of the surface of an object. They measure edges, grooves, angles and curvatures producing a line profile. Using several sensors you may get the complete object outline. If you move the object or the sensors, you receive the complete surface geometry including imperfections.

**LIGHT SECTION SENSORS:**  
OPTARIS M



Measuring ranges	10 ... 100 mm
Measurement uncertainty	from $\pm 2 \mu\text{m}$
Output	4 ... 20 mA, RS 485, Ethernet UDP*, Profibus DP*
Enclosure rating	IP 54
Highlights	Small housing, high precision, fastest measurement (up to 10 kHz)

ATLAS



Measuring ranges	10 ... 400 mm
Measurement uncertainty	from $\pm 1 \mu\text{m}$
Output	4 ... 20 mA, RS 485, Ethernet UDP*, Profibus DP*
Enclosure rating	IP 65
Highlights	High precision, fast measurement (up to 4 kHz), parametrizable

POLARIS



Measuring ranges	customized, 350 ... 4000 mm
Measurement uncertainty	from $\pm 140 \mu\text{m}$
Output	4 ... 20 mA, RS 485, Ethernet UDP*, Profibus DP*
Enclosure rating	IP 65
Highlights	Large measuring ranges and offsets, scanning version available

ANTARIS



Measuring ranges	10 mm, 30 mm
Measurement uncertainty	from $\pm 2.5 \mu\text{m}$
Output	RS 485, Ethernet UDP*, Profibus DP*
Enclosure rating	IP 65
Highlights	Thickness measurement in one housing, highest stability

CALIX



Measuring ranges	45 ... 230 mm
Measurement uncertainty	from $\pm 8 \mu\text{m}$
Output	RS 485, Ethernet UDP*, Profibus DP*
Enclosure rating	IP 65
Highlights	Fast measurement (up to 2 kHz), for diameters from 0.2 to 2000 mm

METIS



Measuring ranges	$6 \times 4 \dots 400 \times 200 \text{ mm (x} \times \text{z)}$
Measurement uncertainty	from $\pm 12 \mu\text{m}$
Output	Ethernet
Features	Temperature sensor, operation hour meter, serial number and sensor data readout
Enclosure rating	IP 64
Highlights	Can be synchronized, versions with protective glass shield and cooling

OPTARIS M



\* via interface

# LAP LASER SYSTEMS HIGHEST QUALITY AND PRECISION

For more than 25 years, LAP has been developing, manufacturing and distributing laser measurement systems, line lasers and laser template projectors for industrial and medical applications. LAP products are high-precision devices **Made in Germany**.

Using LAP laser systems, our customers improve performance and increase the quality of their products as well as the effectiveness of their processes.

As a result of continuous product innovation, LAP has become a world leader in lasers for projection and measurement. LAP products are setting the standards in a wide range of markets from manufacturing to heavy industrial environments and medical applications.

Environmental protection is important to us. We use solar panels, green electricity, roofs planted with grass and rain water. Our production is planned by standards of sustainability.

Quality has always been part of our commitment. We are content if you are. We know your high demands. To meet your requirements, the quality management of LAP is certified by DIN EN ISO 9001:2008 for industrial products and by EN ISO 13485:2007 for medical engineering products.

[www.lap-laser.com/INDUSTRY](http://www.lap-laser.com/INDUSTRY)



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